

# An Institutional Approach to Understanding the Green Paradox of Nuclear Power

By

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*A Thesis Submitted in Fulfilment of the Requirements for the Degree of  
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# Abstract

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This thesis proposes that the range of institutional logics provided by both Friedland and Alford (1991) and Thornton, Ocasio and Lounsbury (2012) has overlooked the inclusion of an environmental societal logic. The concept of an environmental logic is therefore developed and applied in order to understand how a 'green paradox' surrounding nuclear power emerged over the past sixty years of the UK civil nuclear energy programme. The research employs a Critical Realist ontology (Bhaskar 1975) and constructs a qualitative and historical case study of the nuclear power industry via the analysis of newspaper articles and Government policy documents.

The findings show that the green nuclear debate was informed by four 'situated' manifestations of an environmental societal logic which informed the environmental values and expectations of different actor groups engaged in the debate. In particular, the thesis shows how a situated target-based environmental logic emerged within the energy industry as a result of embedded institutional work and eventually informed the arguments promoting green nuclear. These arguments remained in contention with those of the environmental movement who maintained that nuclear power was definitively not environmentally friendly. Additionally, the Critical Realist ontology provides a framework with which to explore levels of meaning and structure and thus offers a means to explain this 'situated' nature of institutional logics.

This thesis contributes to existing institutional theory in three key ways: Firstly it proposes and illustrates the theoretical and analytical utility of an environmental institutional logic. Secondly it develops the concept of a situated logic and, in doing so, builds an improved understanding of the ways in which agency, institutional logics and the institutional structure of industries interconnect. Thirdly it demonstrates and explains how one societal logic may become situated in multiple and possibly contradictory ways depending on the actor groups in which it manifests.

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# Chapter 1: Introduction

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‘Nuclear energy is an inherently dangerous, wasteful and expensive way of generating low carbon electricity, which carries with it enormous environmental costs, such as the generation of waste which we don’t know what to do with...’ [Quote from the Director of Greenpeace in The Times (McCarthy 1989)]

‘Mr President, the evidence is there. The damage is being done. What do we, the International Community, do about it? ...I am thinking of the use of nuclear power which – despite the attitude of so-called greens – is the most environmentally safe form of energy’ (Thatcher 1989 UN General Assembly Speech)

The quotes above illustrate the contesting arguments constituting nuclear power’s ‘green paradox’ – whereby nuclear power is considered vital to protect the planet from Climate Change (CC) and Greenhouse Gasses (GHG), yet its increased usage brings its own environmental dangers. This has meant that advocates for nuclear power proclaim nuclear energy as the planet’s saviour whilst those against its use see it as potentially environmentally catastrophic. It is this paradox which the thesis aims to explain via the application of neo-institutionalism and the development and application of an environmental institutional logic. It is argued that the range of institutional logics offered by both Friedland and Alford (1991) and Thornton et al (2012) overlook the societal level institutional meaning systems which inform how actors interact with their natural environment. The concept of an environmental logic is developed and applied in order to understand how the ‘green paradox’ surrounding nuclear power emerged throughout the sixty years of the UK civil nuclear energy programme. More specifically, with the UK Government moving more and more decisively towards a new nuclear power programme the contestation over nuclear power’s legitimacy seems to rest on an unresolved debate between different understandings of ‘green energy’.

The thesis finds that the green nuclear debate came to be informed by various situated manifestations of a societal environmental logic. These ‘situated logics’ informed the arguments and values of conflicting actor groups who perceived the relationship between society and nature differently and therefore exhibited opposing understandings of the environmental implications of nuclear power. In particular this thesis shows how a situated target-based environmental logic emerged within the energy industry to become increasingly drawn on to legitimate a highly

quantifiable approach to environmentalism. In so doing the thesis provides a narrative detailing how embedded institutional work led to situated logic emergence. Institutional work was explained through the examination of relations between multiple levels of analysis (societal logics, situated manifestations and the actions of specific actor groups and elites) which explained how the emergent situated logic came to reflect the institutional historicities, rationalities, norms and conventions of the energy industry.

## **The Research**

There were two key motivations for this research thesis; the first was the lack of environmental theorising within neo-institutional theory in general. The natural environment is predominantly marginalised by Organisational Theory because its ontological status as an objective reality is assumed. By combining institutional logics theory with sociological literature on the social construction of nature (Purser, Park and Montouri 1995), the possibility arises to develop the concept of an environmental institutional logic which facilitates deeper exploration into organisational approaches to the natural environment. The second key motivation was to understand the recent confusion in the media over whether a new nuclear programme in the UK was environmentally friendly or harmful. During the opening decade of the 2000s the green nuclear debate highlighted opposing institutionalised understandings regarding the relationship between nature and society which in turn affected how actors perceived the environmental legitimacy of new nuclear. It became apparent that these central issues could be explored in a manner that contributed to the development of institutional theory in a number of ways.

Specifically the thesis extends the concept of 'situated logics' to encompass industry level manifestations of societal logics in a way that recognises a dialectical relationship between social structure (institutional logics) and agency. The Critical Realist perspective of the thesis is therefore important because its approach to structure (Leca and Naccache 2006, Delbridge and Edwards 2013) allows for such a view to make ontological sense. That is, Critical Realism's conceptualisation of a structure and agency duality is integral in underpinning the ways in which the properties of institutional levels of analysis and the relationships between them are understood throughout the thesis. Indeed the concept of a 'situated logic' is reliant upon, and indicative of, a Critical Realist perspective. Hence it should be noted that although the application of CR is not intended to be a foremost contribution of the thesis, it is consistently implicit throughout the research because it provides the ontological concepts and language which underpins how the nature of the green

paradox is cast and how it might be explained. With these central elements of the thesis established, a summary of the content of each chapter follows.

## **Thesis Overview**

In Chapter 2 the historical development of neo-institutionalism is outlined. Over the past two decades institutional theory has transformed from a body of literature predominantly interested in organisational homogeneity and assumptions of actor passivity (Meyer and Rowan 1977, and DiMaggio and Powell 1983) to one which has a substantial area of theorisation devoted to examining embedded agency and institutional entrepreneurship (DiMaggio 1988, 1991). The chapter reviews institutionalist approaches to agency and how they relate to, and are embedded within, institutional social structures such as logics. First, the institutional entrepreneur literature is split into explanations for agency which are either 'structural' or 'processual'. The former provide insights into how structural conditions such as embeddedness (Leca, Battilana and Boxenbaum 2008, Greenwood and Suddaby 2006), social position (Battilana 2006, Phillips, Lawrence and Hardy 2004), elite power (Reed 2012), and institutional logic contradiction (Goodrick and Reay 2011, Seo and Creed 2002) produce space for agents to recognise opportunities for institutional change. The latter is interested in the agentic processes through which actors 'work' on these opportunities and primarily reviews the discursive literature on rhetoric (Suchman 1995, Brown, Ainsworth and Grant 2012, Riaz, Buchanan and Bapuli 2011), legitimisation strategies (Vaara, Tienari and Laurila 2006, Vaara and Tienari 2002, 2008, Kuronen, Tienari and Vaara 2005), theorisation (Suddaby and Greenwood 2005) and the relationship between legitimacy and rationality (Townley 2008, Kalberg 1980). The chapter then places the processual and structural facets of institutional entrepreneurship within a wider understanding of agency. The theories of translation (Zilber 2002, 2006), inhabited institutions (Binder 2007, Hallet and Ventresca 2006, Delbridge and Edwards 2013) and institutional work (Lawrence, Suddaby and Leca 2011, Zietsma and Lawrence 2010, Lawrence and Suddaby 2006) are summarised and evaluated in terms of how they connect agency and structure.

The review concludes that theories of agency require better theoretical linkages with broader societal level institutional logics (Kaghan and Lounsbury 2011). Recent literature on institutional complexity (Greenwood, Diaz, Li and Lorente 2010, Greenwood, Raynard, Kodeih, Micelotta and Lounsbury 2011) has begun to consider these links by showing how multiple institutional logics interact in ways which affect how actors at more micro levels of analysis interpret and perceive the

legitimacy of certain actions. Alternative streams of institutional research have tried to understand how actors may 'reach outside' their own organisational field and bring in new institutional logics (from social movements for example) to create institutional change (Sine and Lee 2009, Rao, Monin and Durand 2005). Nevertheless there is an absence of sufficient theorising within neo-institutionalism which considers the interconnectedness of institutional levels of analysis and the role of embedded actors in constructing, maintaining and changing such connections. To address this theoretical shortcoming the concept of a 'situated logic' is proposed. Briefly, situated logics develop through the localised manifestation of societal logics. The form in which they become manifest is an outcome of the meaningful conditions of the field and how they are experienced by groups of actors with their own interests who reinforce and enact them. The concept of a situated logic is applied throughout the research project and is elaborated when necessary. Two research questions are provided at the end of the chapter which speak to the issues outlined above:

### **Research Question 1**

- What is the relationship between institutional levels of analysis?
  - How does the concept of 'situated logics' provide insights into the interactions between agents, fields and societal logics?
  - How does the concept of 'situated logics' help explain the green paradox of nuclear power?

### **Research Question 2**

- What role do actors play in the development of 'situated logics'?
  - How can an institutional work approach be utilised to fully understand the role of agency in the construction and/or reinforcement of situated logics?
  - To what extent can processes of institutional entrepreneurship help elucidate the manifestation, elaboration and institutionalisation of situated logics?
  - How do the actions of actors contribute to the creation of a green paradox?

Chapter 3 develops and justifies the inclusion of an environmental institutional logic within Friedland and Alford's (1991) inter-institutional system and in later revised versions (Thornton 2004, Thornton et al 2012). In particular, the chapter proposes that anthropological paradigms dating back to Enlightenment times set in motion ways of analysing the human-nature relationship which separated human minds from a '...primordial, autonomous and mechanistic' (Goldman and Schurman 2000 p.564) natural environment. Organisational theory has typically continued this paradigmatic tradition by treating the natural environment as a stable and standardised resource

(Shrivastava 1995, Jennings and Zandbergen 1995). However a body of sociological literature has begun to understand how the natural environment might be partially socially constructed (Purser et al 1995, Castree 2001). As such the aim of the chapter is to unpack the socially constructed character of the natural environment in order to argue that this construction is informed by cultural and symbolic 'rules' which reside within the institutional environment. These rules are symptomatic of a higher order environmental institutional logic which informs actors and organisations on what the natural environment represents and thus what constitutes environmentally friendly behaviour. The concept of an environmental institutional logic is applied throughout the research project thereafter. Its ultimate utility is evaluated in the final discussion chapter. A final research question is provided at the end of the chapter:

### **Research Question 3**

- How does the concept of an environmental institutional logic provide utility within an institutional research agenda?
  - How does the concept of an environmental institutional logic help explain the green paradox of nuclear power?

Chapter 4 outlines the methods used to answer the three research questions and places the research within a Critical Realist ontological framework (Bhaskar 1975). Firstly the characteristics of Critical Realism (CR) are discussed and applied to institutional theory in line with the work of Leca and Naccache (2006). It is argued that the analytical dualism of CR, its stratified ontology and its focus on context and history fit well with the research agenda of this thesis. That is, the examination of the emergence of a certain configuration of societal and situated institutional logics over time and the role of actors in its configuration. The application of CR is then achieved through the utilisation of Houston's (2010) steps of Retroduction. The research questions and qualitative research design decisions are then discussed in relation to the Retroductive method. Subsequently the chapter outlines, justifies and evaluates the methods applied in the research. A historical case study was constructed from the analysis of texts from three newspapers (The Guardian, The Times and the Daily Mirror) and a mixture of Government publications. The articles taken from each data source related to debates over the legitimacy of nuclear power, with particular attention paid to articles which presented arguments regarding the environmental credentials of nuclear energy. The data covered the period from the inception of the UK civil nuclear programme in the mid-1950s to the confirmation of a new nuclear programme in 2010. Lastly the nature of analysis and computer aided coding is explained.

The historical case study is presented in a chronological manner and begins in Chapter 5. This chapter presents the initial two decades (1950-1970) of the civil nuclear power programme and begins by introducing the industry and its place within the wider energy context. During this period the public debates over nuclear power's legitimacy were informed by two dominant embedded situated logics manifest within the industry: the national-market and state-resource logics. The chapter details how these situated logics both conflicted and coexisted throughout the period and how they were often drawn on in defence of nuclear power by both the Media and the Government. After presenting the institutional structure of the energy industry, the chapter defines the way in which the environment was understood during the period. The distinctive character of this period is the way in which actors took a broad amenity based approach to the environment whereby it was considered as a picturesque 'facility'. Hence most concerns focused on the visual impact of nuclear stations. The lack of environmental anxiety surrounding nuclear power was enforced by normalising and distancing discursive strategies which proposed that nuclear energy was both ordinary and a peaceful alternative to more devastating nuclear weapons, respectively.

Chapter 6 focuses on the impact of the environmental social movement in the 1970s on the public legitimacy of nuclear power. The environmental movement reduced nuclear naivety and introduced the public to the unique properties of nuclear power stations and their potential to worsen arms proliferation. The movement also inculcated a new way of understanding the nature and society relationship which focused on environmental ethics and the protection of the environment for its own sake. The chapter focuses on two interlinked yet distinct central public debates which emerged: radioactive-waste and proliferation. The former is in regards to the increasing public knowledge of the processes involved in nuclear generation and the lack of solutions for their storage or disposal. The latter is in regards to the specific properties of that waste (and nuclear fuel) which is used in the development of nuclear weapons. This latter point was especially salient given the escalation of Cold War concerns during the period. The impact of these debates is discussed in relation to a highly influential report by the Royal Commission on Environmental Pollution (1976) – also known as the Flowers Report – which warned the public of an impending 'plutonium economy'. The report suggested that no more nuclear builds should begin unless there was no alternative option given the very real threat of the UK enduring a 'plutonium economy' and contributing to continued global nuclear weapons proliferation.

The Labour Government published its official response in 1977 which stated that the report essentially endorsed the continuation of nuclear power. The chapter argues that the energy industry did not regard it as their duty to consider the environmental impact of energy options.

Instead the industry continued to legitimate nuclear power on the basis of the national-market and state-resource situated logics. The latter was particularly salient given the national supply vulnerabilities exposed by the Miners strikes (1972, 1974) and the OPEC oil crisis (1973). The pro-nuclear Labour Government and its supportive press claimed that environmentalists were utopian idealists whose rejection of nuclear power threatened national energy security given the lack of realistic alternatives. The chapter finishes in 1979 with the election of Margaret Thatcher's pro-nuclear Conservative party which pledged to expand the UK's nuclear assets.

Chapter 7 focuses on the period between 1980 and 1990. This chapter covers the struggle between the pro-nuclear Conservatives and escalating nuclear anxiety throughout the public domain. Whilst the Conservatives pushed to expand the nuclear power programme the Cold War intensified and a number of high profile nuclear accidents severely impacted public and media support. Regardless of these concerns the Government legitimated nuclear on the previously established grounds of supply security and future market potential. However, Climate Change was officially ratified by the UN in 1988 and the Government were presented with an opportunity to propose that non-fossil-fuel nuclear power was 'green'. It is at this point in time that the green paradox of nuclear power began to emerge. This opportunity marked the beginning of an emergent target-based environmental logic within the energy industry. Thus this chapter details how a version of environmentalism began to influence the decision making criteria and assessments of legitimacy during energy choice comparisons in the very late years of the 1980s. The chapter ends by detailing the failed privatisation of the nuclear industry. Thatcher's market liberalisation agenda for the energy sector culminated in the attempted sale of the civil nuclear reactors in 1989. However, by the end of that year it became clear to potential investors that the true costs of nuclear power, including the costs of decommissioning and waste disposal were unknown. Consequently the Government called for a five year moratorium on all new builds (apart from one in mid construction) and many saw it as the end of nuclear power in the UK.

Chapter 8 considers the eventual reinvigoration of the nuclear industry in the late 2000s. Throughout the 1990s carbon targets became internationally binding (Kyoto Protocol 1997) and the Government was under pressure to incentivise the now privately owned energy industries (bar nuclear) to work towards lowering their carbon emissions. In particular the Conservative Government (1990-1997) and the Labour Government (1997-2010) hoped that a large renewables industry would flourish in the UK and advance enough to significantly contribute to the UK's low carbon energy mix. Nuclear power continued to appear financially unappealing even after its privatisation in 1996. Nevertheless, by 2006 it was clear that renewables could not be constructed



on the scale necessary to provide enough low carbon electricity for the UK to meet its emissions targets. In 2006 the Labour Government changed its energy strategy against nuclear power. Given the supply concerns with oil, gas and coal as well as the prospect of net importation, nuclear power was now considered as integral within the energy mix.

The chapter then details how key members of the energy industry began to legitimate nuclear power on environmental grounds by drawing from the situated target-based environmental logic. Claims by environmental social movement organisations that nuclear power was not environmentally permissible were met with disputations that they remained irrationally idealist in their expectations of 'green energy'. Discursive legitimisation strategies in support of nuclear power argued that renewables were not able to provide enough clean energy and would thus need to be supplemented by fossil-fuels – meaning that nuclear power would be comparatively cleaner and without its adoption Climate Change would be inevitable. Environmental social movement organisations rejected that carbon mitigation made nuclear power environmentally friendly and instead maintained that it should be abandoned on ecological grounds. The debate over nuclear power's environmental credentials culminated in nuclear power's 'green paradox' and was played out most evidently in the UK Press. The chapter concludes by describing how the new nuclear programme was set in motion by the Labour Government who hoped to meet the deadlines of the Kyoto Protocol. A National Policy Statement in 2009 confirmed their pro-nuclear agenda by providing pre-assessments of nuclear sites appropriate for rapid nuclear development. On each of the site reviews the negative environmental impact of new builds was justified due to Imperative Reasons of Overriding Public Interest (IROPI); in other words, the environmental impact of increasing carbon levels was considered more important than the local environmental impact of nuclear power stations. Moreover, the instigation of a carbon market for emissions trading in 2010 meant that nuclear power was able to become an economically competitive option against more traditional forms of power generation, further escalating interest in nuclear.

In Chapter 9 the key findings are summarised. These are located within the existing literature and four key areas of theoretical discussion and contribution are proposed. Firstly a narrative is provided which illustrates how and why the situated target-based environmental logic emerged within the energy industry and speaks to the first and second research questions. It is shown that a multi-level conceptualisation of institutional work helps to explain how societal logics come to, over time, manifest within an industry. Literature exploring elite power and command situations (Reed 2012) is also drawn on to show how a group of key industry actors who championed nuclear energy were able to provoke institutional change. This first discussion is specifically related to the

manifestation of a target-based environmental logic within the energy industry from 1988 onwards. Secondly, the discussion understands the 'green paradox of nuclear power' as an outcome of multiple situated environmental logics which relate to a single environmental societal logic. To delineate why these situated environmental logics differ from one another the discussion draws on the dimensions employed by Biggart and Delbridge (2004) to identify various systems of exchange. These dimensions are 'social relations between actors' and their 'rationality orientation'. Both these dimensions affected the emergent properties of the various situated environmental logics because they influenced how specific actor groups developed perceptions of nuclear power. By differentiating actors via these variables it is possible to demarcate four quite different interpretations of a societal environmental logic. The subsequent taxonomy of environmental situated logics theoretically contributes to more recent considerations of institutional complexity and logic interaction.

Thirdly, the valorisation of environmentalism is discussed as a means to further elucidate the nature of the situated target-based environmental logic. This discussion speaks to the body of literature on logic coexistence as it reflects an interesting combination of neo-liberal market logics and the target-based environmental logic. Instead of being in conflict, the values and norms of both were appeased through economic modelling and a carbon pricing system. Finally, the chapter defends the utility of an environmental societal institutional logic and argues that an appreciation of such a logic may contribute to future research which hopes to understand the institutionalised understandings underpinning and legitimating organisations' environmental actions. The chapter ends with an evaluation of the thesis's implications and a discussion of the limitations and future avenues for this research.

# Chapter 2: An Institutional Approach

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## Introducing Institutional Theory

Neo-institutionalism emerged in the 1970s as a perspective which was interested in how organisational populations formed and became homogenised. Specifically neo-institutionalists pointed to the role of normative and cognitive processes in the development of isomorphic relationships between organisations (DiMaggio and Powell 1983). Scholars pondered the resilience of institutional prescriptions in the form of taken-for-granted institutional templates which could become normatively embedded within organisational fields and adopted as a means to reduce ambiguity (Greenwood, Suddaby and Hinings 2002) and enhance legitimacy (DiMaggio and Powell 1983). Hence organisations became conceptualised as unwitting recipients of appropriate organising structures, facilitated by the notion that such templates dulled organisational members to the possibility of institutional change. Hence, 'Early work on organizational fields...has led to a preponderance of overly structural and contingent accounts...' (Delbridge and Edwards 2008 p.192) which demonstrate ignorance towards the role of agency and its effect on the interaction between various normative forces within organisational fields. Furthermore the direction of the aforementioned literature raised the paradoxical question of how actors could ever envisage changing highly institutionalized contexts (Holm 1995, Dorado 2005) and under what circumstances this would be likely to occur (Greenwood and Suddaby 2006).

To overcome these queries recent institutional theory has undergone a transformation from examining institutional change from the perspective of convergence and structural determinism, towards an investigation into embedded yet endogenous instances of change. According to Seo and Creed (2002) there may be a requirement for authors to relax the '...assumption that all means and ends available to agents are institutionally conditioned' (p.230) in order to provide space for the consideration of autonomy and reflexive agency. Subsequently an influx of literature around institutional entrepreneurship has materialized which attempts to provoke an interest in the role of human-praxis (Seo and Creed 2002) and social position (Battilana 2006). New ideas around Institutional Work (Lawrence and Suddaby 2006) similarly have recognized the impact of both unconscious and intentional agentic behaviour on instances of change (Koene 2006) and the importance of micro-level dynamics in regards to how 'contextual pressures are interpreted and acted upon by organizational actors' (Greenwood and Hinings 1996 p.1024). Ultimately, recent

research has come to reflect the notion that institutions do not only constrain human agency, but are often the product of such agency (Battilana 2006).

This chapter first provides an overview of early institutionalism before reviewing the large body of institutional literature which has attempted to overcome the issue of embedded agency and, in doing so, has provided some insight into the relationship between levels of institutional analysis. In particular the chapter focuses on the movement away from structural determinism and towards an understanding of how institutional entrepreneurship may be conceptualised – both in terms of the contextual conditions necessary as well as what is required from the entrepreneur. In order to best understand the occurrence of the green paradox of nuclear power, and the logics and discourses reinforcing it, this literature review pays heavy attention to how the roles of legitimisation, theorisation and rationality have been utilised within institutional change literature. Additionally a review of approaches which theorise the relationship between agency and institutions, and it is concluded that the institutional work perspective (Lawrence et al 2011) provides the best means by which to understand the different ways in which actors ‘work on’ institutionalised meanings. Finally the review finds issue with the ways in which the relationship between levels of analysis have been dealt with by institutionalists and proposes the concept of a ‘situated logic’ to account for the ways in which societal logics manifest, through processes of institutional work, within communities of actors such as industries.

## **Institutional Beginnings**

Between the 1970s and early 1980s a body of literature began to outline the conceptual foundations of neo-institutional theory. It postulated that organisations were not only influenced by their technical striving for efficiency, but were also subject to cultural and symbolic pressures to act in certain ways. Such pressures were in the form of institutions, defined by Greenwood, Suddaby and Hinings (2002) as ‘...more or less taken for granted repetitive social behaviour that is underpinned by normative systems and cognitive understandings that give meaning to social exchange and thus enable self-reproducing social order’ (p.6f0). Early authors such as Zucker (1977) and Meyer and Rowan (1977) drew on the social constructivist foundations of Berger and Luckmann (1966) to explore the creation and implications of these institutions. Berger and Luckmann (1966) proposed that taken-for-granted myths about what it was to be ‘rational’ were socially constructed. Myths provided objectivity through continual reciprocal typification from which they could ultimately become external rules and ‘mythical truths’ and act as powerful institutional rules: ‘...rationalised and impersonal prescriptions that identify various social purposes as technical ones and specify in a

rule like way the appropriate means to pursue these technical purposes' (Meyer and Rowan 1977 p.343).

Institutional rules were understood to constitute an organisation's 'institutional context' (Meyer and Rowan 1977) which defined what it was to act rationally and appear legitimate. Instead of focusing on how organisations strive to fit a technical and competitive environment, theorists came to recognise how an institutional environment prompted behaviour within highly institutionalised organisational fields. Institutional theorists delineated a clear dichotomy between 'hard' regulatory and material pressures, and 'soft' social institutional pressures; technical vs. institutional (Meyer and Rowan 1977), regulatory vs. sociocultural or the material-resource environment vs. the institutional environment (Scott 2000) respectively. Early neo-institutionalists noted that it was the institutional environment which compelled organisations to act similarly irrespective of technical and economical requirements (Meyer and Rowan 1977). The effect of the institutional environment was to infuse certain practices with '...value beyond the technical requirements of the task at hand' (Selznick 1957 p.17) so that they would appear legitimate irrespective of practical necessity. This legitimacy was important because organisations did not merely survive by making calculated decisions based on material and resource threats, but endured by '...appearing to be rational' (Scott 1983 p.160) by avoiding illegitimate categories of action (Zuckerman 1999).

The institutional context required a domain in which to exert its force, and thus the concept of an 'organisational field' was born (Meyer and Rowan 1977). An organisational field denoted '...a recognised area of institutional life' (DiMaggio and Powell 1991 p.64). Lounsbury and Pollack (2001) detailed more specially the kind of material interactions that are contained and are constitutive of an organisational field: '...materially fields encompass a broad organizational infrastructure that contains horizontal interactions having to do with networks and competition and vertical authority relations that involve actors such as Governmental agencies and trade associations' (p.321). Scott (1994) further suggested that units within a field share more than just business interactions: 'The notion of a field connotes the existence of a community of organisations that partakes of a common meaning system and whose participants interact more frequently and fatefully with one another than with those outside of the field' (pp.207-208). As organisational fields emerge their developing institutional rules begin to create similarity: '...once disparate organizations in the same line of business are structured into an actual field...powerful forces emerge that lead them to become more similar to one another' (DiMaggio and Powell 1991 p65). Meyer and Rowan (1977) had essentially suggested an alternative Weberian source of formal structure. The legitimating power of rationalised formal structures is generated by norms and conventions denoted by rationalised

myths pertaining to structures and practices within organisational fields. The institutions which emerge are imbued with rationalising value and become increasingly institutionalised as coercive, normative and mimetic isomorphic tendencies and drive homogeneity between field level participants (DiMaggio and Powell 1991).

DiMaggio and Powell (1983) proposed two types of isomorphism: competitive and institutional. The former assumes that organisations converge on a form due to their similar competitive and resource environments. However, this should be supplemented by the latter which considers that organisations also compete for political power and legitimacy and are thus compelled to converge on a form which appears legitimate. The authors provided a triplet of institutional isomorphic pressures which may cause this convergence; coercive isomorphism stems from political influence which may be conveyed through regulations and accreditation; normative isomorphism is due to professional norms and values which lead to accepted practice; and mimetic isomorphism is associated with mimicry between organisations as a response to uncertainty (DiMaggio and Powell 1983). Tolbert and Zucker (1983) further extended and empirically tested DiMaggio and Powell's (1983) argument to find that as innovations spread a threshold is reached beyond which adoption provides legitimacy rather than improved performance. Their extension was able to illustrate that early adopters of civil service reform did so for highly technical reasons, whereas later adoption could be explained as an institutional phenomenon based on the quest for legitimacy (also see Zajac and Westphal 2004, and Sherer and Lee 2002). Overall, Tolbert and Zucker (1983) recognised that: 'As the process of adoption continues, the characteristics of cities become increasingly less relevant to the adoption process' (p.34).

## **The Paradox of Embeddedness**

The neo-institutional theory of the early theorists envisions actors as deeply embedded within the institutional environment to a point where they passively partake in producing field level homogeneity. Unfortunately, given the assumed actor embeddedness there are problems with conceiving of any institutional action which may lead to radical and formula breaking organisational change. These theorists approached organisations as '...captives of the institutional environment in which they exist' (Tolbert and Zucker 1983 p.8). Indeed, Zucker (1977) rigorously applied Berger and Luckmann's (1966) social constructivist thesis arguing that practices are only institutionalised when they are objectivated and exterior, thus proposing that '...institutionalized acts require no monitoring or enforcement, but persist solely through transmission from one generation to another' (p.8). Such embeddedness has led to the question of how actors can ever create institutional change

when their taken-for-granted expectations of what is deemed rational and appropriate are continually compelling them to maintain the status-quo. Battilana (2006) notes that this ‘... paradox of embedded agency stems from the fact that neo-institutional theorists have barely tackled the issue of human agency. Theorists have tended to neglect the individual level of analysis, concentrating instead on the organizational and societal levels of analysis’ (p.655).

Instead, scholars have applied a number of theoretical mechanisms in an attempt to account for institutional change processes which appear to go against field level norms, values and culturally socialised practices. For example, Oliver (1991) provided an alternative approach by combining resource dependency theory with institutional theory to suggest that individuals have strategic options when faced with a pressure to become isomorphic with their environment. Oliver attempts to escape the overly deterministic view of the institutional context by arguing that ‘...institutional theory can accommodate interest-seeking, active organisational behaviour when organisations responses to institutional pressures and expectations are not assumed to be invariably passive and conforming across all institutional conditions’ (1991 p.146). By applying resource dependency theory, she suggests that active resistance can take place, depending on the nature and context of the institutional pressures. However, it may be argued that this model does not overcome the paradox of embedded agency because her theory does not say why an individual would decide to use a resource and why the organisation would then not suffer from illegitimacy. Evidently dis-embedding actors in this way is problematic because it does not explain how they came to be dis-embedded. The most popular way to account for agency and change in subsequent literature was thus not to dis-embed actors, but to suggest that any institutional context is fractured, multivocal and constituted by numerous contesting yet coexisting institutional meaning systems. The interactions and tensions between these may provide opportunities for change without dis-embedding actors from their institutional environment. Such meaning systems were delineated in 1991 by Friedland and Alford as ‘institutional logics’.

## **Institutional Logics**

‘The notion of logics is immensely appealing...it proposes that external rituals and stimuli interact with internal mental structures to generate routine behaviour...it is [also] consistent with the view that culture is fragmented among potentially inconsistent elements’ (DiMaggio 1997 p.277)

The concept of institutional logics is prevalent within institutional research. As a meta-theory (Thornton and Ocasio 2008) the concept of an institutional logic implies an overarching system of higher-order institutional pressures which legitimate certain practices whilst rendering others incompatible. In developing their conceptualisation of institutional logics, Friedland and Alford (1991) argued that understanding individuals as rational-instrumental actors was flawed because an individual is itself somewhat of an institutional construct. In other words, the idea of an isolated and abstracted 'individual' is a flawed production and represents an '... analytical category which has been shaped by institutional transformation' (Friedland and Alford 1991 p.240). Alongside numerous early neo-Institutionalists, the authors claimed that the context of the individual was increasingly becoming ignored in sociological study, and that such a context was best understood as an inter-institutional system which instilled limits on rationality and legitimacy. Friedland and Alford (1991) defined institutional logics as '...symbolic systems, ways of ordering reality, and thereby rendering experience of time and space meaningful' (p.243). They are 'invisible assumptions' (p.240) which have both symbolic and material properties. The material properties are represented in behaviours, but '...behaviours [only] make sense to those who enact the behaviour only in relation to its transrational symbolic systems and that those symbolic systems only make sense in terms of the behavior' (Friedland and Alford p.250).

Each institutional logic organises the symbolic (ideation and meaning) and material properties (structures and practices) of distinct societal sectors (Thornton 2004, Thornton, Ocasio and Lounsbury 2012) or institutional orders (Friedland and Alford 1991). These were initially defined as Capitalism, Christianity, Bureaucratic State, Family and Democracy. Institutional logics define the content and meaning of institutions related to each of the orders (Reay and Hinings 2009) and provide collective identities which establish a normative origin for group membership, inform players of 'the rules of the game', inform struggles for status and power, provide classificatory categories, and cognitively condition actors' understandings of what is important and what is not (Zuckerman 1999, Thornton and Ocasio 1999, Spicer and Sewell 2010). In sum, they mediate between organisations and society through the provision of supra-organisational normative 'guidelines' (Townley 1997 p.263). However, given their variance institutional logics are likely to come into contradiction and tension within an organisational field. Each institutional order uniquely shapes how reasoning takes place and how rationality is perceived and ultimately '...agency and the knowledge that makes agency will vary by institutional order (Thornton et al 2012 p.4). The meaningful variation between orders lays the foundation for contradiction and tension between actors informed by alternative institutional logics. With these foundations set the review will show



how the concepts delineated above have been applied within more recent movements in institutionalism.

## **The new Neo-institutionalism**

Neo-institutionalism is often criticised for a distracted focus on the structural and regulatory aspects of organisational environments, providing little attention to the agency and 'work' involved in institutional change at the micro level of analysis. Although prominent in the rubric of institutionalism, an engagement with meanings, symbols and cognition once stressed as fundamental by authors such as Zucker (1977) has been marginalised in favour of more overtly macro and deterministic accounts of institutional change. Institutional rules are often seemingly dislocated from constitutive agents: '...in portraying institutions as human creations turned into nature-like givens, scholars seem to have neglected the role of social actors in the maintenance of institutions' (Zilber 2002 p.236). In response to such criticisms literature throughout the 1990s and 2000s has engaged with the agency debate. Early institutional entrepreneurship theorists began examining agency with a clear recognition of embeddedness and structure. They understood agency as a result of reflexivity and mobilisation inspired by logic contradiction and influenced by variables such as social position (Battilana 2006) and level of embeddedness (Dorado 2005). More recent studies have emerged which focus on the 'process' of institutional entrepreneurship thereby recognising the role of actors in developing meaning systems and discourses which result in institutional change (Zilber 2002, Hallet and Ventresca 2006). This more cultural and discursively orientated literature spawned additional theories around institutional work which moved away from the concept of a heroic change agent and towards an understanding that actors are continually working on institution maintenance, disruption and change (Tracey, Phillips and Jarvis 2010). However, a concern still remains that the re-focus on agency fails to localise it within the wider societal context. This literature review will argue that a consideration of 'situated logics' as manifestations of societal logics impelled by contextualised institutional work will aid the conceptual re-connecting of the agent, field and societal levels of analysis. The review will examine the movement in literature outlined above, clarifying key concepts and ultimately proposing that societal logics can be understood as situated within fields and industries. Thus, it will begin with the structural nature of institutionalism and the problems therein.

## Organisational Fields and Scientific Diffusion

Institutional logics research has tended to examine the dynamics of logics purely at the field level of analysis (Reay and Hinings 2005, Townley 2002, Greenwood and Suddaby 2006). By 'organisational field' this review is referring to DiMaggio and Powell's (1983) definition: '... those organizations that, in the aggregate, constitute a recognized area of institutional life' (p.148). Often field level studies fail to account for both the role of agency during institutional change and the origins of the field level logics. The former issue is symptomatic of structural determinist assumptions which place all explanatory power in field level institutional structures and subsequently imply actor level passivity. Ashworth, Boyne and Delbridge (2009) suggested that this structural determinacy is rooted in institutionalism's preoccupation with isomorphism which has hardwired the idea that institutional logics diffuse as a given entity to all field actors from a 'higher level'. Zilber (2002) has argued that this mode of diffusion is down to the theory's tendency to adopt a scientific model. 'Scientific diffusion' refers to the way in which a rationalised myth (or logic) becomes diffused as a whole entity throughout an organisational field: 'The diffusion model rests on the assumption that practices are adopted intact, and thus it holds a somewhat reified and static notion of the process' (Zilber 2006 p.282). Importantly, the scientific diffusion metaphor has led to a dominant approach whereby fields have been treated as '...systems with objective features and contingent effects' (Delbridge and Edwards 2008 p.193). By treating fields in this way, institutional theorists have somewhat underplayed an analysis of agency.

Scott, Ruef, Mendel and Caronna's (2000) book on the American Health Care field and its on-going institutional change rarely veers from the field level of analysis. In fact, Scott et al's (2000) treatment of the micro level is merely to recognise the response of actors to the field level changes. Additionally, Thornton (2002) researched competition between the editorial and market logics in the publishing field. She sidesteps the individual level of analysis by looking at '...the link between industry level culture and organisational level social structure and routines' (p.82) and concluded that '...organisational level social structures and routines...were carriers of institutional logics' (p.97) rather than individuals. The paper found that publishing houses moved from a professional logic to a market logic, representing a shift in societal sector from 'professions' to 'market'. Indeed, in these studies a punctuated equilibrium model is often evident as the field alters sporadically from one logic to another to then continue in relative stability. As Hoffman notes (1999) '...actors within a field recognise the dominance of one institutional logic during times that we can characterise as relatively stable' (p.354).

The problem is not just one of field level fixation, but also of ontological grounding. Delbridge and Edwards (2007) have noted that within institutional literature there is a tendency for fields to become objectified and infused with structural variables; they evolve boundaries through structuration processes, become recognisable areas of institutional life and are perceived as archetypal structures for those researching the 'top-down' effects of the regulatory and structural dimensions of institutions. An antecedent of this treatment, and possibly a self-perpetuating consequence is the assumption that organisational fields have a substance of their own (Emirbayer 1997) which feeds down and causes similarity within itself. Emirbayer (1997) noted this as a form of 'structuralism' whereby '...holistic theories and "structuralisms" posit not individuals but self-subsistent "societies", "structures", or "social-systems" as the exclusive sources of action' (p.285). Similarly Holt and Mueller (2011) suggested that the drawing of general lines and the fixing of meaning in organisation studies leads to '...an epistemological tendency to conflate understanding of organizational life with the fixing of things and events as extant outside any awareness of the experience of this fixing' (p.3). The terms used within institutional theory such as 'fields' are, in this sense, confining.

However, Markowitz, Cobb and Hedley (2011) argue that Bourdieu's (1977) initial notion of an organisational field was borrowed by Institutionalists to explain isomorphism and homogeneity rather than to appreciate Bourdieu's conception of them as changing and organic in nature (Emirbayer and Johnson 2008). Emirbayer and Johnson (2008) propose that an organisation field is composed of interaction as well as structure, and thus constitutes a ground for contestation between agents '...differently endowed with the resources necessary for gaining and safeguarding an ascendant position within that terrain (p.36). Therefore within an organisational field there may be multiple competing and contradicting logics challenging existing logics, embodied by actors vying for change and power. As such it is not rejected that fields embody norms and values as defined by institutional logics, but that they lead definitively to stability is a false simplification. Indeed, this resonates with Berger and Luckmann's (1966) thesis that institutionalisation can never be completely achieved. The idiosyncrasies and incomplete socialisation of individuals mean that fields can never be totally accepted as completely institutionalised: '...every symbolic universe is incipiently problematic' (Berger and Luckmann's 1966 p.106). Therefore, overly socialised views which focus on the structural determinacy of institutional forces are problematic because they negate the peculiar, creative and distinctive variations in the way individuals conceive of the universe.

As a consequence, ‘...even though the concept of institutional logics connects field-level values and beliefs with action at all organizational levels, most studies focus only on field-level actors’ (Reay and Hinings 2009 p.632). Given that these approaches rarely engage with the micro level of analysis, an assumption of structural determinacy often underlies their findings. This focus on structural determinacy means that field level logics are frequently abstracted from any societal background. Given that societal institutional logics transcend organisational fields (Friedland and Alford 1991) why are field level logics not linked explicitly to their societal origins? An understanding of field level logics as manifestations of societal logics would require both an explicit recognition of its origins as well as an understanding of the micro-processes involved in its manifestation. Such an engagement can only occur once institutionalists recognise that logics are not self-evident (Zilber 2006) – they do not ‘present’ themselves as a given whole outside of human creation - but are enacted and reproduced at individual, organisational and societal levels (Seo and Creed 2002). This proposition leads the review on to a more specific focus on the ways in which institutionalists have dealt with micro-processes of agency in the form of institutional entrepreneurship. Given that institutional logics are constantly re-enacted and/or transformed by those actors who are embedded within the practices and symbols they legitimate, an understanding of how change may occur is intrinsically linked to the ability of those actors to think and act in novel and entrepreneurial ways.

## **Bringing Back the Actor: Institutional Entrepreneurship**

Institutional logics were introduced as a means to elucidate the diverse range of meanings and symbolisms facing actors embedded within a transrational symbolic system. Possibilities for understanding agency were predicted by Friedland and Alford (1991) who suggested that, under certain conditions, individuals can be ‘...artful in the motivation of different institutional logics to serve their goals’ (p.254). It is only recently that scholars have begun to seriously consider how such actors might go about eliciting change from within their own institutional context by contributing to a growing body of literature on institutional entrepreneurship (DiMaggio 1988). As Mutch (2007) notes ‘...the notion of the institutional entrepreneur was one response to the missing discussion of agency within neo-institutionalism’ (p.1135) and refocused the attention on institutionalists to the individual context, conditions and characteristics of actors themselves. To review the literature on institutional entrepreneurship the body of work has been split into structural and processual approaches. The former understands the ability to create change as dependent on actor’s social position and levels of embeddedness. The latter reviews the concept of agency as more of a process

which is on-going through translation (Zilber 2002, 2006), institutional inhabitation (Hallet and Ventresca 2006) and enacted through discursive strategies (Vaara et al 2006). It is the processual approaches which engage with the manipulation of meaning systems through legitimating strategies utilising rhetoric and discourses. New literature on institutional work (Lawrence et al 2011) often utilises these discursive strategies to illuminate both intentional and unintentional institutional maintenance and disruption. Ultimately it is argued that insights from these micro level approaches to institutional change need to be theoretically reconnected with the societal intra-institutional context. The review will conclude by outlining approaches which begin to tie together micro engagements with societal environments by responding to calls to 'situate' institutions within complex institutional and technical environments.

## **Structural Approaches to Institutional Entrepreneurship**

The concept of institutional entrepreneurship was initially introduced by DiMaggio (1988) and refers to attempts by actors to create new, or transform existing institutional arrangements: '...only individuals who somehow break with the rules and practices associated with the dominant institutional logic...can be regarded as institutional entrepreneurs' (Battilana 2006 p.657). Given that institutional entrepreneurship must recognise the embeddedness of actors, much of the structural literature assumes that the extent to which opportunities are recognisable and acted on is mediated by an actor's structural characteristics. These characteristics are used to account for why, if all actors are faced with the same circumstance, only some pursue particular courses of action (Mutch 2007). Importantly, this does not imply structural determinacy but rather suggests that the structural location of actors permits them to recognise institutional opportunities and mobilise resources for change. There are two central themes of structural accounts: The first regards how the social position and elitism of actors affects their ability to act on opportunities for institutional change; the second considers how an actor's degree of embeddedness with an institutionalised field affects their capacity to recognise opportunities for such change.

## **Social Position and Elite Power**

Social position has been drawn on by researchers such as Battilana to account for the ability of actors to pursue change projects whilst embedded within institutional structures. Battilana (2006) proposes that an individual's position within a network of resources and asymmetrical power relationships affects his or her willingness and ability to elicit institutional change. An individual may have low status within an organisational hierarchy, hampering their ability to conduct change, whilst also having a strong social status due to strong ties to other more powerful actors. The mix of positions within formal and informal structural contexts determines the ability of an actor to be entrepreneurial. At a higher level of analysis, Markowitz, Cobb and Hedley (2011) suggest that institutional entrepreneurs use their 'social location' in multiple organisational fields to compete with an existing logic and legitimate their new organisational form. Additionally, Phillips et al (2004) argue that being central within a field heightens the possibility that the discursive creations of the institutional entrepreneur will be consumed. As such, '...institutional entrepreneurs must strive to attain positions that enable them to bring together diverse stakeholders among whom they can champion and orchestrate collective action' (Leca et al 2008). Both social position and network location offer access to political systems and may lead to the identification of political opportunities in the shape of identifiable allies, apparent instabilities in the elites and vehicles by which to mobilise supporters for collective action (Rao and Giorgi 2006).

More recent institutional literatures on power and elites have shown how certain social locations within both horizontal and vertical networks can lend agents the capacity to enact autonomously. Zald and Lounsbury (2010) propose an institutional research agenda which considers national and international elites, 'organisational infrastructure' (p.964) and power centres in the study of important policy issues. They employ the term 'command posts' which refer to '...traditional centres of societal power that regulate, oversee and aim to maintain social order in society and economy, both at regional, nation-state and inter-state levels' (p.954) such as the United Nations, Government agencies and other formal bodies of governance and bureaucratic office. Such command posts should be understood as embedded within a wider field of organisations, cultural beliefs and interests which shape the formulation of policy. In other words, a 'field approach' is provided which highlights how power is '....variably dispersed across a wider set of actors who are unified by shared interests, issues or discourse' (p.965). As such, command posts have institutional, normative and cultural components which affect the ways in which particular elites function in terms of the decisions they make and the ways in which they negotiate and mobilise resources. The

pluralistic conceptualisation of Zald and Lounsbury (2010) frames the notion of 'elite' as in flux given the autonomy of state actors, the growing importance of expertise, the influence of fame or academic credentials and the ways in which these may come together over time and space to shift the nature of command posts. As fields change, new actors emerge and develop field powers which further affect expert discourses and command post outcomes.

Reed (2012) argues that Zald and Lounsbury (2010) lose track of their own agenda for a re-engagement with vertical forms of power and control by instead reinforcing the 'intellectual fascination' with horizontal and culturally based forms. Although accepting that their approach begins to sketch out a framework with which to understand the dynamic interaction between vertical power structures and 'emergent power networks' (Reed 2012 p.205), Reed suggests that they underplay the '...hierarchically stratified power structures and mechanisms that underlie interactional orders' (Reed 2012 p.206) evident within enduring and resilient domination structures. In other words, domination relations and their role in reproducing elite power and control cannot be solely understood as cultural phenomena, but instead need to be theorised as socio-material relations that are ideologically legitimated and sustained through elite rule and its political interests. By studying how vertical and horizontal forms of power relations interplay it is possible to unearth how structures of dominance and emergent elites shape and reshape forms of organisational power and control. The nature of elite forms of power, and the way in which domination structures and cultural and normative expectations interplay to create potentially temporary 'command situations' (Reed 2012), may aid an understanding of the propensity of actors to mobilise resources in order to enact institutional change.

### **Degree of Embeddedness**

The ability to conduct institutional entrepreneurship has also been shown to be dependent on organisational field level characteristics such as levels of heterogeneity and institutionalisation, both of which signal degrees of embeddedness (Leca et al 2008, Sewell 1992). High embeddedness may act as a constraint on action (Reay, Golden-Riddle and Germann 2006) because actors are highly institutionalised and unaware of alternatives. From this perspective any purposeful activity can only be enacted by those with low levels of embeddedness. Low embeddedness can be a characteristic of organisations on the periphery of a field because there are less institutional pressures on them to comply with a dominant institutional arrangement (Battilana, Leca and Boxenbaum 2009). Authors such as DiMaggio (1988) and Fligstein (1997) have both suggested that

the possibilities for institutional entrepreneurship are at their most plausible when the level of institutionalisation within a field is low and when uncertainty is high. During such eras there are loose structural constraints which provide space for action and reconfiguration.

There have also been studies which argue the contrary and propose that larger and more central organisations are in a better position to undergo institutional entrepreneurship. For example, Beckert (1999) claims that in relatively highly institutionalised fields actors are more likely to carry out strategic action because uncertainty is low and therefore the security of stability is less imperative. Similarly, Greenwood and Suddaby (2006) examined the institutional entrepreneurship of accounting firms within the centre of a highly institutionalised field. The centrality of the firms and their embeddedness aided their growth and interaction with new ideas. Similarly, Reay et al (2006) illustrate that the microprocesses of 'small wins' show how highly embedded actors use the expertise and knowledge of their structural, cultural and political environments to accumulate a series of accomplishments leading to desired change outcomes. In the authors' words, '...embeddedness serves as a means of stratification by opening windows of opportunity for some, while erecting barriers for others' (p.979). Key to their argument is the knowledge that practitioners hold as a consequence of their embedded position, and also their awareness and determination to pursue change via a slow and incremental strategy. It is an interesting example of how structural context aids the development of strategies which enables micro activities to effect macro level constructs on a continual basis. A more general theory is provided by Dorado (2005) who explains how highly institutionalised contexts may provide more space for entrepreneurial behaviour. Both the heterogeneity and levels of institutionalisation within a field are taken into account in order to build a typology of possible contexts which facilitate institutional entrepreneurship. Field level characteristics will have implications for whether or not the field is classed as 'opportunity opaque', 'opportunity hazy' or 'opportunity transparent' which occupy a continuum of zero opportunity provisions towards an almost 'free for all' opportunity state.

Maguire, Hardy and Lawrence (2004) offer an additional dimension of field 'newness'. The authors class fields as either emergent or mature, and argue that the differentiation between the two types is consequential upon the institutional entrepreneur's ability to act in certain ways. In emerging fields they argue that '...there are no established patterns for leaders to mimic; the widely shared values associated with normative forces have yet to develop; and diffuse power makes it difficult for individual actors to coerce others' (p.659). Additionally, the subject positions of institutional entrepreneurs coupled with the emergent characteristics of the field allow the authors to outline success tactics for entrepreneurs. These studies often imply that opportunities exist and are there



to be discovered by well-placed actors. Furthermore, research has also shown that change agents may introduce new practices in an attempt to overcome competitive pressures. Leblebici, Salanik, Copa and King (1991) showed that peripheral actors such as 'fringe players' in the US radio broadcasting industry, can transform the conventions of an industry as an outcome of trying to survive: '...organization of an inter-organisational field is a product of practical solutions developed at the micro level and institutionalized through conventions at the macro level' (p.393). Actors at the periphery are always looking for ways to 'solve the problem of realising more value from transactions' (p.394) and although they are newer and less powerful participants in the field, their experimentation is likely to be less costly and they are less likely to be sanctioned. In sum, the structural position of actors is important to recognise as it can explain both their reasons for institutional change (e.g. competition) as well as their ability to 'get away with it'. However, there is still a question of how opportunities for institutional change come to arise.

### **Contradiction and Entrepreneurship**

'...the bases of individual and organizational autonomy, and some of their most characteristic internal tensions, derive from the contradictory relationship between institutions' (Friedland and Alford p.255).

The paradox of embedded agency (Mutch 2007) does not just problematise the ability of actors to notice and act on opportunities, but also raises problems regarding how these opportunities arise in the first place. The initial theory by Friedland and Alford posited that organisational change occurs in the wake of actor reflexivity triggered by inconsistencies within the societal intra-institutional context. Inconsistencies arise because the institutional environment is constituted by multiple institutional logics which offer potentially contradictory meanings and countervailing determinants of organisational structure (Thornton 2002). A seminal paper by Seo and Creed (2002) examined the dynamics between institutional contradictions and human praxis in an attempt to escape the caging concern that both actors and their interests are unequivocally institutionally determined. Their dialectical framework delineated how, over time, institutional arrangements are able to create inconsistencies and contradictions which may '...transform the embedded social actors into the change agents of institutional arrangements...' (Seo and Creed 2002 p.223). In essence a '...complex array of interrelated but often mutually incompatible institutional arrangements' (Seo and Creed 2002 p.225) collide during social interaction. Actors reflect on the contradictions thrown into light and may respond by demonstrating human praxis. These contradictions are a continuous strain on institutional reproduction as they are inherent by-

products of an institutionally constituted social world, and may eventually elicit a shift in collective consciousness (Leca et al 2008).

The idea of logic contradiction has lit the way for more recent literature which has moved away from studying the tensions between two contradictory logics, and focused instead on the interactions between multiple and coexisting logics within fields. For example there has been related work on constellations of logics within fields (Goodrick and Reay 2011). In particular, the idea of dominant and subdominant or secondary logics has become increasingly important in institutional analysis as a means to understand the interactions and contradictions between many logics over time within a field. Goodrick and Reay (2011) have argued that mapping logics in constellations can help researchers see the ways in which logics do not just contradict but combine to guide behaviour. This view considers that logics are embodied in practices, and thus practices within one field may be informed by elements of many different coexisting logics. Certainly this is an interesting avenue for institutional theorising because it moves past the 'one logic to another' punctuated equilibrium model and begins to appreciate that there may be an on-going coexistence of logics and thus enduring contestation between actors within certain fields (Reay and Hinings 2009).

The above section has provided an overview of institutional research which has attempted to understand institutional entrepreneurialism by examining the structural embeddedness of actors and how, given this embeddedness, they may come to recognise opportunities for change. However, Mutch (2007) warns that institutional entrepreneur literature has a tendency to imply a rational-choice approach due to its focus on self-interest and calculative activity. Instead Mutch (2007) suggests that aside from recognising that an individual's context within a contradictory social structure may provide opportunities to enact change, that individual also conducts an 'internal conversation' (Archer 2003) in which they reflect on moral considerations. As such the agent is not only embedded but 'embodied' with their personal reflexivity being symptomatic of an historical and dialectical interrelationship between themselves and their social contexts. Hence opportunity existence and recognition is primarily attributed to the contradictory nature of interactions between institutional logics which jolt actors out of their day-to-day rota and trigger a period of 'autonomous reflexivity' (Mutch 2007) which can result in actors recognising and initiating change projects.

Nevertheless, although logic contradiction as a result of expansion (Green and Suddaby 2006) or new State regulations (Reay and Hinings (2006), for example, may illuminate opportunities for

change projects, the literature has shown that actors often need to be in certain social positions in order to mobilise resources around their change project (Phillips et al 2004, Rao and Giorgi 2006). Additionally, the ability of actors to recognise opportunities for change may also be dependent on their level of embeddedness within a field. However, this section has been predominantly interested in how embedded actors may come to perceive of the potential for change, but does not explain how institutional entrepreneurs 'negotiate social reality' (Markowitz et al 2011 p.2). The following section reviews the body of literature which examines the processes employed by actors to theorise and diffuse their new ideas and operationalise their institutional change projects in light of the opportunities presented by structural contradictions.

## **Processes of Institutional Entrepreneurship**

Institutional entrepreneurial projects involve an array of political and rhetorical struggles for securing the legitimacy of new practices (Leca et al 2008). Seo and Creed (2002) noted that contradictions do not cause change alone, but are supportive in adjusting political dynamics and undermining the hegemonic position of dominant groups. Consequently individuals may gain voice and access the resources necessary for political action. Nevertheless the image of a heroic entrepreneur single-handedly changing institutions is flawed and institutional entrepreneurs can seldom transform institutions alone (Leca et al 2008). Discursive and rhetorical strategies are necessary so that institutional entrepreneurs can access social capital, legitimacy and formal authority which may enable them to be taken seriously by other actors upon whom they depend (Fligstein 1997). Therefore this review will firstly define legitimacy before reviewing the role of rhetorical appeals and legitimisation strategies in the diffusion of new theorisations. The discursive mechanisms under review are those which the literature considers as representative of agency. The review will then consider a re-engagement with concepts of rationality, suggesting that they provide a valuable means to relate discursive strategies and rhetorical appeals with institutional logics.

### **Legitimacy and Rhetoric**

Leca et al (2008) noted that institutional entrepreneurship is predominantly a discursive strategy whereby the role of the entrepreneurial agent is to generate discourse aimed at reconstructing institutional environments. Nevertheless they also need to legitimate their proposed meanings and values to a wider audience. Discursive strategies are therefore also legitimisation strategies which provide cognitive frames and alternative scripts in the hope of mobilising legitimacy for the practice

or meanings under negotiation. Generally it is accepted that there are three types of legitimacy which may be pursued (Suchman 1995, Deephouse and Suchman 2008): pragmatic, moral and cognitive. Pragmatic legitimacy is based on rational evaluation, moral legitimacy is based on moral expectations and cognitive legitimacy is based on the '...taken-for-grantedness' and comprehensibility of actions. Suchman (1995) proposes that, 'All three types involve a generalised perception or assumption that organisational activities are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions' (p577). Institutional logic theory says that institutional logics define how legitimacy is to be judged by prescribing appropriate norms and conventions and by '...often specify[ing] extensive webs of causality, identifying some methodologies as "science" and others as "quackery", regardless of isolated outcomes' (Suchman 1995 p.580).

Hence, institutional entrepreneurs face a difficult challenge in reframing what is legitimate, often against taken-for-granted practices and symbolisms established by a dominant logic or assortment of logics. Suchman notes that 'cognitive legitimacy' is perhaps the most important element in legitimating an entrepreneurial project. This is because cognitive legitimacy requires audience comprehension which can only be garnered through consistency with larger belief systems and experienced reality (p.582). Indeed, this relates to the need for legitimating strategies to reflect the institutional environment because they rely on the recognised meanings, norms and practices within this environment to be comprehensible. Legitimating is therefore an important part of institutional entrepreneurship and discursive strategies employed in its pursuit often evoke particular rhetorical appeals in order to generate associations between the proposed change and alternative legitimate meanings.

## **Rhetoric**

Rhetorically focused institutional studies assume that logics can be constituted through language and are incorporated into written texts via discursive and rhetorical strategies (Brown et al 2012). Rhetoric aims to manipulate the sources of legitimacy and thereby reflects deliberate political action towards either the status quo or change. In their seminal essay on legitimacy and rhetoric, Suddaby and Greenwood (2005) focus on the role of persuasive texts in manipulating cognitive legitimacy (p.40). They argue that contestations between logics are often '...a function of rhetoric in which the legitimacy of competing logics is openly debated' (p.41). In these debates actors employ rhetorical strategies to '...connect elements of an existing or proposed form to broader cultural understandings in an effort to support or challenge the comprehensibility of an innovation'

(p.41). The authors based their text analysis on three primary forms of persuasive appeals highlighted by classic rhetoric literature: 'logos' (appeals to logic), 'ethos' (appeals to emotion) and 'pathos' (appeals to character). Additionally they note 'kairos' which is found in arguments sensitive to time.

These forms of rhetorical appeal have been subsequently applied in more recent research. For example, Riaz, Buchanan and Bapuji (2011) observed rhetorical strategies in media accounts during the US financial crisis to understand whether actors were neutral, in support of change or favoured the status quo. They identified three strategies which they labelled 'scenarios tell us', 'blame game' and 'expert knows best'. The first had sub categories related to time frames so that they may appeal to past, present or future, and tended to appeal to 'logos' or logic. The second created either a general or specific 'them' and 'us' narrative which appealed to 'pathos' or emotive reasoning. The third either directly or indirectly referred to an 'expert' and its appeals were based on 'ethos' or character. Their study illustrates that the media provide a fruitful platform with which to study rhetorical appeals to legitimacy and actor positions within complex debates. Additionally both studies explored above show how rhetorical appeals are closely linked to legitimation and discursive strategies which are themselves reflective of contestations between institutional logics. Thus if the multiple strategies at play within a text can be pinpointed, the nature of the logics underpinning them may be inferred.

It should be noted that institutional logics are not merely evident in appeals to logos. Brown et al (2012) applied ethos, logos and pathos to a single text to understand how multiple logics made the rhetorical appeals of texts complex. Rational argumentation repertoires underpinning each logic were shown to be in tension with others when multiple logics were represented in a single text. This made it difficult for a text to convincingly support one logic over another on the basis of logos appeals, and therefore appeals to ethos and pathos became important. Unlike Greenwood and Suddaby (2005) (and informed by Aristotle) they suggest that ethos involves appeals to morals and ethics, whereas pathos includes appeals to emotion. They extend Riaz et al (2011) by explicitly attempting to link institutional logics with each appeal, arguing that logos has received the most attention in logics literature (implicitly), perhaps because the focus tends to be on the 'logical' prescriptions of logics, rather than their emotive or moral details. The research finds that in the context of multiple logics, ethos and pathos can be important appeals within a rhetorical campaign. Two strategies in particular were identified as ethos and pathos based appeals: humanisation and narrativisation respectively. The first appealed to a societal belief surrounding the moral worth of

youth, and the latter related to emotionally resonant stories. With an understanding of rhetorical appeals as key elements of discursive legitimation it is prudent to move on to legitimation strategies more generally which perhaps relate less explicitly to rhetorical appeals outlined above, yet still provide useful insights into the discursive legitimation pursued by agents.

### **Legitimation strategies**

Humanisation and narrativisation strategies of Brown et al (2012) and Erkama and Vaara (2010) speak to a large and established body of work regarding discursive legitimation strategies (Kuronen et al 2005, Vaara et al 2006, Vaara and Tienari 2002, 2008). These papers propose that agents can 'play with discourse' (Vaara et al 2006) and draw from research in 'new rhetoric' as explored above to understand the role of discursive practices in the legitimation and 'sensegiving' (Vaara et al 2004 p.10) involved during the legitimation of new institutional or organisational forms and practices. For example, Kuronen et al (2005) focused on the role of journalists and suggested that they confirmed existing presuppositions of the audience, enacting an essential process of the legitimation and naturalisation of management ideologies and ideas. Rhetorical constructions attempted to convince the audience of the organisational change (merger) through a mix of nationalistic and rationalistic legitimation strategies aimed at normalising change. Vaara and colleagues (2002, 2004, 2006, 2008) further refine the typologies of these strategies, proposing five distinct legitimation strategies: normalisation, authorisation, rationalisation, moralisation and narrativisation, similarly with a focus on the media as transmitter: '...these specific legitimation strategies appear in individual texts [and] their recurring use in the intertextual totality of the public discussion establishes the core elements of the emerging legitimating discourse' (Vaara et al 2006). Rhetorical appeals may form or constitute elements of each of these strategies which construct or reconstruct senses of legitimacy (Suchman 1995).

Vaara's work is an extension of Van Leeuwen's 'grammar of legitimation' wherein four general types of semantic-functional categories were proposed; authorisation, rationalisation, moral evaluation and mythopoesis. Authorisation is legitimation by reference to authority garnered from tradition, custom or law. Rationalisation is legitimation by reference to '...the utility of social action, and to the knowledge that society has constructed to endow them with cognitive validity' (Kuronen et al 2005 p.784). Moral evaluation to Van Leeuwen is akin to Vaara's moralisation whereby legitimation refers to specific values, although he notes that rationalisation always has a moral basis and is therefore not as distinct from moralisation as it may first seem. Mythopoesis corresponds to Vaara's narrativisation whereby legitimation is attempted through the telling of a narrative-type

construction providing some sort of drama that may demonstrate winners or losers, inevitability and causation. Finally, Vaara et al's (2006) fifth strategy is normalisation which was previously understood by Van Leeuwen as a form of authorisation from tradition. However, for Vaara and colleagues normalisation 'seeks to render something legitimate by exemplary' (Vaara et al 2006 p.798) and either retrospectively or prospectively renders something a 'natural' or 'normal'. Therefore when attempting to uncover how and what institutional logics inform a large and complex debate it is integral to recognise the diversity and character of legitimating strategies so that their rhetorical appeals may be identified and their underlying assumptions known. However, it remains to be explained how actors develop these strategies given that such a process would need to be conceived of as an embedded practice. To understand the conception of legitimations strategies, notions of theorisation are drawn on and explored below.

## **Theorisation**

Suddaby and Greenwood (2005) suggest that rhetorical strategies contain two elements; institutional vocabularies which represent '...the use of identifying words and referential texts to expose contradictory institutional logics' (p.35) and theorisation '...by which actors contest a proposed innovation against broad templates or scenarios of change' (p.35). Institutional vocabularies develop broad 'discursive frames' which include two processual dimensions: specification, and justification (Leca et al 2008). Specification is when an institutional entrepreneur frames a failure in a way that includes a diagnosis and causation with existing systems. For example, Reay et al (2006) showed how Nurse Practitioner advocates framed problems concerning reduced physician coverage in a way that fitted the desired solution, invoking the beneficial use of Nurse Practitioners to fill the gap in medical treatment supply. Justification is the process of promoting the new agenda in a way that de-legitimises the old institutional arrangements, thus allowing space for the 'new way'. Essentially, '...proponents and opponents of...new form[s] coalesce into distinct discursive communities defined by their institutional vocabularies' (Greenwood and Suddaby 2005 p.47) and use these vocabularies to interpret and exploit contradicting institutional logics. As such, they are a key part of building legitimating strategies for institutional entrepreneurs in particular.

Theorisation is the means by which these vocabularies are employed to justify new ideas by linking them to broader cultural schemas. Suddaby and Greenwood (2005) propose five types of theorisation which they label teleological, historical, cosmological, ontological and value-based. Shifts in logics are achieved by language and secured by rhetoric which modifies or displaces past

logics in order to encode new criteria of legitimacy. Contradictions or exogenous shifts in the institutional structure allow the ascendance of new logics which emerge amidst contestation which is enacted through actors' skilled use of language and rhetoric (Suddaby and Greenwood 2005). When the legitimacy of competing logics is openly debated, institutional vocabularies form one or more of these theorisations; that the change is part of a necessary grand plan (teleological), that there is an inherent incompatibility between organisational attributes thus requiring change (ontological), that the change is naturally occurring (cosmological), that the change is an unnecessary deviation from the past (historical) or that the change somehow correlates with normative, ethical and moral needs (value-based). Each theorization of change acts as a '...linguistic device by which actors manipulate the degree of uncertainty implied by an innovation' (p.59). By connecting alternatives to cultural templates, theorisation can make new forms comprehensible by '...naturalising some contradictions and suppressing others' (p.59) and thus increases the intelligibility of change.

Greenwood and Suddaby (2005) argue that the comprehensibility of cognitive legitimacy requires '...active efforts to reshape dominant ideologies within an organizational field' (p.37). Maguire et al (2004) recognise these 'active efforts' as the political mobilization of normative support by relating the new practices espoused by institutional entrepreneurs with the key values of different actors. As such, they propose that theorization is central to the process of institutional entrepreneurship because it is how actors assemble an array of arguments which frame problems and justify new solutions or practices they support in ways that resonate with a variety of different stakeholders to create a broad base of support. These framing theorizations can be vague in order to confer a 'flexible solution' for the multiple actors involved. Maguire and colleagues (2004) also suggest that theorization can involve direct political bargaining and negotiations with community and industry representatives, during which new practices can be persuasively theorised as '...logical solutions to identified problems' (p.671). In sum, the authors argue that the successful institutionalization of new practices relies upon '...attaching them to pre-existing organisational routines and by reaffirming their alignment with important stakeholder values on an on-going basis' (p.672). This aligns with Rao, Monin and Durand's (2003) use of theorisation to account for how individuals justify new identities in concordance with social movements by employing symbolic devices to connect new ideas to established cultural accounts.



## Legitimacy and Rationality

‘...what is rational depends on the institutional organisation of society’ (Townley 2008 p.97)

Neo-institutionalism argues that the institutional environment informs what is accepted as rational and hence discursive strategies are likely to reflect how actors rationalise certain actions. Recent work on institutional rationality draws on Weberian theory in an attempt to move away from the older neo-institutional dichotomy between a rational technical environment and an ‘irrational’ institutional environment. Kalberg (1980) offers an accessible guide to Weber’s writings on rationality and argues that ‘...the “irrational” is not fixed and intrinsically “irrational” but results from the ideal-typical incompatibility of one ultimate constellation of values with another’ (p.1156). As Weber suggests, ‘...something is not itself “irrational”, but rather becomes so when examined from a specific “rational” standpoint’ (Kalberg 1980 p.1156 quoting Weber 1930). Kalberg identifies two central types of rationality; substantive and formal or instrumental rationality. Substantive rationality directly orders action into patterns on the basis of past, present or potential ‘value postulates’. As Biggart and Delbridge (2004) note ‘...actors often feel morally or emotionally bound to pursue the substantive goal’ (p.34). The alternative form of rationality often drawn upon is formal rationality which is based on means-ends calculations in reference to rules, laws or regulations and a rejection of distinct personalities. An action is formally rational if it is calculably determined to be the ‘best’ means towards an end and practically rational if it benefits self-interest and egoistic accomplishments (Kalberg 1980). More commonly found in the literature is the concept of ‘instrumental rationality’ which represents a combination of Weber’s practical and formal rationalities. Instrumentally speaking, an action is judged as rational when, upon the weighing up of all means, it is interpreted as the most practical and logical (Biggart and Delbridge 2004 p.34).

Institutional rationality has received scarce attention within recent institutional literature (Lounsbury 2007, 2008, Townley 2008). Meyer and Rowan’s (1977) initial neo-institutional thesis suggested that legitimacy was intrinsically linked to rational myths. So this begs the question, how does the institutional entrepreneurial project and concurrent legitimation relate to rationality? Initially neo-institutionalists maintained a separation between economic neo-classical rationality and an institutionally rational ‘irrationality’ (Townley 2008) whereby institutional isomorphic relationships led to ‘irrational’ passive adoption of practices and forms by those pursuing legitimacy (Tolbert and Zucker 1977). However, literature has moved on to an understanding that judging economical based action as ‘rational’ is flawed. As Lounsbury (2008) notes, Friedland and Alford

(1991) recognised that the dichotomy between the technical and institutional ‘...assumes an institution-free conception of interest and power, and maintains the materialist-idealist dualism in which actors have objective interests which can be understood independently of the actors’ understandings’ (p.352). Hence ‘...that which is ‘rational’ [is] determined by a wider institutional environment’ (Townley 2008 p.101). The institutional environment provides legitimating structures which, when taken-for-granted and institutionalised within a field, lead to the rationale of certain actions becoming lost. These actions subsequently appear as rational myths and are adopted because of their legitimacy rather than their efficacy (Meyer and Rowan 1977, Townley 2008).

Nevertheless there is yet to be any clearly defined and accepted relationship between institutional logics, legitimacy and substantive or instrumental rationality within institutional theory, and only a handful of papers broach the subject directly. In 2002 Townley drew on Weber’s types of rationality to suggest that there are both multiple dimensions of rationality, as well as multiple domains in which they compete. She suggests that Weber’s ‘value spheres’ have their own normative obligations, patterns of action and ways of life defended as rational. These value spheres are relatively synonymous with institutional logics: ‘...the rationality of an action is thus conferred by its location within a broader institutional logic, and the framework of knowledge and belief sustains this’ (Townley 2008 p.97). Similarly, Glynn and Lounsbury (2005) propose that certain logics are more akin to certain types of rationality. In their study they argued that an aesthetic logic within the Orchestral world was predicated on a Weberian form of substantive rationality, whereas a market logic was more akin to the formal rationality of capitalist society (p.1037). Hence it seems the most prevalent approach is to argue that dominant institutional logics in a field prescribe the most salient dimensions of rationality. Therefore, institutional change as enacted through discursive battles or otherwise may bring to light the struggles between competing rationalities and contesting logics (Townley 2002). Indeed, Lounsbury’s (2008) conception that ‘...fields are comprised of multiple logics, and thus, multiple forms of institutionally based rationality’ (p.254) suggests that research on the creation of new organisational forms and new logics within a multi-logic context could offer interesting insights into the development of different rationalities.

Additional complexity was documented by Biggart and Delbridge (2004) who theorised that one societal domain or logic can comprise of multiple rationalities dependent on the actors creating it, which can lead to alternate ‘types’ of activity such as varying systems of exchange. Substantive rationality and instrumental rationality combine with universalistic and pluralistic types of social relations to create various ‘systems of exchange’ which typify alternate approaches to a market system. This approach suggests that ‘type of rationality’ is a characteristic of certain actor groups,

as are the social relations to be found in any group. Thus instead of seeing the rationality adopted by actors as a passive symptom of the institutional environment, it is possible to understand rationality type as an actor or field level predisposition which affects the way an institutional logic is operationalised and enacted. These rationality types are thus likely to be heavily reflected in the distinct institutional logics which guide the norms and conventions of discrete actor groups, which in turn could be identified by the discursive legitimation strategies employed by each group. Certainly it is thus plausible to suggest that institutional logics which reflect alternative forms of rationality may come into conflict if the multiple actor groups drawing on them come to be engaged in a single argument over the legitimacy of a contested practice. Hence ideas around the implications of contesting forms of institutional rationality seem to promise utility in understanding the underlying contradiction between institutional logics. Through close examination of an institutional logic, as made evident through material actions, symbolism and discourses, a researcher may unearth a prevalent rationality type embedded within its meaning structure which may help elucidate both its character and the reasons for why it may contradict another logic.

### **Conclusion to Process Theories of Institutional Entrepreneurship**

In response to concerns that institutionalism provided oversocialised and structurally determinate accounts of organisational change, a wave of discursively orientated literature emerged offering theories pertaining to agency. Much of this work looked at how institutional entrepreneurs (DiMaggio 1991) both perceive of change from within institutionalised fields and pursue discursive strategies in order to legitimate and rationalise such change. Although useful for the analysis of text in particular, often process based studies focus on a single issue such as rhetorical appeals or legitimation strategies, and fail to give adequate explanation to the conceptual linkages between institutional concepts such as legitimacy, rhetoric and rationality. This review has tried to illuminate the often implicit relationships between the concepts. An understanding of each should facilitate a more thorough analysis of the theorisation and application of certain discursive strategies and how they relate to, and elucidate, contesting institutional logics. Nevertheless, although the literature reviewed above gives detailed accounts relating to the specifics of actor motivated institutional change it tends to focus on the 'heroic' institutional entrepreneur as the master of the change project. As such, it often fails to place its discursive strategies within a broader understanding of agency. Fortunately recent papers are engaging with the challenge of delineating broader theories of embedded agency and moving away from viewing the change agent as the hero battling against all odds.

## **Agents in Institutions**

There is a growing base of literature which understands the dialectic between institutional agency and structure as an on-going negotiation of institutional maintenance as well as change (Clegg, Courpasson and Phillips 2006, Zietsma and Lawrence 2010). There are three theoretical categories discussed here; translation, inhabited institutions and institutional work. The first recognises the role of multiple actors' interpretations in the process of institutional change and places these actors in the centre of institutional analysis. The second concentrates on the continual negotiation of meanings within institutions, and begins to bring in actor knowledge, creativity and historically sourced knowledge. The third body of work recognises the role of actors in the maintenance, disruption and change of institutions, with a focus on creativity and intentionality. All approaches explored stress that '...institutions are not inert categories of meaning' (Hallett and Ventresca 2006 p.213) which structurally determine the daily lives of actors. Certainly this does not truncate the importance of previous literature, but reminds institutionalists that various actors may persistently negotiate, reinterpret or defend institutional rules consciously or otherwise.

### **Translation**

Translation was brought into the realm of institutionalism most predominantly by Zilber (2002, 2006). By diverting attention away from overly structural accounts, the approach conflates agency and structure by proposing that institutional logics are 'carried' by actors who may transform their meanings through interpretation, thus creating institutional change. More generally, the theory of translation is an inter-disciplinary concept which takes its influence from perspectives such as Actor-network-theory and related academics in the 1980s such as Serres, Callon and Latour (Brown 2002). Early work by Serres focused on the passage traversed by a communication before it reached a 'receiver'. This passage is subject to 'noise' which induces translatory effects (Brown 2002). Subsequently the focus moves to the receiver of institutionalised instruction: 'Communication may be thwarted or betrayed by the medium through which it passes. But if we take the position downstream, at the point of destination rather than departure of the message, we may see this failure, this betrayal, as also the process of invention' (Brown 2002 p.8). As such, the role of individuals as 'institutional spectators' (Lamertz and Heugens 2009) becomes empirically and analytically important. Authors within institutional theory have analysed the roles of many such spectators such as Securities Analysts (Zuckerman 1999), Culture critics (Glynn and Lounsbury 2005) and the popular press (Maguire and Hardy 2009).

There is also the recognition of continual institutional transformation. Czarniawska-Joerges and Sevón (1996) applied translation to institutional theory by looking at the transportation of ideas into action and institutions. Their proposition was that organisational change is continual due to on-going moments of translation. Translation occurs as ideas become quasi-objects, similar to social processes of objectification (Berger and Luckmann 1966), which then, if repetition occurs, may lead to action and the creation of institutions. A chain of translations occur as this image-idea-action-institution process continually develops and consequently an idea becomes increasingly objectified. Interestingly, translation simultaneously creates variations as it reproduces social structures. To take from their example, fashion followers act differently in an attempt to act the same way. Others, such as Schultz and Wehmeier (2010) have alluded to the continual nature of translation which they argue is based on the constant struggle of actors to develop a more encompassing understanding of a concept such as CSR as a whole, while, at the same time implementing bits and pieces that they deem relevant.

The ontological constructivism behind the theory of translation is the primary reason why its approach to agency is not adopted in this thesis. The constant nature of interpretation is certainly a valuable insight; yet recognising actors as carriers of institutional logics is problematic because they become undefinable and almost analytically fluid. In other words, by conflating agency and structure in this way the ontological purchase of institutional logics is lost and they become increasingly difficult to define as anything apart from interpretation. Literature on inhabited institutions provides more structural solidity upon which to base analysis.

## **Inhabited Institutions**

Inhabited Institutions literature combines institutionalism with symbolic interactionism (SI) to explain micro level negotiations of meaning and institutional change. Hallett and Ventresca (2006) frame this re-engagement with interactionism as a response to the a-social micro level institutionalism which represented an ironic consequence of scholars attempting to 'bring society back in' via institutional logics. These authors note that institutional logics have been '...analytically removed from the more active struggles over meaning' (Lounsbury, Ventresca and Hirsch 2002). By drawing on Symbolic Interactionism the inhabited institutions approach illustrates how interactions organize social orders (see Hallett and Ventresca 2006) and engages more clearly with micro sociability and its links with institutions: 'Organisations are not merely the instantiation of environmental, institutional logics "out there", where workers seamlessly enact preconscious scripts valorised in the institutional environment... instead, they are places where people and

groups make sense of, and interpret, institutional “vocabularies of motive” and act on those interpretations’ (Binder 2007 p.551).

Interestingly inhabited institutions literature considers the creative capacities of individuals with background knowledge and interests (Binder 2007, Levy and Scully 2007, Hallett and Ventresca 2006, Scully and Creed 1997). Micro level social interactions are the arenas wherein such creativity is applied and thus where the meanings of institutions are constructed, albeit by agents drawing from institutional rules and norms which provide the raw materials and guidelines for such interactions. Consequently, ‘Institutions are not inert categories of meaning; rather they are populated with people whose social interactions suffuse institutions with local force and significance’ (Hallett and Ventresca 2006 p.213). This literature rejects that assumption that actors are ‘carriers’ of logics and instead suggests that they are active creators and adapters of practice (Binder 2007). For Binder (2007) actors are responsive to the institutional logics within their organisational spheres, and are thus embedded. But their derived ability to be creative with their institutional placement means that they can find themselves in an ‘institutional juncture’ (p.565) whereby the distance needed to play with the meanings of institutions creates an unsettled feeling of ambivalence towards what is considered appropriate. Her point is that actors are inventive within their contexts, and their institutional scripts are both guided by broader social systems as well as local meaning systems developed through political and meaningful interaction.

Thus this perspective offers a novel means to understand and appreciate the role of micro level interactions within the socially defined contours of resource rich institutional logics. As Hallett and Ventresca (2006) note, ‘...a focus on inhabited institutions must not neglect the wider systems of meaning that provide, authorize and organize the elements of on-going activity’ (p.227). The focus on micro level meaning construction of both translation and inhabited institutions is certainly an important one and suggests that actor groups are prone to interpreting institutional structures in different ways. Additionally, the latter also holds agency and structure apart to recognise the structural boundaries facing actors. Delbridge and Edwards (2013) explored this facet by combining inhabited institutions theory with Critical Realism. They theorise that agents are reflexive in that they combine their past experiences with their assessments of situational circumstances. Past experiences are generated from exposure to and reflection on multiple institutional logics which, through social interaction, may lead to institutional variation and change. Interestingly, literature on institutional work has supplemented the insights from inhabited institutions literature by providing explanations for both unintentional and intentional change, and for institutional maintenance as well as change.

## **Institutional work**

In a reaction to the predominantly structural and hagiographic lens of institutional entrepreneurship, 'Institutional work' (Clegg et al 2006) looked to elucidate the day-to-day equivocal instances of agency with a focus on intentionality and effort (Lawrence, Suddaby and Leca 2011). Lawrence and Suddaby (2006) defined three broad types of institutional work; creating, maintaining and disrupting. Creating involves 'political work' whereby actors reconstruct rules and boundaries, reconfigure belief systems and alter abstract categorisations which in turn modify meaning systems. Disrupting involves work which disconnects rewards and sanctions from practices, technologies and rules in an attempt to disassociate practices from their moral and normative foundations by undermining the core beliefs and assumptions undergirding it. Finally, maintenance is achieved by continued adherence to rules and meaning systems and the ensured reproduction of existing norms and beliefs.

The intentional dimension to institutional work implies that individuals actively engage in processes of institutional creation, maintenance and destruction in ways that speak to Emirbayer and Mische's (1998) idea of 'projective agency'. Actors may strategically and consciously reshape social situations when they are able to reflect on their embeddedness whilst acting within it and alongside it. Embedded actors thus retain a '...degree of latitude and choice in how they interpret the range of legitimate actions available to them' (Lawrence et al 2011 p.54). In particular, institutional work as an agent-centric approach has been applied by academics studying the rhetorical and discursive strategies of institutional change. For example, Riaz et al (2011) found that emerging institutional work relating to the financial crisis was evident in broad rhetorical narratives which indicated the positions taken by actors. They suggested that actors' application of rhetorical strategies depended on their positions as neutral, supportive of the status quo or in favour of change. Communicating positions is seen as a form of institutional work which can be geared towards creation, disruption and maintenance. Indeed, even rhetorical neutrality can be understood as a subtle form of institutional work in support of existing arrangements. Similarly Clegg et al (2006) argue that when creating change actors 'use' institutional logics to legitimate their own institutional projects by discursively linking logics' cognitive and normative resources with the new practices they wish to legitimate. Such actions clearly relate to Suddaby and Greenwood's (2005) conception of theorisation types which involve the development of associations between new actions or practices and existing cultural templates.

It should be noted that a smaller body of literature has examined the types of institutional work involved in institutional maintenance (Lawrence and Suddaby 2006, Zilber 2009). For example, Zilber (2009) theorises that an institution's maintenance involves the reconstruction of an institutional order through story type narratives. Zilber states that forms of institutional work are used to carry, embed and translate societal meta-narratives into organisations and their members. In Zilber's (2006) study of an Israeli rape crisis centre, institutional maintenance occurred because meta-narratives were 'carried' through recruitment and training practices which ensured that only certain institutions entered into the organisation.

Institutional work also occurs at various levels of analysis (Lawrence et al 2011, Tracey et al 2010). Tracey et al (2010) outlined how institutional entrepreneurs carry out institutional work at the micro, meso and macro levels when creating and building new organisational forms (Table 1). Their study develops the concept of 'bridging institutional entrepreneurship' whereby actors pursuing institutional work combined aspects of two established institutional logics and their associated organising forms in order to create a hybrid logic which they then used to legitimate a new organisational form. Key dimensions of the bridging process represent various institutional work types at different levels of analysis: problem framing, counterfactual thinking [micro], building organisational templates, theorising those templates [meso], connecting with a macro level discourse and aligning with highly legitimate actors [macro] (p.5). Legitimizing was predominantly carried out at the macro level; theorising of the organisational template distilled the '...essence of the organizational form to help actors used to operating according to different logics understand the new logic' (p.13). Their framework therefore illustrates that a new logic cannot be developed and legitimated outside the sensemaking criteria of a priori incumbent logics. In other words, Tracey et al (Table 1) demonstrates that institutional work is bounded by and reliant upon the institutional structure in which actors are embedded. In particular, at the macro level institutional work involves re-articulating the new logic to embedded actors in ways which resonate with appropriate macro discourses, norms and conventions.



**Table 1 Summary of a Multiple-level Institutional Work Framework**

<b>Levels of analysis</b>	<b>Institutional work</b>	<b>Personal actions</b>
<b>Micro</b>	Opportunity recognition, problematisations and framing: counterfactual thinking	Rooted in interest and experiences of institutional entrepreneur
<b>Meso</b>	Design new organisation form, build an organisational template and theorise why it makes sense	Creativity and imaginations required – drew strategically on multiple logics
<b>Macro</b>	Legitimate new form, connect with appropriate macro discourse and align with legitimate actors	Creative linguistic management needed

*Source: Tracey et al (2010)*

Tracey et al's (2010) framework provides individuals with the theoretical capacity to transcend the totalising influence of institutions (Lawrence, Suddaby and Leca 2011). Discursive strategies constitute the tools used to resist, challenge or conform to the pressures of the institutional environment. However, there is concern that this approach privileges the micro 'bottom-up' mechanisms of institutional change (Hwang and Colyvas 2011). Such a 'reversal of causality' (Hwang and Colyvas 2011 p.63) from earlier neo-institutional accounts may imply an under theorising of the interinstitutional context. In a similar vein Schildt, Mantere and Vaara (2011) suggest that '...a fuller understanding of institutional work requires analyses that link specific rhetorical strategies to broader logics of reasoning and prevailing discourses through which the abilities of arguments to stand out as justifications are established' (p.83). They argue that the discursive manifestations of institutional work need to be considered more directly in the context of wider normative and cognitive restraints given that discursive work is a key part of institutional work. Additionally, Kaghan and Lounsbury (2011) claim that institutional work is too focused on agency and therefore suffers from methodological individualism. They advise institutional work theorists to consider insights from '...old institutionalism to inform a 'methodological groupism' approach which allows an understanding of the self and intentionality with reference to the 'other' and the 'generalised other in which the acting individual is embedded' (p.75). All criticisms above have a common reproach in that they recognise that an effort is still required to synchronise debates on intentionality and institutional work with the contextual accounts of institutional logics and '...multiple social and technical structures at all levels' (Kaghan and Lounsbury 2011 p.76). There is still a requirement to appreciate the linkages between all levels of institutional analysis so that

macro dynamics of the field are understood in conjunction with the lived experience and work of actors.

## **Institutional Complexity: Connecting the Levels**

Recent fascination with discursive and rhetorical based approaches to understanding the micro-processes of institutional change has led to a body of institutional literature which has disengaged somewhat from macro and structural considerations. This is perhaps symptomatic of an academic migration away from the older structurally centred models of Meyer and Rowan (1977) and DiMaggio and Powell (1983). The micro level focus of newer literature is not fundamentally problematic, but creates a literature gap for further research into the links between institutional work and the societal intra-institutional system. As Friedland and Alford (1991) note, agents '...live across institutions' (p.42) and thus do not reside in a small fortified and isolated institutional domain. There is thus space for institutional literature to examine how broader and multiple institutional logics manifest within the more local worlds of actors. Indeed Thornton, Ocasio and Lounsbury (2012) suggest that field-level logics '...are both embedded in societal-level logics and subject to field level processes that generate distinct forms of instantiation, variation and combination of societal logics' (p.148). Literature on institutional complexity has made some headway here. The term 'complexity' refers to the multiplicity of institutional pressures and logics enacting and interacting through actors engaged in their empirical context. Recent papers on complexity have highlighted the multivocal nature of institutional contexts and how actors affected by multiple logics tend to respond in different though patterned ways (Greenwood et al 2011, Delbridge and Edwards 2013). This section will first outline complexity before examining research which has considered the relationship between macro institutional structures and micro actions. It will conclude that an understanding of field or industry based 'situated' logics provides a means to understand the emergent and manifest outcome of the interactions between actors and societal logics.

Greenwood et al (2010) provided a recent delineation of institutional complexity. The authors conducted a multiple level study which examined how the reaction of companies to an overarching market logic was mediated by historical state and family logics. The interactions of these logics at various levels led to community level idiosyncrasies which were important in understanding the motivations behind the resistance to or advocacy for institutional change. Greenwood and colleagues found that non-market logics of the state, religion and of family act at the community

level to affect business responses to market contexts. The findings illustrate that individuals who inhabit organisations are members of multiple institutional fields with many conflicting and coexisting institutional logics. Consequently, the legitimacy of an action is not only dependent on the dominant logic of a single field, but alternative logics from other fields have mediating effects which leads to institutional complexity. Although this stirs up questions regarding the construction and porosity of field boundaries, it begins to build a more complete and complex picture of the interactions between societal logics outside the field and those within it. Indeed studies in complexity work towards overcoming Delbridge and Edward's (2007) concern that '...work at the micro level has struggled to locate and embed agency in the wider institutional and organizational contexts' (p.193).

This thesis draws certain lessons from the institutional complexity literature. Primarily it recognises that logics may mediate the implications of other logics at the field level, and that this mediation can seemingly create a degree of agency which may manifest as resistance (Greenwood et al 2010). Additionally it notes the need to explore not only logics identified within a field, but also those which exist externally but impact actors within that field nonetheless. Indeed, such 'external' logics have been identified as important by theorisation and legitimation literature which often points to the existence of 'broader meaning systems' to which new theorisations are linked.

## **Field Externalities and Institutionalisation**

Literature on institutional work and entrepreneurship has shown that contradictory and contesting logics offer the resources needed for actors to begin discursively building comprehensible change. This comprehension comes from the alignment of new forms and practices with historically expected and embedded institutional arrangements. For example, actor theorisation draws on alternative logics to encode new criteria of legitimacy by connecting new forms to already accepted cultural templates. There are two streams of institutional literature which stand out as having offered ways in which to conceptualise institutional change as a result of the dynamics between societal logics and field level actors. The first is literature on the legitimating of new organisational forms, and the second is the literature on institutional change facilitated by social movements. Both rely on the assumption that '...Institutional entrepreneurs creatively manipulate social relationships by importing and exporting cultural symbols and practices from one institutional order to another' (Thornton and Ocasio 2008 p.115).

Researchers studying the emergence of new organisational forms often identify institutional 'tools' residing outside of a field to explain how actors can be both embedded and able to create new institutionally legitimate forms (Tracey et al 2010, Markowitz et al 2011, Rao and Giorgi 2006, Lounsbury, Ventresca and Hirsch 2002). These authors try to elucidate how institutional entrepreneurs conduct institutional work during a legitimation project through which they hope to combine meaning systems from internal and external social realities. For example, in their 2012 book on institutional logics, Thornton, Ocasio and Lounsbury argued that cultural entrepreneurship can involve the 'blending' of logics through the segregation of 'elemental categories of different institutional orders' (p.107). Segregated elements of orders can then become blended with others to develop novel institutional forms (Glynn and Lounsbury 2005). In essence, institutionally innovative behaviour works towards and is motivated by the recombination of institutional meanings whereby an 'element' of an institutional order may be isolated from its previous institutional moorings and transposed into a new institutional space (Thornton, Ocasio and Lounsbury 2012): '...individuals and organizations connecting segregated groups are influenced to a greater extent by alternative ways of thinking and behaving. This reveals opportunities to synthesise novel combinations of ideas and borrow ideas that may have been commonplace in one community for implementation in another context where they are more valued or valued in a different way' (Thornton, Ocasio and Lounsbury 2012 p.110)

Additionally Rao and Giorgi (2006) studied how actors deployed pre-existing logics to forward their own institutional projects. They '...liken institutional innovation to code-breaking' (p.270) whereby the code-like character of ambiguous cultural logics is challenged by both insiders and outsiders of a bounded social system who either exploit an existing logic or import an alternative logic from another social system. The possibility to re-institutionalise an institutional project also depends on structural factors such as political opportunity and the ability to mobilise resources. Markowitz et al (2011) builds on Rao and Giorgi (2006) to argue that institutional entrepreneurs are members of multiple fields and use existing institutional logics from various fields to legitimate themselves as innovators (p.3): '...if we conceptualise organisations as populated by individuals who exist in multiple organisations, then we view these individuals as accessing institutional logics from multiple fields' (p.4). Hence actors are simultaneously inside and outside of an organisational field, rather than being in one or the other as implied by Rao and Giorgi (2006). Markowitz and colleagues (2011) propose that institutional entrepreneurs gain legitimacy in three consecutive ways; they draw on an existing logic by adopting its rational myths and ceremonies in order to delineate their general being; they then use 'boundary framing' to distinguish themselves from other actors in the field by

integrating outside frames and emphasising their commitment to these; finally, they use framing strategies of these 'outside actors' such as social movements, to motivate and mobilise those sympathetic to the outsider's frames.

Rao, Monin and Durand (2005) considered how a social movement affected the French fine cuisine movement. They examined how the institutional logics changed within French gastronomy by exploring how individuals identified with the Nouvelle cuisine social movement. They argue that social movements shift the dominant logic in a field by defining new roles and identities (Meyer and Hammerschmid (2006). Institutional contradictions caused by social movements therefore occur at the level of identity: '...social identity is the link between institutional logics and individual behaviours...our study shows how identity movements create institutional gaps by highlighting defects at the immediate and proximal level of identities rather than at the abstract and distal level of logics' (p.835). Meyer and Hammerschmid's paper shows how identity movements encapsulated within social movements oppose previous cultural codes, aspire for cultural change and thus promote new institutional logics. It is also interesting how the authors relate the nouvelle movement to the developing zeitgeist of post-revolutionary France and the societal change pervasive within the broader national context, including the literary and film worlds: 'Nouvelle cuisine arose because an initiator movement exposed the mutability of the logic of classical cuisine and surfaced tensions between the logic of classical cuisine and the new logics that were being established in cognate fields such as literature, drama and film' (p.808).

More recently Sine and Lee (2009) have provided an environmentally focused institutional paper examining the role of social movements in propagating cognitive frameworks. They argue that societal level forces such as Social Movement Organisations (SMOs) can disrupt institutional arrangements by embedding their values into regulatory structures. In so doing they create new supportive contexts for entrepreneurial activity. The paper specifically studies the US wind energy sector between 1978 and 1992 and observes how a social movement attempted to overturn previous conceptions of wind technology as 'expensive' 'uncertain' and 'risky'. Sine and Lee propose that the geographical variation in wind farm construction was not down to efficiency, but more attributable to the influence of SMOs in particular areas. SMO's engaged in institutional work through problematizing issues and theorizing wind energy solutions, they then mobilised their membership to promulgate new frames whilst providing a social infrastructure through which information could flow. Via this process the SMOs created a '...coherent and resonant "renewable energy frame" that simultaneously delegitimated the use of oil, coal and nuclear fuels... and

valorised more benign inputs such as wind, photovoltaic, geothermal and biomass' (p.135). Indeed this is a clear example of a societal environmental logic becoming embedded within a field previously unrelated. However, whilst implying that SMOs created specific frames for the US energy industry in their pursuit of legitimating wind power, Sine and Lee, as well as the previous scholars explored above (bar Rao, Monin and Durand 2005) pay little attention to how the process of field level manifestation impacts the nature of the institutional logic. Indeed this oversight may be symptomatic of a lack of theorising around the connections between actors, fields and societal logics. The following section looks to develop the conceptualisation of 'situated logics' which appreciates the relationship between processual and structural theories of agency discussed earlier and the more macro and societally focused literature explored here.

## **Conceptualising Situated Logics**

There is yet to be an accepted and clarified approach to understanding how societal logics come to be manifest within organisational fields. Although institutional research has moved away from oversocialised and structural determinate accounts of institutional change towards more agency based research agendas, there remains a tendency to understand field level logics as abstracted and isolated from 'wider and higher' institutional structures. By combining agency based theories such as institutional work and the processual accounts of institutional entrepreneurship with structural literatures which focus on the societal institutional context and the fractures and contradictions therein, it is possible to construct a view of embedded agency which recognises the interconnectedness of institutional levels of analysis.

This thesis therefore proposes the concept of 'situated logics' to understand the dynamic between institutional levels of analysis. Actors are embedded within a societal level interinstitutional system (Friedland and Alford 1991, Thornton and Ocasio 2008) but this environment does not scientifically diffuse (Zilber 2002) into organisational fields in a way which guarantees passivity and deterministic adoption of forms and practices. Actors are constantly engaged in institutional work, interpretation and creativity which affect the ways in which societal institutional logics become manifest within a field. Situated logics develop through the localised manifestation of those broader logics, either passively informing or offering the 'tools' for actors to actively reengineer how such logics inform practice and action within a given industry. Given that actors are embedded within fields as well as within societal institutional systems, their ability to perceive and mobilise institutional change is dependent on structural conditions, yet the form in which the logic manifests at field level is an

outcome of the meaningful conditions of the field and the interests of the actors engaging with projects for change. Such situated institutionalised values echo the unique historical and expressive characteristics of the field as understood by constitutive actors. There are likely to be multiple situated logics within a field, and their character is likely to mediate how external logics are perceived (Greenwood et al 2011) or, alternatively, come to be manifest within the field itself. An institutional work framework (Tracey et al 2010) can be applied to understand the role of agency in the situating and manifestation of situated logics, as well as their maintenance and disruption. As such a 'situated logic' is defined as:

The localised manifestation of a societal logic within a specific community of actors whose institutional context and history has implications upon the nature of the situated logic, and for whom the situated logic informs perspectives of legitimacy and delineates values, norms and conventions which align in some way with the societal logic from which it draws its coherence and ultimate purpose.

## **In Summary**

The review has outlined the direction of institutional literature over the past few decades and has identified a number of shortcomings within institutional theory which are yet to be resolved. The body of work around institutional entrepreneurship has provided many fascinating insights into why and how embedded agency is enacted. Structural approaches which focus on logic contradiction, social position and embeddedness have illustrated that structural conditions provide opportunities for actors to recognise the possibility for change, but that they also must have the political power and the resources necessary to enact such change. More processual accounts have shown the micro-sociological detail of such enactment. Through discursive strategies and meaning based work agents may diffuse their own theorisations in order to rationalise and legitimate a change project. Theories such as translation, inhabited institutions and institutional work have provided broader agency based frameworks from which to study the discursive actions of agents. Whilst agent based literature has boomed there has also been a move towards understanding institutional complexity and the plurality of institutional logics. This body of work has revealed that multiple logics interact at various levels of analysis and may affect how actions are perceived at the field level. However, it remains unclear how findings from micro based studies fit with their field and societal level counterparts. There still seems to be little inclination for field level studies in particular to delineate the origins of their field level logics. Additionally there is a lack of research

which illustrates how societal logics external to a field come to be manifest within them as a result of agency (bar the social movement and new organisational form literature) .

This literature review has forwarded the concept of a situated logic to overcome the shortcomings outlined above. As an analytical concept, situated logics provide this thesis with the tools necessary to unearth the relationships between embedded actors, field level logics and higher-order societal logics. Theory explicated within the literature reviewed throughout the chapter provides many accompanying resources to understand both discursive behaviour at the agentic level and structural opportunities at the societal level. Additionally institutional work (Tracey et al 2010) provides a broader framework from which to study the relationship between embedded agency and societal logics. As such, the research questions outlined below speak to both the research gaps highlighted throughout the chapter as well as to the ontological dynamic between agency and structure within institutional analysis. All research questions relate to the broader research objective of explaining the green paradox of nuclear power.

#### **Research Question 1**

- What is the relationship between institutional levels of analysis?
  - How does the concept of ‘situated logics’ provide insights into the interactions between agents, fields and societal logics?
  - How does the concept of ‘situated logics’ help explain the green paradox of nuclear power?

#### **Research Question 2**

- What role do actors play in the development of ‘situated logics’?
  - How can an institutional work approach be utilised to fully understand the role of agency in the construction and/or reinforcement of situated logics?
  - To what extent can processes of institutional entrepreneurship help elucidate the manifestation, elaboration and institutionalisation of situated logics?
  - How do the actions of actors contribute to the creation of a green paradox?

A third research question will be developed in the following chapter which explores the utility and necessity of recognising a societal level environmental institutional logic as part of the interinstitutional system.



# Chapter 3: An Environmental Logic

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## **An Environmental Societal Logic**

Organisational Theory (OT) has the potential to move beyond a conceptualisation of the natural environment as a purely objective resource. Sine and Lee (2009) suggest that ‘...the social and cognitive processes by which resources and products take on value are understudied...and much of contemporary organizational theory assumes that resources are objective realities’ (p.151) which may account for why the socially constructed element of the natural environment is rarely approached within OT. However, in the past decade there has been an increase in sociological theorising which extends a ‘social nature’ and encapsulates an understanding that nature is not merely a resource, but is also socially constructed by society in ways that lead to variety in perspectives and attitudes towards the environment (Egri and Pinfield 1996). This thesis argues that there is an opportunity for organisational scholars to adopt this movement in sociology and move away from the ‘...OS [Organisational Studies] ideas of organisational environment [which] are narrow, economistic, and anti-naturalistic’ (Jennings and Zandbergen 1995 p.711) and towards a more subjective understanding of the environment and its relationship with organisations and industries.

In particular, institutional theory provides an interesting field in which to consider ‘social nature’, or rather the socialised and subjective understandings of nature, because of its interest in the division between material and institutional environments (Scott et al 2000). Considering a social dimension to the natural environment moves the conceptualisation of nature away from the purely objective and towards an approach which embraces its material, social and institutional characteristics. Understanding can be enhanced by accepting that perceptions of the natural environment should be considered as organised and informed by a societal logic which should be included within Friedland and Alford’s (1991) intra-institutional framework. This is in response to organisational theorists who demand a re-conceptualisation of the ‘...organisational environment in a way that gives centrality to the natural environment’ (Shrivastava 1994 p.705) and resonates with academics who promote the need to make ‘...environment’ a more inclusive signifier within organizational studies, particularly given that organizations are responsible for the majority of natural capital depletion (Jennings and Zandbergen 1995).

This chapter will examine the different paradigms defined within social science and how they provide different ways of analysing the human-nature relationship. Such descriptions will be used to understand why nature has been omitted for so long within organisational studies. Indeed, the construction of an environmental institutional logic is inherently a matter of nature's epistemology; to what extent is nature a known objective entity and to what extent may it be construed as an institutional construct? It is argued that all human understandings of what is 'nature' are subjective and crucially mediated by social and cultural assumptions, practices and belief systems (Goldman and Schurman 2000). In other words, the natural environment is given a social form which recognises that understandings of nature are mediated by institutional rules and norms which denote what nature represents and thus what it is to be environmentally friendly. Examples from both institutional and sociological work will be presented in order to develop and justify a societal environmental institutional logic.

## **Anthropological Beginnings: Objectifying Nature**

The lack of theorising around the natural environment within organisational theory prior to the 1970s has in part been attributed to the anthropocentric bias of the social sciences (Shrivastava 1994, Purser et al 1995). Anthropocentrism, as suggested by Purser et al (1995) is an ontological position which is founded on the perception that there is a fundamental polarization between organisations and the natural environment which generates a code of ethics towards nature that undermines its moral relevance. In other words, anthropocentrism marginalises the moral significance of the environment by ontologically distinguishing it from the central role of humankind and its organisations. During the 1970s sociologists Dunlap and Catton (see Dunlap and Catton 1979) published a series of articles which examined why the natural environment was largely omitted from sociological inquiries. They contended that sociology was composed of 'minor variants of the same paradigm; the 'human exemptionalist paradigm' (Goldman and Schurman 2000 p.563). Much like the 'dominant social paradigm' wherein man is seen to have a 'divine right' to tame the chaos that is 'nature' (Egri and Pinfield 1996), this paradigm linked many theories by their common trait of anthropocentrism whereby humanity's role is to maintain dominion over that which is earthly and natural. As Goldman and Schurman (2000) note, this common conception of the natural environment accepts a great divide between nature and society which treats nature as a discrete and external object of study.

The separation of human minds from the physical world within which they exist is a cornerstone of much social science theorizing given its basis in the Cartesian dualism of mind and matter (Egri and Pinfield 1996, Gladwin, James and Tara-Shelomith 1995): ‘...Led by Descartes, philosophers had begun to formulate a new conception of nature as intricate, impersonal, and an inert machine’ (p.39). Indeed, Goldman and Schurman (2000) understand the lack of ecological sociology, especially before the 1970s, as a consequence of 17<sup>th</sup> Century Enlightenment ontology which treated nature as ‘...primordial, autonomous and mechanistic’ (Goldman and Schurman 2000 p.564). Purser et al (1995) further suggests that this dualistic thinking and anthropocentric tendencies have been reinforced by three sociological inclinations; linear vision perspectives, a ‘camera theory of knowledge’ and, as mentioned, the socially constructed categorical separation between humans and nature. Briefly, the linear vision perspective was an artistic and scientific tool developed during the Renaissance whereby the observer viewed the world as if from a fixed vantage point. According to Purser et al (1995) this perspective was a precursor to scientific conceptualisations of the environment where the landscape became merely “geometry of the eyes” (p.1056) and actors located themselves at the centre of the natural world through a detached form of inquiry. The camera theory of knowledge followed the linear view and was evident during the Enlightenment when researchers were attempting to gather ‘truths’ about the environment through unobtrusive measurement and observation: ‘Behind the lens of the camera, a certain habit of mind was also formed – a detached, disembodied, and neutral observer – a recorder of events’ (Purser et al 1995 p.1057). The combination of these factors produced a spectator epistemology whereby the natural world became merely an ‘object of vision’ in accordance with the ‘hegemony of the eye’ (p.1056). Understandably these paradigmatic foundations have influenced the approach of organisational theory to the natural environment given its theoretical roots in sociology, psychology and economics.

## **Organisational Theory and Nature**

Gladwin et al (1995) argues that the paucity of attention to the biophysical world in management theory makes it appear as if organisations lack any biophysical foundation, thereby disassociating them from the basic sources of life upon which they are reliant. Similar to their critique of sociology, Gladwin et al (1995) and Purser et al (1995) attribute this disassociation to management and organisation theory’s contemporary manifestations of anthropocentrism. Purser et al (1995) refer to these manifestations as ‘technoknowledge’ and ‘egocentric orientation’. The former privileges technological knowledge discourses in a way which emphasises utilitarian functionalism and

marginalises any subjective view of nature by dismissing it as mere sentiment. The latter expresses the ultimate purpose of nature as a natural treasure trove for exploitation and optimization. These manifestations may explain why much work on the environment tends to lead to the development of management strategies which base their success on definitions of progress such as profit maximisation (Shrivastava 1995).

As such, research engaging with environmental issues within organisational and management theory tend to provide functionalist approaches which further the perception that organisational theory should be proposing strategies to control the natural resource environment. Consequently Newton and Harte (1997) note that '...at a theoretical level, writers on environmental strategy tend to simply rewrite the corporate strategy literature in environmental terms' (p.87). Additionally academic papers provide methods through which companies can achieve sustainability through processes of adaption to the natural environment (Jennings, Zandbergen and Martens 2002). These environmental papers explicate guidelines which have transformed from specialised and situated programmes to rationalised and standardised practices for all organisations. For example, TQEM (Total Quality Environmental Management) and life cycle analysis are among the most common (Shrivastava 1995, Jennings et al 2002). As such, organisational theorists tend to treat the natural environment as a controllable system, reinforcing its objectivity and thereby hindering more epistemologically challenging research agendas. The following section examines the sociological movement away from these objectivist and resource-centric accounts of the environment and towards an understanding of nature's socially constructed elements.

## **Introducing an Ecological Paradigm**

The movement away from the 'dominant social paradigm' (Purser et al 1995 p.1054) has been led by a handful of sociologists who understand a distinction between theorists who externalise nature and comply with the metaphysical polarity between nature and humanity, and theorists who do not. This work has spring-boarded from Dunlap and Catton's (1979) renowned call for an 'ecological paradigm' to overcome the chauvinisms of the one previous: '...the environment should not be introduced as just another new variable or theme, but as a radically new way of thinking about society' (Goldman and Schurman 2000 p.564). Their request echoes the tensions between recent scholars who believe that nature and social organisation are inseparable and intertwined, and 'traditionalists' who impose '...an enduring conflict between the logic and dynamics of natural ecosystems and those of industrialised society which prevent any meaningful synthesis at either

practical or theoretical levels' (Egri and Pinfield 1996 p.460). The ecological paradigm implies that the inextricably intertwined nature of markets and ecosystems means that organisational actions have far deeper reaching consequences on societies: '...ecosystems support economies, not the other way around' (Daly and Cobb 1994 quoted in Jennings and Zandbergen 1995 p.1015).

However, this 'ecocentrism' is criticised as failing to adequately address social pathologies and therefore depreciates the importance of humans by subordinating them to nature (Gladwin et al 1995). Additionally, ecocentric approaches may still consider the natural environment as an externality, meaning that the ontological conditions which have in the past been blamed for the marginalisation of environmental issues have not been reconsidered within the realms of organisational theory. Indeed, there is an ambiguity around what an 'ecological paradigm' means; does it mean functional consideration of the environment at all times, or does it represent a fundamentally new approach to considering the nature and human relationship? Castree and Braun (2001) answered this question by suggesting that both technocratic and ecocentric perspectives are non-social in their descriptions of nature and therefore the ecological paradigm continues to reinforce the functional consideration of nature: '...it is this notion of a non-social nature that underpins the familiar geographical vocabularies of societies 'impacting upon', 'interfacing with', or 'destroying' environments' (Castree 2001 p.13). The basic assumption of ecocentric work is thus that '...alignment between environmental strategy and organizational culture, capabilities and competences in general are conducive to improved environmental performance' (Etzion 1997). However, institutionalism offers scope to engage more fully with the concept of 'social nature'.

## **Institutionalism and Nature**

Institutional theory offers the means to contemplate themes often considered objective by understanding that the meanings of each are inscribed in institutional prescriptions that exist within the realms of an institutional environment (Scott 1995). For example, the concept of an objective market is problematised by understanding that a market consists of socially constructed institutional prescriptions of how it should be structured and enacted (Biggart and Delbridge 2004). Hence, there is scope to overcome the stifling externalisation of the natural environment by recognising that societies' approaches to nature are prescribed by meaning systems residing within the institutional environment. However, in spite of the ubiquity of the natural world and its effect on the way organisations make sense of their surroundings '...current institutional theory does not focus much of its explanatory effort on the constraints imposed by the physical or natural world on

the construction of reality or instilling value (Jennings and Zandbergen 1995 pp.1041-2). Institutionalism is well equipped to deal with the social and normative character of the natural environment, but its roots within management science and sociology hold it to the approaches discussed previously. Indeed, the previous discussion has illustrated the dismissal of nature as something which lies 'beyond' social scientists. Hence, to allow for nature to become a part of the institutional environment the mind-set which separates nature from the social world needs to be problematised and overcome.

This is not to say that institutional studies ignore the existence of the environment because of their ontological predisposition, but rather that the few studies that do contend with environmental issues refer to the environment in a way that implies its 'otherness'. For example, Maguire and Hardy (2009) discuss the translations of problematisations involving the use of DDT brought about through environmental discourse surrounding issues raised in Rachel Carson's (1962) book *Silent Spring*. However, they avoid any analysis of societal level changes in perceptions of the natural environment which may have precluded the deinstitutionalisation of DDT usage; perhaps institutional change regarding what was 'environmental' was affecting the legitimisation of the emergent anti-DDT discourse and facilitating the survival of problematisations as they underwent translation. In other words, what did the voluntary abandonment of DDT say about perceptions of the environment? The paper side-lines any interest in the social understandings of the natural environment. Rather the environment is viewed as the stable scenery to the institutional change being viewed.

Similarly Hoffman (1999) examined the development of an organisational field around the issue of corporate environmentalism and asked how field level research could illuminate the institutional origins of organisational approaches to the natural environment. For Hoffman, '...fields become centres of debates in which competing interests negotiate over issue interpretation' (p.351). The meaning of corporate environmentalism was shaped by the social dynamics and debates found during processes of field-level reconstruction. The constituents of fields continually change as members join and leave, and as the field alters new institutions enter and are redefined to reflect the interests of the newly formed field. Thus, over the period 1960-1993 there was continual redefinition of corporate environmental practice within the US chemical sector. In both studies explored above the socially constructed element are the strategies pertaining to the environment, not the environment itself. As such, the legitimacy of management approaches in relation to the natural world are affected by institutional pressures, but that environment itself remains a fixed and taken-for-granted consideration.

Fineman (2001) argues that greening is adopted in light of strong societal surges despite its minimal rationality and attractiveness from an industrial point of view. The question he asks is whether or not 'Greening' is a management fashion and focuses on the ways in which moral entrepreneurs 'sell' the rhetoric as pragmatic. Interestingly, the author draws on 'environmentalism' as a mentality inspired by ideals of harmonious human residence with natural systems, which resonates with an ecocentric mind-set and a conception that the strategies of 'environmentalism' represent a social view of how the environment should be understood. The author further mentions 'other voices': '...the green wave in society is a broad one, and various professions and special interest groups tangle with each other to promote their different green ways' (p.23) suggesting a variation in the social meaning of the natural environment. Fineman surmises that the societal surge in green awareness continues to become institutionalised in legal, Governmental and educational institutions, yet industrial sectors struggle to '...embrace more than the lighter trappings of greening' (p.27). This study therefore suggests that organisations have a pragmatic and distant relationship with the natural environment and that the roles and actions of stakeholders and consultant 'moral entrepreneurs' steer them a safe passage through 'green irritants'. However, it also implies that environmental ideas are varied and constructed by organisations in ways that may re-tune institutional structures. Interestingly, this illustrates the mediating role of organisations in re-organising what it means to be 'green' via displays of corporate power. Consequently, Fineman's approach provides the closest example of an institutional understanding of the natural environment.

## **Nature and the Institutional Environment**

The studies explored above illustrate an implied assumption that what is meant by 'environmentalism' can vary between organisations within fields. This suggests that what is 'environmental' is institutionally conditioned to some extent. However, this is often seen as a re-engineering project by corporations or 'moral entrepreneurs' (Fineman 2001) who employ pragmatic logics to re-frame a corporate environmental practice. As such, environmentalism is a practice whose meaning changes, not an institutionally conditioned way of thinking. To do the latter would be to imply its existence within the institutional environment and ontologically alter its current position, which is precisely the agenda of the following sections of the chapter. The aim is to recognise the socially constructed character of the natural environment in order to argue that this construction is informed by cultural and symbolic 'rules' which reside within the institutional environment. These rules are symptomatic of a higher order environmental institutional logic which informs actors and organisations on what the natural environmental represents and thus what

constitutes environmentally friendly behaviour. This is not about delineating an ecological paradigm, but rather to appreciate that the natural environment is mediated by institutionalised meaning systems. To begin theorising an environmental logic this thesis has drawn on a relatively new area of sociology which examines the possibility of 'social nature'.

## **Social Nature as Part of an Institutional 'Environment'**

'The "needs" of the environment are never represented directly by the natural environment itself, but rather by different groups and collective entities, each with its own agenda and belief system. ...Norms, beliefs, and actions in the organizational environment are...heavily influenced by the way actors-both within the organization and external to it-perceive and understand the natural environment' (Etzion 2007 p.650).

In order to convincingly fashion the concept of an 'environmental logic' there needs to be a clear sense of what would constitute such a logic. That is, without a clear depiction of the social element of the natural environment it would be impossible to comprehensively argue that it resides within the institutional environment. Therefore this discussion moves on to incorporate sociological theorising from the domain of 'social nature' which considers that nature is represented by multiple connotations; '...nature is both a concept and all those physical things to which the concept refers. It's a complex concept, not just because it refers to many different entities – from the weather through animals to human 'nature' and beyond – but because it also has multiple meanings' (Castree in Castree 2001 p.5). Epistemologically it is argued that there are various perceptions of what 'nature' means and what we think we know about it. These are mediated through cultural lenses, and influenced by different social, political and historical factors (Palmer 2003).

As discussed, nature is frequently taken to mean a totality of everything that appears not humanly constructed. Yet recent decades have witnessed a turnaround in the institutionalised division between society and nature within nature/geographically based disciplines specifically. Initially inspired by Margaret Fitzsimmons' lamentation of the 'peculiar silence on the question...of nature' (Castree and Braun 2001 p.xi) developments have been made by researchers within the academic domains of radical geography (Fitzsimmons 1989, Castree 2001), environmental sociology (Greider and Garkovich 1994) and environmental history (Bird 1987). These scholars readdress the Enlightenment legacy which inculcated the ontological abstraction of the natural environment from the social world, by developing a social theory of nature. In doing so they propose that nature has no meaning in itself (Greider and Garkovich 1994) and therefore relies on the development of



socially constructed norms and values to infuse it with meaning. Similarly Castree (2001) argues that 'Nature is both a concept, and all those physical things to which the concept refers' (p.1). Indeed, the idea of 'social nature' is not new, and has inhabited distinct realms of Geography influenced by post-modernist theorizing (Castree 2001). These scholars ascertain that nature is unknowable as a pure objective and singular entity and that society must therefore construct its social dimensions. As such, the symbolic meanings and definitions of nature are sociocultural phenomena which become superimposed upon a physical nature (Greider and Garkovich 1994). Greider and Garkovich (1994) suggest that a 'symbolic landscape' is created which reflects the culturally defined self-definitions of the 'observer'. Actors therefore reify natural elements by creating them from cultural symbols, meaning that '...various conceptions of the environment are created from different social and cultural contexts...[and] intersubjective definitions of the situation...constitute reality' (pp.5-6)

'...nature is always something made...and its making is always about much more than just nature' (Castree and Braun 1998 p.109).

The literature on social nature provides an opportunity for the subjective knowledge of nature to conceptually reside within the institutional environment because it reaffirms that norms, values and cultural symbols are the tools for the natural environment's social construction. From an institutional perspective these tools are institutional constructs which reside within an actor's institutional environment. Given that the institutional environment is ultimately informed by higher level societal logics (Friedland and Alford 1991) it comes to pass that if environmental meanings cannot be explained by the organising principles of alternative logics, then a societal level environmental logic provides theoretical utility. The following section will examine in more depth the characteristics of institutional logics as defined by Friedland and Alford (1991) in order to build a higher-order environmental logic by combining institutionalism's theoretical principles with those of the social nature theorists explored previously.

## **Developing an Environmental Logic**

An institutional logic, as defined by Friedland and Alford (1991) is a '...set of material practices and symbolic constructions...' (p.248) which form the central organising principles of the significant institutional orders of Western society. These institutional orders (also known as societal sectors by Thornton 2004) pertain to Christian religion, family, capitalism, democracy and bureaucratic

state (see previous chapter). Through continual enactment and reproduction the central logics of these orders accumulate a sort of anonymity and objectively structural worth (Berger and Luckmann 1967) which stabilise institutional practices for those embedded within their influential bailiwick. Thus, there befalls two distinct conceptual elements to demarcate an environmental logic. Firstly it is proposed that concerns pertaining to environmental welfare and informed by meaning systems relating to the natural environment are constitutive of a central institutional order within the Western world. Secondly, the characteristics of the environment logic which encapsulate the principles of this order are defined so that its central organising facets and their symbolic and material prescriptions are illuminated in line with those of the pre-defined logics (Table 2). Both are elaborated below.

For environmental thought to be considered as an institutional order within the intra-institutional system the argument must be made that environmental consideration is a fundamental and societally accepted system of thought which is not fully informed by the existing institutional orders in the West. From the sociology literature above the former point has been argued; the natural environment is always mediated by social perceptions. These perceptions are influenced over time and may manifest in various forms, but they have key threads and themes running through them that conjoin them into a decisive institutional form. Indeed, for all institutional orders it is likely that the approaches to the material and symbolic subjects of each has changed; just like environmentalism has moved from 'using God's gift' to 'conservation and protection' so the understandings of what is religious or constitutes a family unit has similarly transformed over time. However, all pertain to historically enduring relations such as the relations between humans and a deity, the relations between blood relations and the relationship between society and nature. And all have logics which provide relatively stable demarcations of how these relationships should be formed and enacted. As such, it is defensible that approaches to the relationship between man and nature are defined by the institutional environment, and that an environmental institutional order would represent a relatively stable structure from which these definitions emanate.

Furthermore, it must also be considered to what extent other orders are able explain diverse understandings of nature. This chapter argues that an environmental institutional order assists institutional theorists in understanding why organisations interact with their natural environments in particular ways because no other institutional structure can fully account for such interactions. Organisational actions of environmental purpose are unconvincingly explained within the purview of alternative institutional orders. It is accepted that the environment is protected to some extent because companies want to make money by appearing environmentally responsible, because

religious individuals feel it is a divine practice or because family members may see it as their responsibility to protect future generations. However, Greenwood et al (2010) demonstrate how logics from multiple orders may influence a community's approach to practices prescribed by another order, illustrating that although orders impact each other they only define and impede specific aspects of one another. For example, understanding that environmental protection is a divine expectation neither means that a religious logic provides a complete and comprehensive set of institutional rules to inform all environmental action, nor that an environmental logic does not exist to inform environmental meaning not proffered by the religious meaning systems. In light of Greenwood and colleagues (2008) findings it may be argued that environmental action is not informed by other orders completely, but may be affected by them depending on the extent to which those orders may consider the natural environment important in their own meaning systems. Fundamentally, the institutional structure of an environmental order fills a theoretical gap in the current inter-institutional system.

Table 2 demonstrates the synchronisation of the environmental institutional order with the central characteristics of Friedland and Alford's (1991) previously accepted institutional orders. The details are taken directly from their 1991 work (pp.248-249). Each order is explained in terms of its central institutional logics. Those logics' social relations are constituted both by symbolic and instrumental acts and are reinforced by rituals. The outcomes and implications of the institutional orders on wider structures are also explained. For an environmental institutional order, a central logic attempts to cultivate a collective rationality which encourages actor participation in pro-nature behaviours and psychologies. The characteristics of environmental logics mean that they are likely to come into tension with alternative logics – a probability accepted widely within institutional logic literature. The conversion of issues into environmental ones may problematise actions and practices in ways that disturb the status quo legitimated by another institutional order. For example, the destruction of natural resources and the pollution caused by big business means that organisations embedded within the opposing environmental and capitalist market logics come into direct tension. Additionally the ideals of private ownership within the capitalist order may come into contradiction with the environmental logic. For example, the selling of national forests to private firms by the UK Government became widely criticised by environmental groups who saw capitalism as a threat to natural preservation.

An environmental logic channels human activity towards participation in nature's protection and conservation to ensure the future survival of ecosystems. Social relations informed by the logic tend to reinforce the importance of collective mobilisation and defensive guarding of the environment

and instil the mentality that environmental protection is for itself and therefore not for other social or economic goals. Environmentalism is then concretised through the enactment of rituals such as collective lobbying and environmental practices such as recycling. These practices are also highly symbolic and are often used in CSR and marketing to convey some sense of 'environmentality' to the public. However, environmental logics become most purely manifest within environmental social movement organisations which educate and diffuse environmental messages in an attempt to mobilise more 'followers'. These organisations may be comparable to other institutions and organisations which reflect the manifestation of other societal institutional logics; for example the logic of Christian religion is manifest within and diffused by various forms of Church. Furthermore it is important to note that societal level environmental logics are likely to become evident in situated forms which will reflect the nature of the actors and their context, and therefore the environmental logic may inform numerous understandings of what it is to be 'green'. In other words, although the environmental logic ushers action towards environmental protection, the actions and debates it informs at the level of micro-processes may vary significantly.

In addition Table 2 provides suggestions as to how the environmental logic is likely to interact with alternative logics. Friedland and Alford (1991) noted that conflicts between logics should be expected given that they contain inherent contradictions. Certainly there are conflicts between actors informed by an environmental logic and those more dominantly informed by capitalism which are evident within society now. For example the tension between capitalism and the natural environment can be seen in the conflicts between frugal living and consumerism, natural purity and the creation of unnatural emissions during production. In fact there has been a rise in literature since the 1970s which has proposed a mutual exclusivity between nature and capitalist society: '..."the end of capitalism" or the "end of the world".' (Kovel 2007 p.4). At a more local level of analysis, environmental logics and market logics, for example, may be able to coexist or

**Table 2 Explanation of Societal Institutional Orders with Environmental Addition**

<b>Institutional orders</b>	<b>Central Organising Logic</b>	<b>Social relations and [Rituals]</b>	<b>Outcome</b>
<b>Capitalist Market</b>	Accumulation and commodification of human activity	Buying and selling of commodities [Signing of contracts]	Conversion of all actions into buying-selling of monetarily valuable commodities
<b>Family</b>	Community and the motivation of human activity by unconditional loyalty to its members and their reproductive needs	Marriage, divorce or lovemaking are all symbolic and instrumental practices [Marriages, divorces]	Family brought into tension from market based forces, religious indifference, or universal bureaucratic rules
<b>Bureaucratic State</b>	Rationalization and regulation of human activity by legal and bureaucratic hierarchies	Acceptance of symbolic and hierarchical roles geared to achieve State ends [The issuance of budgets]	Converts individual situations into the basis for routine official decisions
<b>Democracy</b>	Participation and the extension of popular control over human activity	democracy is concretized through voting [Voting , inauguration]	Parliaments and electoral institutions convert a breadth of diverse issues into decisions which can be made by popular majority vote or consensus
<b>Christianity [religion]</b>	Truth, whether mundane or transcendental, and the symbolic construction of reality within which all human activity takes place	God is found through prayer [Prayer, Christening]	convert all issues into expressions of absolute moral principles accepted voluntarily on faith and grounded in a particular cosmology
<b>Environmental</b>	The channelling of human activity towards ultimate participation in nature's protection and conservation for future sustainability.	Acts of conservation and preservation – often collective acts involving mobilisation and demonstration [Lobbying, Recycling]	Converts issues into those of environmental defence against forces appearing to threaten healthy development of natural ecosystems

*Source: Table adapted from Friedland and Alford (1991 pp.248-249)*

hybridise to inform ideas around sustainability and CSR. In any case, the recognition of an environmental logic may provide institutional researchers with the necessary tools to shed more light on how and why organisations attempt (or not) to become greener.

## **Conclusion**

The intention of this chapter was to provide a conceptual foundation from which to understand the constitution of a societal level environmental institutional logic. Sociological literature on the social dimension of nature has illustrated that the natural environment is not merely a physical ‘thing’ which resides in an objective material world. Instead there are multiple socially constructed meanings which surround the ‘natural environment’ and inform how actors understand the relationship between society and nature. As such, actors and organisations drawing from an environmental logic construct their ‘green’ actions based on institutionalised meaning systems which denote how the natural environment should be conceived of. In other words, the socially constructed character of the natural environment is informed by cultural and symbolic rules which reside within the institutional environment (Scott 2000). It is argued that the logics of Friedland and Alford’s (1991) original inter-institutional system (or the additional community logic added by Thornton et al 2012) are incapable of convincingly explaining environmental understandings, and therefore conceptualising a separate environmental logic provides analytical utility.

In sum, the natural environment has maintained an objectivity which should be supplemented with a more socialised view if organisations’ behaviours towards environmental issues are to be more clearly studied by organisational theorists. In particular an environmental logic provides the means to examine the specific institutionalised rules which guide organisational behaviour towards the protection and conservation of the environment, in whatever form this may take. Indeed, the variety of forms offer interesting empirical domains as their variation is likely to be an outcome of logic interplay and complexity. More widely this research responds to the broader body of organisational behavioural literature which calls for a deeper engagement of organisational theory with the natural environment (Purser et al 1995, Jennings and Zandbergen 1995, Shrivastava 1994).

## **Research Question**

The above discussion completes the arrangement of research questions for this thesis. Indeed, the agenda of this research is to contribute to the current literature on institutional theory by both examining the relationships between theoretical constructs as illustrated by the research questions

pertaining to the previous chapter, and by developing a new environmental societal institutional logic to aid the extension of Organisational Theory into environmental research domains. Moreover the theoretical developments outlined in this Chapter speak to the need for institutional academics to outline and justify their depictions of certain logics so that the discipline does not descend into a situation where everything can be defined as a 'logic' – fundamentally questioning the utility of the theory. Additionally the concept of an environmental logic is central to this particular research setting. The green paradox facing the UK nuclear industry provides an excellent opportunity to test the utility of an environmental institutional order and constitutive logic. Nuclear power's environmental credentials have been the site of aggressive debates for over three decades and as such the application of an environmental logic should provide the kind of insight into the institutional character of the debate which can not be achieved by purely analytically applying the incumbent institutional orders defined by Friedland and Alford (1991). Hence the final research question is as follows:

### **Research Question 3**

- How does the concept of an environmental institutional logic provide utility within an institutional research agenda?
  - How does the concept of an environmental institutional logic help explain the green paradox of nuclear power?

# Chapter 4: Methodology and Research Design

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In the following chapter the ontological assumptions underpinning this research agenda will be explored in relation to both institutional theory and the practical methods employed. First, the features of Critical Realist ontology (Bhaskar 1975) and its combination with institutional theory will be explored. It is argued that there are dimensions of compatibility between Critical Realism (CR) and institutional theory which provide utility for institutional analysis. Work by Leca and Naccache (2006) is drawn on to delineate the ontological status of institutional concepts. In line with the Critical Realist ontology a Retroductive methodology is applied (Houston 2010) which structures the research project and focuses it towards uncovering the nature of the institutional logics underpinning the green paradox of nuclear power. A discussion of the qualitative methods applied to the research process follow. A 60 year case study was constructed from four text based data sources: Government documents, *The Times*, *The Guardian* and the *Daily Mirror* newspapers. It is suggested that a historical document analysis aligns with the value placed on context, time and agency by Critical Realists (Archer 1995). Thereafter a detailed description of the coding process is provided. Documents were analysed for specific debates and discursive legitimating strategies which illuminated the nature of the situated institutional logics informing actors' perceptions and arguments in relation to nuclear power. The research questions are as follows:

## Research Question 1

- What is the relationship between institutional levels of analysis?
  - How does the concept of 'situated logics' provide insights into the interactions between agents, fields and societal logics?
  - How does the concept of 'situated logics' help explain the green paradox of nuclear power?

## Research Question 2

- What role do actors play in the development of 'situated logics'?
  - How can an institutional work approach be utilised to fully understand the role of agency in the construction and/or reinforcement of situated logics?
  - To what extent can processes of institutional entrepreneurship help elucidate the manifestation, elaboration and institutionalisation of situated logics?



- How do the actions of actors contribute to the creation of a green paradox?

### **Research Question 3**

- How does the concept of an environmental institutional logic provide utility within an institutional research agenda?
  - How does the concept of an environmental institutional logic help explain the green paradox of nuclear power?

## **Introducing Ontology**

‘Every research tool or procedure is inextricably embedded in commitments to particular visions of the world and to knowing that world’ (Remenyi, Williams, Mone and Swartz 1998 p.23)

A clearly defined ontological standpoint provides a set of assumptions about the nature of reality and knowledge which underpin what researchers can say about the world. Thus, for a researcher, ontology is important because it has implications for the appropriateness of research methods, systems of analysis and claims of knowledge. Within the broad subject area of institutional theory, researchers have adopted a variety of ontological perspectives which define the ‘reality’ of institutional structures and have been evident in the ways in which they have understood the relationship between agency and social structures such as institutional logics. For example the work of Zilber (2002, 2006) on translation takes a social constructionist approach by proposing that actors are carriers of institutional logics. In doing so, Zilber conflates social structure and agency because logic change and variation is located in the mind of institutionalised actors. This is problematic because the social structure (the institutional logic) becomes increasingly difficult to define. Alternatively, authors such as Barley and Tolbert (1997) hold structure and agency apart to understand the dialectic between the two. This latter approach is more noticeable within institutional theorisation given the focus on institutional entrepreneurship and the paradox of embedded agency (Holm 1995, Boxenbaum and Battilana 2004, Dorado 2005, Mutch 2007). Leca and Naccache (2006) have suggested that CR delivers utility here as it provides an ontological framework which allows the researcher to conceive of embedded agency. CR provides an important ontological distinction between ‘the parts’ and ‘the people’ (Willmott 2000) which is needed if the interplay between the analytically distinct concepts of agency and structure is to be explored. As such, this research project applies CR because it is interested in the dynamic and dialectic

relationship between agents and their discursive efforts, and the institutional logics which both guide them and are changed by them. In particular, the CR of Bhaskar (1975) and Archer (1995) is explored below.

## **Critical Realism**

The adoption and development of CR by scholars of Organisational Theory was part of a retaliation against anti-realists who claimed that realism was a naïve form of objectivism. Yet, CR proposes a way of combining naturalism and realism with a recognition that social worlds are constituted through actors' sensory experiences and perceptions (Sayer 2000). A series of books by Roy Bhaskar (1975, 1993, 1998) is generally credited with the development and refinement of the CR approach. Bhaskar describes CR as a 'transcendental realism' whereby '...it is necessary to assume for the intelligibility of science that the order discovered in nature acts independently of men' (Bhaskar 1998 p.21). This is maintained by two integral principles of CR; the stratified ontology and the epistemic fallacy. The former distinguishes between the real, the actual and the empirical domains of reality. The real is regarded as 'whatever exists' (Sayer 2000 p.11) irrespective of whether it manifests as an empirical object available to us. Within the real ontological domain lie generative mechanisms (objects, structures and causal powers) which have capacities and tendencies to produce outcomes which may lead to perceivable events if triggered. Events occur in the domain of the actual and are experienced by actors in the domain of the empirical (Sayer 2000). Thus, actor's perceptions of 'actual' events may not accurately reflect what is generating events because the 'real' mechanisms and structures which generate the actual world are conceptually mediated by subjective experience (Fleetwood 2005). The stratified ontology thus moves away from the simple dichotomy of 'objectivism versus subjectivism'; at the empirical level CR appreciates actor subjectivity whilst also remaining recognisant that the world exists independently of this subjectivity. In this sense, CR provides a way to challenge the empiricist's disbelief that the unobservable can exist and the constructionist's refutation that the objective world can be known.

The 'epistemic fallacy' component of the CR philosophy suggests that to observe and perceive makes us more confident about what exists, yet existence itself does not depend upon it: '...powers may exist unexercised, and hence what has happened or been known to have happened, does not exhaust what could happen or has happened' (Sayer 2000 p.12). As Bhaskar also notes, '...there could be a world of events without experiences. Such events would be actualities unperceived and, in the absence of men, unperceivable' (1998 p.24). As such the knowledge underpinning any analysis may never be complete. Hence, for CR researchers knowledge ceases to be an essential

predicate of things: ‘...we can allow that experience is in the last instance epistemically decisive, without supposing that its subjects are ontologically ultimate, in the sense that their existence depends on nothing else’ (Bhaskar 1998 p.28). This element speaks to the ‘realist’ ontology of CR; there are ‘real’ causal and generative mechanisms which exist outside of our perception, and which manifest in certain ways in certain contexts. Manifestations are then able to be perceived by actors who may project on them multiple meanings depending on their social understandings. Indeed, this latter emphasis on context reflects the importance of time and space (Archer 1995, 1998) to the Critical Realist who must understand the setting and circumstance of events in order to retroduce, as much as possible, the nature of the generative mechanisms at play.

## **Critical Realism and Institutional Theory**

In the past decade a number of institutionalists have begun to explore the implications for, possibilities for and advantages of applying CR to institutional analysis. This section will look at two dimensions relating to the compatibility between institutional theory (IT) and CR: 1. CR’s agency and structure dualism allows us to understand embedded agency and 2. Levels of institutional analysis are compatible with CR’s stratified ontology. Both dimensions have helped institutional theorists to more clearly delineate the relationships between institutional structures at multiple levels of analysis and embedded agents (Mutch, Delbridge and Ventresca 2006). Such insights are important to this research project as they provide a framework against which to understand the reality of the institutional concepts applied. A clear grasp on the ontological properties of such concepts provide the means to more visibly conceptualise the dynamics between agents and structures which may ultimately create and explain institutional change. The dimensions proposed above will be explored in turn below.

### **The Duality of Agency and Structure**

‘...human agency, in the form of reasons and motives, combines with unseen generative mechanisms to produce effects in a social world that is multi-layered, complex and at times pockmarked with ambiguous contours’ (Houston 2010 p.74)

Compatibility between CR and IT can be found in the overlaying of CR’s concept of analytical duality upon institutionalism’s multi-level framework. As Delbridge and Edwards (2013) note, the conception of society as an inter-institutional system as proposed by Friedland and Alford (1991) presumes an ‘...integrated conceptual architecture that works at three levels of analysis... i.e. the

individual, the organisation and the societal' (p.2). This multi-level approach provides a framework from which to understand micro-processes of agency within higher-order levels of analysis, and is therefore compatible with an ontological perspective which holds structure and agency as analytically distinct in order to understand the relational dynamic between them. Previous institutional research has often privileged and prioritised the role of structure over that of agency, thus providing a top-down model of action (Delbridge and Edwards 2013, Leca and Naccache 2006). Through the application of CR one may start to tease out the role and implications of agency with concern given to its embeddedness and its dialectical relationship with social structure (i.e. institutional logics) (Barley and Tolbert 1997, Mutch et al 2006, Mutch 2007).

For example, Leca and Naccache (2006) apply CR in order to propose a non-conflating model of institutional entrepreneurship. They argue that the conflation of structure and agency leads to '...the denial of either actor's freedom or the constraining power of structures...[and] to remain coherent with institutional theory, a model of institutional entrepreneurship must provide a model of change in which actors can create and change institutions without disembedding from the social world.' (p.628). By delineating the ontological status of structure and agency (i.e. their distinctive emergent properties, relative autonomies, previous existences, and causal efficiency), CR proposes that actors are not merely passive but can shape social structures (Bhaskar 1975). For Leca and Naccache (2006) institutional entrepreneurs are actors who use the causal powers of pre-existing structures to create new institutions or challenge existing ones. The emerging properties of structures imply that institutional entrepreneurs can use institutional logics by developing a practical knowledge of them without being fully aware of all their causal powers. Unintended consequences are likely as it is impossible to predict entirely how causal powers will operate in context. Similarly, Wry (2009) argues that actors within the domain of the empirical react to patterns of action through practices which reinforce or challenge institutions, and in so doing may induce change at the structural level of institutional logics. Given that multiple logics exist within the social world, actors can draw on multiple logics to imagine new institutions and justify divergent practices (although they are unlikely to be fully aware of those structures' causal powers).

## Stratified Ontology

The above illustrates that CR's approach to holding apart structure and agency provides institutionalists with the means to understand how agents may relate to, and 'use' social structures in order to alter them. This dualism is reinforced by the application of CR's ontology to the levels of institutional analysis. By applying a combination of IT and CR proposed by Leca and Naccache (2006) in particular, this research accepts a specific understanding whereby institutional logics and their ontological properties exist in the domain of the real. To reiterate, in the domain of the real lie social structures which serve as '... "generative mechanisms" which give rise to action, manifest not in the form of deterministic outcomes but rather as empirical tendencies' (Delbridge and Edwards 2013 p.8). Additionally, these exist prior to human action so that structures of social reality are always pre-existing givens to present actors. Leca and Naccache (2006) argue that institutional logics correspond to structures located in this domain because they cannot be reduced to institutions, yet they have generative mechanisms which, when activated within particular contexts for particular reasons, will unfold in the domain of the actual as institutions. Moreover, institutional logics pre-exist actors and as Bhaskar (1998) notes, the pre-existence of social forms establishes their autonomy as possible objects of investigation and their causal powers establish their reality.

Leca and Naccache argue that institutions must be considered in the domain of the actual because actors may or may not perceive of them yet they exist regardless. Actors may not be perceptive of certain institutions because they may be so taken-for-granted as to be cognitively invisible and unperceivable as institutions. Nevertheless, researchers with training may be able to access them and reveal their nature. To do so, researchers must try to uncover them via the domain of the empirical. However, actors who are within the empirical domain are more than mere recipients of higher level logics. Indeed, institutional structures are intrinsically social and thus 'While logics have the power to impede or facilitate the action of different actors, the activation of such powers is contingent upon those agents who conceive of and pursue what might be possible' (Delbridge and Edwards 2013 p.5). Importantly, this is in no way in support of methodological individualism. In line with Bhaskar (1998) '...societies are complex real objects irreducible to simpler ones, such as people' (p.208). However, agents both perceive of and interpret institutions and may activate the causal powers of real social structures whilst maintaining or attempting to change them – although the activation itself may be unconscious, unintended and uncontrollable.

## **Situated logics**

These dimensions lead to some interesting questions regarding the ontological standpoint of situated logics as defined in the literature review and later in the findings and discussion. Indeed, CR institutionalism is a developing field of theorising and there is still much to be understood about the implications of the former on the latter. However, a provisional suggestion would be to suggest that situated logics represent a specific configuration of logics' causal powers which represent the context of a specific industry or organisational field at any given time and space. At a given time of inquiry, certain situated logics may be pre-existent whilst others may be emergent. This reflects the idea that logics have causal powers but the activation of these powers is contingent: '...the way structures' causal powers will develop, or not, will depend on the contextual conditions' (Leca and Naccache 2006 p.631). As a meaningful configuration of the generative mechanisms of certain higher-order logics, situated logics do not reside within the domain of the real, yet represent the manifestation of higher order 'real' logics within context. These logics inform the maintenance and creation of institutions within the domain of the actual yet are neither synonymous with institutions nor reducible to them. Perhaps for now it is better to understand them as an analytical concept to explain a certain configuration of generative mechanisms than it would be to provide any concrete ontological property. Indeed, their ontological status is open for debate, as is the ontological status of all institutional constructs. Partly this is because of the difficulties in demonstrating the 'realism' of social worlds. The following section will attempt to delineate how CR tackles this issue.

## **Implications of a CR Social Structure**

'People do not create society. For it always pre-exists them and is a necessary condition for their activity. Rather, society must be regarded as an ensemble of structures, practices and conventions which individuals reproduce or transform, but which would not exist unless they did so' (Bhaskar 1998 p.216)

Archer (1998) notes that CR '...accepts the challenge of ontological difference between physical and social reality' (p.190). She argues that social reality differs ontologically from natural reality because there is no methodological means to enclose order in society – because it will always be inhabited by actors able to engage in creative and reflexive thought. Additionally, society cannot be reduced to its constituent parts in the fashion of individualism, because '...designating properties special to persons all presuppose a social context for their employment' (Archer 1998 p.191). Thus, when applying CR to the social world one must recognise the stable yet mutable and corrigible properties

of the social context and its institutional structures such as logics; they cannot be reduced to their parts, yet they can be creatively adjusted or maintained by them. This is because social actors perform a double function in that they both make social products and make the conditions of those products' making (Bhaskar 1998 p.218). Similarly Archer (1998) argued that cultural systems have '...the same temporal priority, relative autonomy and causal efficacy vis-à-vis socio-cultural actions as do structural properties' (p.198). These cultural systems are the intransitive objects of the social sciences which predate 'current agents' who can maintain and transform them, and become shaped and reshaped in their attempts to do so (Archer 1998). So although society is a necessary condition for any intentional human act: 'Society is both the ever-present *condition* (material cause) and the continually reproduced *outcome* of human agency' (Bhaskar 1998 p.215).

Recognition of a duality of agency and structure which considers both conscious production and often unconscious reproduction of the conditions of society (Archer 1998) brings to light questions regarding the corrigibility of institutional logics. Indeed, the latter is conceptually plausible only when the nature of agency is established. In order to better understand the dimensions of agency this research borrows from Emirbayer and Mische's (1998) relational sociology and their focus on projective intentionality. The authors suggest that there are different constitutive elements of agency: 'iterative' refers to behaviour which is often habitual and unelected in nature, 'projectivity' refers to the future, and 'practical-evaluation' refers to the capacity of agents to '... contextualize past habits and future projects within the contingencies of the moment' (p. 962). Institutionalism has a pre-occupation with the 'iterative dimension' and therefore limited attention is paid to '...the way in which social actors relationally engage with those pre-existing patterns or schemas' (p.975). However, Emirbayer and Mische's (1998) 'projective' dimension of agency can explain actor propensity for institutional work because actors are considered '...the inventors of new possibilities for thought and action' (p.984). Actors are capable of distancing themselves from habit and schemas which constrain their social identity and institutions: '...immersed in a temporal flow, they move "beyond themselves" into the future and construct changing images of where they think they are going, where they want to go, and how they can get there from where they are at present' (p.984).

Such projective agency is relational in that agential intentionality is not an '...a prior causal force or mechanism' (Delbridge and Edwards 2013 p.9) but is rather an outcome of the relationality of structure and agency over time. In other words, agency is somewhat historically conditioned. This conditioning does not determine an outcome but provides an insight into the generative agency which creates it. The disparity in actors' histories, personal characteristics and relational position

means that actor's actual experiences of structures (and their emergent properties) are not uniform. Variation in actors' perceptions has implications on the reproduction of social structures and may explain why reproduction is never fully stable (Delbridge and Edwards 2013). Actor positions within a social setting (a relational position) implicate them within different personal projects which affects how a logic facilitates or constrains their action. Therefore, within realms of institutional complexity and multiple logics, actor reflexivity has many possible outcomes (Delbridge and Edwards 2013, Wry 2009). These insights are significant because they show the importance of understanding the historical context of actors in order to appreciate the creative, intentional or purely routinized agency of actors and their interactions with social structure.

## **Conclusion to Critical Realism**

This research is concerned with uncovering ontologically deep institutional logic structures, evidenced at the 'empirical level' of the day-to-day, which may help explain the 'green paradox' of nuclear power. Critical Realism is concerned with the nature of these structures and how they interplay with agents to create actual and empirical phenomena. A number of institutionalists have applied CR (Leca and Neccache 2006, Wry 2009, Delbridge and Edwards 2013) because the ontological status which it lends institutional analytical concepts provides a framework from which to examine embedded agency and institutional change. Institutional logics, considered as deep and 'real', have generative mechanisms and causal powers which can be activated intentionally or otherwise by actors and come to be manifest in the form of events (such as institutions) within the domain of the actual. Researchers may observe and delineate the nature of these deep logics by understanding how actors subjectively understand, produce and reproduce institutions within the domain of the actual. The difficulty lies in the application of CR to a methodology in a way that combines an '...account of process on the one hand with one of the enabling context on the other, without collapsing one into the other' (Mutch et al 2006 p.622). To do so a CR methodology known as retrodution (Houston 2010) is adopted which aims to identify recurring patterns of action and to postulate logics that, if they were to exist, would provide a causal explanation for such patterns of actions. Such postulations are then subject to empirical scrutiny (Ekstrom 1992, Sayer 2000, Wry 2009).



## Implications of Critical Realism: Applying Retroduction

Critical Realist research is compatible with a wide range of methods but is most commonly associated with a methodology of retroduction (Sayer 2000). Retroduction aims to explain events by ‘...postulating and identifying structures and causal powers that are capable of generating them’ (Sayer 1992 p.107). Social structures such as institutional logics must be inferred from recurring patterns in the domain of the actual, which may or may not be consciously apparent. Therefore researchers must understand their role as ‘readers’ of action and institutions. At the level of the empirical they must attempt to ‘read back’ that which is not visible from that which is (Wry 2009). The means to do so is provided by a Retroductive methodology which is more specifically garnered to the character of CR than inductive (observe and generalise) or deductive (Hypothesise and test) methodologies (Houston 2010);

‘Whereas deduction refers to the inference from the general to the particular and induction refers to the particular to the general, retroduction, which is adopted by Critical Realism, refers to the inference from a description of some phenomenon to a description of something that produces it or is a condition for it...’ (Houston 2010 p.82)

This thesis applies Houston’s (2010) stages of retroduction (see Table 3) which specifies the construction of the research questions and the role of the methods. Firstly Houston suggests that the research questions should be of a transcendental nature. Because this research project is curious as to how the ‘green paradox’ of nuclear power arose, the first research question asks what institutional logic configurations (domain of the real) must be in place for this to have occurred. Secondly, Houston argues that to answer transcendental questions the researcher must construct an a priori hypothesis to explain what has been observed ‘...drawing, through logical inferences, on a knowledge of in-depth theory from the range of domains that shape the social world’ (Houston 2010 p.83). This stage constructs theoretical hypotheses to depict how elements within the social world are expected to relate and predominantly involves the application of institutional theory.

Thirdly evidence is sought by the researcher to confirm, deny or modify the hypothesis. This evidence is observed in the empirical domain and relevant methods are employed to recognise the workings of generative mechanisms. In this stage qualitative research is important (Houston 2010) so that researchers may access actor’s meanings, reasons, and justifications and intentions given that these areas of agentic action have causal properties in their own right (Bhaskar 1998). Fourthly, the researcher looks to reaffirm the earlier hypothesis in order to answer the transcendental

questions. Explanatory hypothesis may be refined, redefined or completely reformulated and then further evidenced to the point where there is a ‘...robust connection between the hypothesis and the patterns of social activity observable in the empirical world’ (Houston 2010 p.85). Finally, the critical element of CR involves the instigation of emancipatory action to counter any oppressive mechanisms exposed by the retroductive process. It should be noted that this research does not have a strong emancipatory agenda, yet it retains interest in exposing mechanisms which may not be visible but nevertheless create conflict. Perhaps, through exposure, some element of this conflict previously hidden may lead to a more ethical outcome; i.e. actors involved in the nuclear debate may be more aware of their institutionalised understandings of the environment and morally evaluate them.

The following section outlines how this research has followed the retroductive steps proposed by Houston (2010). The first two steps are related to the research questions, whereas the latter are provided through a detailed exploration of the methods used.

**Table 3 Steps of Retroduction**

<b>Step One</b>	Asking a transcendental question
<b>Step Two</b>	Developing hypotheses to address the question in terms of: (a) the generative mechanisms at play (b) the role of ‘agency’, ‘time’ and ‘context’
<b>Step Three</b>	Seeking evidence of hypotheses by looking for the effects of mechanisms and their interplay with ‘agency’, ‘time’ and ‘context’
<b>Step Four</b>	Refining, confirming, falsifying or reworking hypotheses and seeking more evidence
<b>Step Five</b>	Instigating emancipatory action to counter oppressive mechanisms and activating enabling mechanisms

*Source: Houston (2010 p.83)*

### **Step One: Transcendental Questions**

All research questions (RQ) pertaining to this research project speak to the nature of structural entities and their dynamic with agency. The first RQ ponders how societal logics in the realm of the ‘real’ come to manifest in specific ways within specific organisational fields. The second considers how agency is understood within structural boundaries. The final research question is concerned with the extent to which the current ‘accepted’ intra-institutional societal structure is able to

provide researchers with a comprehensive toolkit for understanding organisational approaches to the natural environment. As such, all research questions try to get a grasp on deep level structural forces, how their causal powers affect lived experience and how the causal powers of agency both maintain and inform social structural manifestations (Houston 2010).

### **Step Two: Development of Hypothetical Relationships among Theoretical Concepts**

The first two research questions can be taken together. They relate to the relationship between societal and situated logics and the role of agency in the 'situating' of societal logics. Situating was proposed in the literature review as a useful concept from which to study the interaction between institutional levels of analysis. From a CR perspective societal level logics have generative mechanisms which are configured in certain ways at lower levels of analysis to create and maintain situated logics. However, actors activate those generative mechanisms, and thus it is hypothesised that institutional work within a specific context (time and space) may trigger the causal implications of societal logics' generative mechanisms. Nevertheless, their contextual and historical embeddedness is likely to mediate the configuration of the generative mechanisms so that the 'situated' result is of a specific nature. This is not to say that the nature of this can be pre-defined and built to match, but rather that agency, context and time have an impact on the local manifestation of causal mechanisms and their actual and empirical outcomes. The third research question asks whether an environmental societal logic contains generative mechanisms which explain institutions and practices at the levels of the 'actual' and 'empirical' which cannot be explained by other societal logics. Its utility is therefore hypothesised to be in the possibilities it grants institutional researchers to explain societally constructed understandings of nature which impact organisational behaviour. To seek evidence of the nature of these theoretical and hypothesised relationships the methods will be explored below.

### **Step Three: Seeking Evidence: Qualitative Method**

Step three for Houston (2010) involves seeking evidence of the hypothesised interplay between agency, time and context as defined by the transcendental research questions. A qualitative methodology is applied in order to focus the research on uncovering the construction and negotiation of meaning pertaining to the green nuclear debate. A historical case study was constructed which covered the period from the inception of the UK civil nuclear programme in the 1950s to the confirmation of a new nuclear programme in 2010. The contested nature of nuclear power throughout the 60 years meant that data on the topic was abundant and often rather

animated. Computer Aided Qualitative Data Analysis Software (CAQDAS) called MAX-qda was used to code all documents. These codes both informed the case study construction and aided the identification of discursive legitimation strategies which were considered illustrative of situated institutional logics.

### **The Retroductive Process**

In applying retroduction this thesis has undertaken elements of both induction and abduction; this can be understood as the 'inductive-abductive process of analysis' (O'Mahoney et al 2013). A retroductive method is a mode of inference which requires the researcher to "...identify the circumstances without which something (the concept) cannot exist" (Meyer and Lunnay 2013 p.1), and thus works well with an abductive approach (Sayer 1992) which "...is a means of forming associations that enable the researcher to discern relations and connections that are not otherwise evident or obvious" (Meyer and Lunnay 2013 p.2). This can often involve analysing data that appear to fall outside of existing theoretical frames. However, this does not mean that the researcher must face the data with no a-priori knowledge of theory. Indeed, abduction assumes that the researcher has prior theoretical knowledge and will engage in an iterative process through which empirical data is induced into coding frameworks which are then compared to existing theories (Ketokivi and Mantere, 2010, Suddaby, 2006). Additionally, the application of abduction as part of a retroductive approach can lead to the formation of new conceptions and theoretical frameworks (Danermark et al 1997). This is because abductive and retroductive inference provided opportunities for elaboration and exploration of the explanatory power of given theories during the analysis of data. This might mean concluding that one theory, in comparison to competing theories, describes the necessary conditions for the event under study in a more complete and comprehensive manner. The following paragraph will detail more specifically how this thesis's research process applied retroductive and abductive inference.

The research began as an institutional project because the primary point of interest was the concept of an environmental institutional logic. The coding framework was therefore developed by the researcher who had a-priori knowledge of the institutional literature. This remains in line with abduction and retroduction which acknowledges that observations and interpretations are theory-laden (Meyer and Lunnay 2013). The initial activities undertaken are denoted as inductive (see Table 4) because they took a 'bottom-up' approach to data analysis, exploring the data as a means to uncovering higher level causal mechanisms that may explain their existence. The specifics of the coding approach are detailed later in the chapter, however it is important to note here that the first

stage of research involved the open-coding of all data in chronological order in an attempt to explore, describe and organise its key debates, events and issues. The second round of coding explored these events, debates and issues in more depth, and focused specifically on unearthing the justificatory discourses and arguments surrounding them. Such discursive contestations and legitimations are understood as indicators of higher order institutional structures (see p.35). Following the coding, two steps were taken simultaneously: a case study was written up in order to provide a comprehensive reference for the research which kept all the data contextualised and chronological. At the same time, the coded findings were compared with a variety of existing theories of knowledge, and the theories that appeared to best explain them were chosen. The final stages, as shown in the table below (Table 4), were iterative. A number of complementary yet analytically varied theories were applied to help explain the results obtained from the coding phases. The final choice of theories applied in the thesis was a result of continuous iteration between the data and the literature.

More detail will be provided in the following sections that explore and appraise each of the methods employed throughout the research project. Firstly, the qualitative method is explored, justified and evaluated.

**Table 4: The Inductive-Abduction Process of Analysis**

Activity: Induction	Coding of all data to identify central debates, issues, tensions and contestations over the historical period. Primarily exploratory and descriptive.
First order codes	Descriptive codes relating to both the wider energy industry and the nuclear industry specifically (see Appendix 3 for coding framework).  For example: Ownership, Economic Viability, Climate Change, Health, Technological Advancement, Disarmament/non-proliferation
Activity: Induction	Development of second-order codes to identify themes relating to key justifications, arguments and emphases in areas of debate highlighted by the first-order coding activity.
Second order codes	Justificatory codes relating to nuclear power (see Appendix 3 for initial coding framework)  For example: Mastery over nature, New Challenges of Tomorrow, Nuclear as Lesser of Two Evils, Impact on Communities.
Activity: Case Study	Coding informed the construction of a detailed historical case study
Activity: Abduction	Comparison of case study data and second order codes with existing theories of knowledge (e.g. institutional logics theories, systems of exchange, translation, institutional vocabularies)
Result	Selection of theories of knowledge which appeared to best match events and justificatory codes identified previously
Activity: comparison of themes with theory	Categorisation of second order themes in line with selected theory. Assessment of theory applicability.
Result: theory development	Institutional development: Situated Logics, assertion that an Environmental logic is a useful construct
Activity: Iterative process	Reworking theoretical framework based on the commensurability between selected theories of knowledge and the development of understanding pertaining to the events and justifications identified.

*Table structure taken from O'Mahoney et al (2013 p.214)*

## **Qualitative Methodology and Data Collection**

‘...unfettered from the pursuit of transcendental scientific truth, inquirers now feel free to resituate themselves within texts, to reconstruct their relationships with research participants in less constricted fashions, and to create re-presentations that grapple openly with problems of inscription, re-inscription, meta-narratives and other rhetorical devices that obscure the extent to which human action is locally and temporally shaped.’  
(Lincoln and Guba 2003 p.272)

CR ontology resonates convincingly with a qualitative methodology which is underpinned by an assumption that actors subjectively mediate the social and natural worlds. The dynamic between agency and structure has previously been explored, yet it is important to remember that the only means to gain an understanding of real structures and their generative mechanisms is by deciphering the nature of the actual events which are perceived and given meaning by actors. Thus institutional logics fundamentally imbibe certain social rules and organising principles which may only be understood by accessing the understanding of actors involved in their reproduction, defence or transformation. Thus, it is through qualitative research that a CR researcher may begin to build a picture of subjective understandings and start to broach their transcendental research questions. Qualitative data provides a depth and richness which cannot be gained from a more positivist and quantitative research agenda. Stake (1995) suggests that this form of data aligns with the qualitative researcher’s appreciation of explanation and understanding as purposes of inquiry and the construction rather than the discovery of knowledge. It stands epistemologically apart from quantitative research due to the centrality of interpretation and an understanding that a researcher within a field exercises subjective judgement and should be reflexive of their own consciousness (Stake 1995). Consequently there tends to be an emphasis on actor’s intersubjective experiences and how these impact and illustrate the symbolic and ideational aspects of the social environment. As mentioned, the qualitative methodology in this project involved the analysis of media and Government documents via the construction of an historical case study – the particularities of which will subsequently be discussed.

### **Case Study Creation**

The case-study research design is a common qualitative approach because it aids the examination of both the holistic case and the particularities within (Yin 2003). Because qualitative researchers

place emphasis on the unique characteristics of individual cases a single case study, defined by Stake (1995) as a 'bounded system' or 'integrated system', is suitable because it provides the researcher an object of study which can be leveraged open to provide in depth understanding of particularity. Furthermore, Yin (2003) suggests that case studies should be the preferred method when research questions asking 'how' or 'why' are offered, when the researcher has little control over the events and when the focal point of the research is on '...a contemporary phenomena with some real-life context' (p.1). Indeed the research outlined in this thesis meets these requirements because it asks why an apparent green paradox exists in relation to nuclear power, is based on events which have mostly already taken place and exists in 'real life'. Moreover, given the historic approach of this research the holistic promise of a case study is valuable in that it affords the researcher recognition of coexisting happenings and chronologies rather than simple cause and effects (Stake 1995). In sum the case study method resonates comfortably with the nature of this research project.

Case studies have been increasingly utilised within institutional theory research. The move towards theorising around radical and non-isomorphic change has brought with it studies that have used particular cases to illustrate the dynamics between individual and organisational levels of analysis. For example, Delbridge and Edwards' (2008, 2013) research into the beginnings of the Super yacht industry adopted a single case study approach which covered the movement from the yacht design of the pre 1960-70s era to the newer revolutionary designs offered by Jon Bannenberg. Similarly the seminal study by Greenwood et al (2002) on the recomposition of the health care field in Alberta, Canada used a case study that covered the 20 year period in which the profession underwent major change (1977-1997). Although these are but a few of the case studies now published in the field, they do highlight an important reason for the adoption of the case study technique; case study analysis works well with the assumption of historical contingency within institutional theory, especially in the institutional logics approach (Thornton and Ocasio 2008). Indeed, as Greenwood and Suddaby (2006) note in their study on the big five accounting firms, '...the analysis involved historical processes and such dynamic events are best analysed through the use of inductive techniques by which event sequences are clarified and overlapping causal forces disentangled' (p.29). Ultimately, the case study method allows authors to trace how larger environments affect individual and organisational behaviour over time and thus appreciate the historicity of institutional actions rather than merely treating them as points of incidence (Yin 2003). Indeed their character resonates with more recent movements in institutional analysis towards institutional biographies (Lawrence et al 2011) and logic constellations (Goodrick and Reay 2011).



Nevertheless, it has been suggested that case studies may allow for equivocal evidence which can direction findings and conclusions in ways that help confirm pre-conceived theory (Yin 2003). Furthermore, case studies provide no firm basis for scientific generalisation as their particularising nature inhibits this. Similarly, Bryman (1989) proposes that there is a misguided view that case studies are selected from a pool of similar cases, and that this is assumed to allow a degree of generalisation. However, this research agenda recognises that the UK nuclear power industry is a unique research site and thus only wishes to offer some degree of theoretical generalisability. This resonates clearly with the nature of the transcendental research questions. As Stake (1995) maintains ‘...we do not choose case study designs to optimise production of generalisations’ (p.8) but instead use them to modify and enhance existing theory. Ultimately the capacity to generalise need not be taken as a benchmark for the method’s value, and in this research the case study method is understood to resonate well with the nature of the research questions and the ontological framework applied.

### **The Case Study**

A case study of the history of the nuclear energy industry and the environmental debate surrounding it was constructed from four data sources: three newspapers (The Guardian, The Times and the Daily Mirror) and a mixture of published public documents (such as white papers and green papers) and confidential or unpublished Government documents (such as parliament minutes, memos, policy document drafts). In the construction of the case study comprehensive time-lines and summaries for each data source were developed in order to garner a detailed understanding of the opposing political allegiances of the different newspapers and their idiosyncrasies in terms of focus and coverage. The wider energy context was also important in understanding the various debates surrounding nuclear power and as such supplementary reports were often referred to such as those published by Friends of the Earth (FOE) or by international energy organisations such as the IAEA (International Atomic Energy Authority). The aim of the case study was to cover all identifiable justifications and legitimations relating to the support or rejection of nuclear power, and to understand each in historical context and from the divergent perspectives of each data source.

However, it should be noted that the collection of data for coding did not include the integration of diverse sources of secondary literature such as histories of the period and published memoirs. There were two primary reasons for this. Firstly, it was decided that the case study should purely reflect the perspectives of the specified (Government and Media) data sources. Therefore the

configuration and variety of data sources (such as those with differing political motivations or different audiences) was crucial to ensure that they would provide a comprehensive and relatively complete picture of the events. By doing so it was possible to keep in mind and recognise more explicitly the differences in opinions between the various media sources and the Government. Indeed, the construction of the case study was not only about building a comprehensive story, but it was also an analytical process that aimed to explore how various actors interpreted and understood nuclear power. By bringing in secondary voices, the central interests and perceptions shown within the articles pertaining to each data source may have become impossible to isolate. However, it is noted that by not bringing in additional literature, certain issues, events and perspectives may have been overlooked. Nevertheless, effort was put into additional reading outside of the case study parameters and therefore events that were not noted in the data were recognised as meaningful omissions by the researcher. Secondly, and more practically, the time and word constraints of the thesis limited the size of the case study and decisions were made in terms of when to stop developing and elaborating.

## **Historical Study**

The specific configuration of institutional logics within an industry at a given point in time is not a temporally isolated event but is symptomatic of context and history. Theoretical movements within institutionalism towards complexity (Greenwood et al 2010, Delbridge and Edwards 2013) and logics constellations (Reay and Goodrick 2012) illustrate that institutional research appreciates these concerns. For instance, Greenwood et al's (2010) paper on complexity argues that applicable cultural lenses can only be gained by the consideration of 'appropriate historical linkages' (p.26). The authors found that the legitimisation of actions from a managerial logic was dependent on a community's regional identification, which had its origins in history; regional identification is '...symbolically associated in Spain with rejection of a state logic imposed following an earlier and bitter civil war' (p.26). Indeed these researchers suggest that it is necessary to understand the arrangements of institutional logics as part of a historical context to hypothesise why they converge in particular ways to create institutional transformation at given moments. A historically sensitive analysis of institutional change and transformation is pursued in this thesis because the 'green paradox' of nuclear power is merely a present moment embedded within the complexities of the past.

Ontologically CR researchers have shown the importance of context (Leca and Naccache 2006 p.631). Houston (2010) argues that time is very relevant in shaping social outcomes because

individuals face constant challenges throughout history. He draws on Archer's (1995) morphogenetic approach to emphasize this temporal aspect because she highlights how social structures are reproduced as part of history. Overall, according to Houston, the CR approach to context is '...congruent with Marx's (1973 p.146) famous utterance: 'The tradition of the dead generations weighs like a nightmare on the minds of the living' (2010 p.76). As such the Critical Realist researcher must consider that any social outcome is the product of context, generative mechanisms and, importantly, time. The physical limitations of the research project meant that a relatively modest history was built over the 60 years of the UK nuclear energy programme. Although additional insights may have been developed from a more extensive history, it was felt that historic understandings of civil nuclear power from the point of its implementation had a particularly important part to play in understanding the present opinions and attitudes towards the technology.

To help the reader through the complex history of the case study a timeline is provided before each of the findings chapters. These timelines provide a chronological overview of the key events which occur over the subsequent chapter and a brief overview of their implications. It is felt that these timelines offer a useful reference point for the reader to quickly review the key events within each of the findings chapters. Additionally, although each chapter covers a distinct period of time, the way they are structured means that they often go forwards and backwards in time throughout each period. The timelines therefore provide a backbone to temporally re-orientate the reader if needed.

## **Documents**

The case study was constructed from newspaper articles sourced from online archives and a variety of Government databases. In the collection of Government documents most official white papers (and their drafts) and policy statements were sourced from the National Archives in Kew, London (via either their online portal or from their headquarters). A small number of documents were inaccessible from the Archives and hard copies had to be purchased from alternative sources. For example the 1995 white paper 'The Prospects for Nuclear Power' (Department for Trade and Industry) was purchased from Amazon marketplace. The National Archives permitted searches for numerous parliamentary documents relating to 'nuclear power', 'nuclear energy' or 'atomic power/energy'. These searches brought up commons minutes, committee minutes, select committee reports and confidential memos. All sources pertaining to nuclear power were collected and considered in case study construction. Additionally, special reports such as the Flowers Report (1970) were accessed via the National Archives or their respective Government Departments. More recent white papers and report were downloaded directly from the Department for Energy and

Climate Change (DECC), Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency (EA) websites. During the reading of all these sources additional reports were often mentioned which were then searched for and accessed when available. Certain Acts were also included in the data analysis if related to the Energy Industry. For example the 2008 Climate Change Act had implications on the legitimization of nuclear power.

**Table 5 Document Sourcing**

Data Source	Owner	Political Orientation	50s	60s	70s	80s	90s	00s	Database
<b>The Guardian</b>	Scott Trust Ltd	Centre-left, 2010 Liberal Democrat supporter	15	34	14	59	37	115	1950-2000 Guardian Digital Archive  2000+ Guardian Online
<b>The Times</b>	News Corporation	Centre-right, 2010 Conservative supporter	52	52	78	124	56	118	1945-1985 Times Digital Archive  1985-2010 Times Online
<b>Daily Mirror</b>	Trinity Mirror	Social Democrat, 2010 Labour supporter	12	7	9	21	10	26	1957-2010 UKpressonline Database
<b>Government</b>			26	63	10	21	51	59	National Archives, Government Department Websites
<b>Other sources</b>	International Atomic Energy Authority (UN) reports, Friends of the Earth (1976) response to influential Flowers Report by the Royal Commission on Environmental Pollution, Nuclear Energy Authority (OECD) reports.								

*Table showing the data sources used, their political orientation and the number of articles sourced per decade.*

To collect newspaper articles for each paper their respective archives (Table 4) were searched using the same terms ‘nuclear power’ ‘nuclear energy’ and ‘atomic energy/power’ either in the title, abstract or main body of the text. These searches brought up hundreds of hits which were individually read to ensure relevance. For example, some articles mentioned ‘nuclear power station’ passively whilst reporting on something unrelated and were thus discarded before deeper analysis. Each database provided results which covered each decade as expected given the major events and themes within each. For all three papers, a much larger number of articles were accessible in the 2000s due to the increase in digital media articles. Similarly, the 1950s have a relatively small number of articles partly because the civil programme began in 1956, and partly because the newspaper articles were often shorter and concise. Additionally, the historical reach

of the databases differed given the archiving of each of the papers (see Table 4). The three newspapers were chosen due to a number of similarities and differences. They are all daily papers which increased the likelihood of large data sets and they all predated the UK civil nuclear industry. Conversely they have different owners and political orientations, thereby ensuring that together they provide a comprehensive view of the diverse political perspective which influenced, informed and interpreted the nuclear power debate. Given the time and space constraints of the thesis it was considered that articles from additional newspapers would create a dataset of an unmanageable size. It should additionally be noted that the omission of page numbers in the article references is because the online databases from which the articles were sourced often showed only the text excerpt and therefore the page numbers were not available.

### **Theoretical Considerations when using Text**

This thesis draws from scholars who have focused on the use of textual data and discourse analysis within a CR framework. An overview of the associations between discourse and institutionalism is provided in the literature review (pp.27-34). What are important to delineate here are the ways in which texts can be theoretically understood within a CR framework; that is, what do texts allow the CR researcher to do and what do they represent as a data source? Importantly, for CR researchers, language does not reflect the 'true' nature of reality but may provide key insights into the nature of events and institutions in the domain of the actual. The researcher may then 'read back' (Wry 2009) to surmise the character of institutional logics in the domain of the real via inference. Leca and Naccache (2006) have noted that researchers can '...render actors' subjective view of the world by mean of discourse analysis' (p.632). In other words, the analysis of documents aligns with the CR assumption that the researcher should uncover actor's understanding and perceptions because it provides a window to deeper level acuties.

Primarily this thesis has taken methodological instruction from the discourse-historical method of Van Leeuwen and Wodak (1999) and Critical Discourse Analysis (CDA) as developed by Fairclough (2005) and Wodak and Meyer (2009). Van Leeuwen and Wodak's (1999) discourse-historical method is applicable because it shares two interests with this thesis; historical context and discursive legitimation strategies. The method has three dimensions – the content of the data, the discursive strategies employed and the linguistic realisation off these contents and strategies. Additionally, history is important because 'discursive "events" are embedded' (p.91). As such the method focuses both on specific texts and the wider environment, including national demographic and political trends. They point to how legitimation is central in texts: '...representation always

involves some measure of legitimization or of de-legitimation, critique, opposition. It always seeks to construct new social practices, to perpetuate, justify or transform existing practices, or to destruct practices which no longer serve their purposes' (Van Leeuwen and Wodak 1999 p.98). Overall their methods point to the importance of recognising both historical context and broader contextual variables in order to understand the purpose of discursive legitimization strategies within textual data.

In terms of institutionalism the recurrence of discursive legitimization strategies pertaining to events and institutions are understood to elucidate certain situated manifestations of higher order (and ontologically deeper) institutional logics. Of course, actors writing texts are not always aware of existing institutions and therefore it is the job of the researcher to iterate between empirical tendencies, context and established theory to qualify an institution or the activated generative mechanisms of an institutional logic (Leca and Naccache 2006). Nevertheless the difference between text and behaviour must be noted. There are certain behaviours which are made invisible if one purely focuses on text. For example, Meyer and Rowan's (1977) idea of 'decoupling' shows that if a researcher focused purely on organisational texts to account for adoption rates of institutionalised practices the decoupling between textually noted compliance and physical non-compliance based on actual implementation would be rendered invisible. As such, the researcher may miss important data that might better show the extent of generative mechanisms at play. However, it is hoped that the wealth of documents from multiple political and journalistic perspectives and sources will build a case study which is rich and detailed enough to cover both attitudes and actions relating to the green nuclear debate and its context.

This thesis also draws from Critical Discourse Analysis (CDA) (Fairclough 2005) which adopts a position of analytical dualism in line with CR. In so doing CDA understands a '...dialectical relationship between discursive events and situations/ institutions/ social structures which frame them' (Wodak and Meyer 2009 p5). As such, the realist view of discourse analysis centres on the '...tension between process and pre-structured objects' (Fairclough 2005 p.918). Consequently, discursive strategies (and language in general) are seen as social practices which are integral to the study of action and interaction because they mediate the relationship between events and structures (Wodak and Meyer 2009, Fleetwood 2005). With this in mind, discursive legitimization strategies are understood as a form of social practice which may both support and transform institutions depending on the reflexivity and intent of embedded actors. However, CDA also includes detailed semiotic analysis of textual data which is highly time-consuming. Unfortunately the time constraints of this research have meant that a detailed CDA of the linguistic characteristics

of each text was unachievable. Indeed Van Leeuwen and Wodak's (1999) discourse analysis only focused on seven texts because of the depth they went into for each. Nevertheless, elements from the analytical-dualist emphasis of CDA and the discourse-historical approach (Van Leeuwen and Wodak 1999, Wodak 2009) are combined in this thesis because they provide useful insights into the ontological properties of texts and the ways in which they may be utilised in retrodution.

More generally texts are beneficial for the construction of historical case studies because articles and policy documents written in the past may be accessed. As such they are not retrospective as might be the case with interview transcripts relating to the past, and may therefore provide more 'reliable' information on events and public attitudes relating to issues which span multiple decades. Nevertheless, it is important to access meanings and understandings of said events and therefore the researcher has to be conscious of the types of textual data gathered. For example, newspaper articles were chosen in this thesis because they illustrate various attitudes and understandings pertaining to highly publicised debates. Additionally both Government and media texts attempt to justify their positions within those debates and will therefore present legitimisation strategies. Nonetheless, it should be noted that CR researchers must be reflexive in their construction of past texts in present terms. CDA researchers are self-reflective of their own research process and should be aware that their own work is driven by social, economic and political motives and that they are not in a superior position (Wodak and Meyer 2009). The types of text utilised in this research will be considered in more detail below.

## **Media**

Newspaper articles are not often part of the data cache of institutionalists, although lately they have been employed in the related fields of rhetoric and legitimacy literature (Kuronen et al 2005, Vaara et al 2006, Riaz et al 2011). Kuronen and colleagues (2005) suggest that the media is a domain of journalists' rhetorical constructions which tend to confirm the existing presuppositions held by the audience and carry out an essential part of the legitimisation and naturalisation of ideas and ideologies. As such the rhetorical constructions identifiable within media texts reflect the interests of the audience and may thus reflect and reproduce widely held assumptions of a practice or idea. Consequently this research recognises the ability of media legitimations to echo wider societal understandings. Nevertheless, the media has also been understood as a set of actors which have some degree of agency and may undergo some level of transformative institutional work. Vaara and colleagues (2006) consider journalism as 'institutional work'. For example, the rationalistic discourses embedded within journalistic projects may have intentions to convince an audience of

the legitimacy of a contested idea. Therefore the media are an important, although not well known 'legitimizing arena' (Vaara et al 2006 p789) for organisational practice because they 'give sense' to phenomena. Because journalists act as gatekeepers and editors of messages they have influence over what issues to raise and what to ignore, what perspectives to take, whom to give voice to and who to leave silent (Vaara et al 2006). Riaz et al (2011) agree that the media undertakes institutional work: '...the media itself engages in institutional work through the process of framing' (p.188). Here framing refers to 'making sense of' events and issues and relates to the agentic intentional and unintentional construction of legitimating arguments for a purpose.

## **Government**

A number of different Government documents were utilised in order to acquire a consistent representation of data over time; for example, white papers are infrequent and therefore draft white papers, independent committee reports and parliamentary minutes are useful supplementary sources of information detailing energy policy justification and action. Careful coding and filing ensured that the type of document used, its 'writer' and its purpose were not lost in the analysis. For example, the findings explicitly distinguish between quotes from white papers, arguments made by Ministers in parliamentary sessions and recommendations made by certain politically motivated sub-committees. As such, each text and its legitimating strategy are considered alongside the context of their creation. Aside from these complexities much of the Government data have a similar agenda to that of the press – to convince society of its perspective by legitimating certain proposals whilst delegitimizing others. Additionally the media often relayed the legitimating strategies of Government publications. Given these similarities both media and Government documents are coded and analysed in terms of the same institutional logics and their signifiers.

## **Analysis and Coding**

This process is part of Houston's (2010) fourth step which compels the researcher to elaborate, refine, and falsify the research findings through analytical robustness. The hypothetical assumptions underlying the research questions should be confirmed or reworked during this stage so that the findings can reflect the most persuasive and comprehensive answer to the research agenda available to the researcher. For the analysis both media and Government data sets were analysed using a CAQDAS (Computer Aided Qualitative Data Analysis Software) called MAX-qda.



Media and Government data sets were analysed in different 'document systems' to limit the complexity involved within having too many documents in one 'system'. However, both were coded under the same emergent coding categories to ensure consistency between the analyses of the data sources.

CAQDAS is often critiqued because it is assumed that the richness of qualitative research is lost when the systematic nature of the software alienates the researcher from the data (Fielding and Lee 2002). However, Kelle (2004) defends the use of CAQDAS and argues that the techniques used in qualitative analysis software are newer versions of the traditional methods of coding, indexing and cross-referencing. Additionally scholars using CAQDAS are forced to make their use of the software transparent to avoid such criticisms. Indeed, throughout this research there was a highly conscious effort to avoid the alienation of coded segments from context. The memo function was used to annotate every coded segment with article subject, context and any apparent position on nuclear power. Ultimately CAQDAS was used minimally as a technique for simple coding to avoid the estrangement of contextual richness from specific quotes. Given the electronic format of much of the archival based data it provided a straightforward alternative to coding the data in paper format.

Coding was of particular importance during the analysis given the large quantity of textual data (see Appendix 3 for coding framework). The initial round of coding set to unpick key events, issues and debates from the data and make the mass of text more approachable for a deeper analysis. As such the codes developed were predominantly descriptive in nature and related to both the wider energy industry and the nuclear industry more specifically. The second round of coding explored these events, debates and issues in more depth, and focussed particularly on unearthing the justificatory discourses and arguments surrounding them. In line with Kelle (2004) this second round of coding was loosely informed by the institutional literature; the justificatory and legitimating discourses provided insight into the higher-level institutional structures and the ways in which their conjunctions led to observed events.

Following the coding process an abductive analysis (see Table 4) was undertaken. A case study was written based on all the codes previously explored and the analysis looked to understand the dynamics of the debates with reference to wider literature. A number of theories of knowledge which best seemed to explain what was happening were applied and then developed where necessary in order to better explain the phenomena. For example, relationships between coded sets were explored and it was noted that the set of institutional logics denoted by Friedland and Alford (1991) would provide an appropriate framework from which to analyse the data.

Additionally, it was felt that the contestation evident between certain parties matched the Systems of Exchange theory posited by Biggart and Delbridge (2004). Additionally a number of legitimation strategies unpicked from the cases appeared to match previous literature in the area (Vaara et al 2006, Vaara and Tienari 2002). Where existing theories of knowledge lacked explanatory power, possible new theories were proposed such as 'situated logics' (p.52). Moreover, the development of the concept of an environmental logic was an aim of the research and the coding which spoke to its nature was emergent and fully informed by the data. The coding and analysis process did not appear to contradict the possible utility of an environmental institutional logic. As such the environmental institutional logic developed in Chapter 3 was used in the same way as the institutional logics of Friedland and Alford (1991) during analysis.

The selection, elaboration and development of appropriate theories of knowledge was an iterative process. A number of theories which first appeared to match the data were later discarded, and new theories were applied as the analysis of the data deepened. Although it is believed that the thesis applies the best means to explain the data explored, it should be noted that future theory development and alternative disciplines/perspectives might lead to a better explanation of events.

## **Conclusion of Methods**

This chapter has detailed how the CR methodology of retroduction has been applied to this research and has clarified the specifics of the research method. The chapter has examined the characteristics of CR and how it resonates with neo-institutionalism's key theoretical and analytical concepts; with particular attention paid to how institutional logics can be conceptualised from the CR ontological viewpoint. Houston's (2010) stages of retroduction have been used to structure both the research questions and the research process. Initially the transcendental research questions were presented. Each question spoke to the nature of social structural entities and their dynamic with agency (i.e. how institutional constructs such as logics may interact as a result of micro-level processes). Secondly, the hypothetical relationships among theoretical concepts were developed in order to illustrate how the thesis approached generative mechanisms, context, time and agency.

The use of qualitative methods and the construction of the case study were explained. A historical case study was constructed from newspaper articles and Government documents which provided a comprehensive story of the UK nuclear power industry and the environmental debates surrounding it. Given the CR perspective taken these texts were not understood as illustrating 'truth' or objective reality. Instead they were considered as the creations of actors who were

attempting to discursively persuade others to agree with their assessments of nuclear power's legitimacy. The discursive strategies provided in these media and Government texts provided possibilities for the nature of institutional logics to be retroduced. Moreover the methods of analysis applied elaborated the hypothesised relationship among theoretical concepts as suggested by Houston's (2010) fourth stage of retroduction. MAX-qda software was used to code the data both for theoretical insights and to aid the organisation of the data into debate themes. The latter process helped contextualise the former and the two could be cross referenced. The analytical system was structured around pre-determined concepts from the literature, but remained flexible to allow new concepts and themes to emerge from the data. Constant movement between the literature and the empirical findings ensured that the analytical process remained iterative so that the development of the findings was always done with prior theory in mind.

<b>Table 6 Overview Timeline for Chapter 5: Introducing Nuclear Power</b> <b>Covers the period 1940 to 1970</b>		
<b>Date</b>	<b>Key Event</b>	<b>Details</b>
<b>1945</b>	The Atomic Bomb Committee recommends the building of one or more nuclear reactors	The first sign that the UK is to have its own civil nuclear programme
<b>1946</b>	Launch of the Atomic Energy Research Establishment	Construction begins immediately on non-commercial nuclear power reactors.
<b>1947</b>	Windscale chosen as the site for the first commercial nuclear reactors (Cumbria)	
<b>1952</b>	The first reprocessing facility begins construction on the Windscale site	Allows the UK control over much of the nuclear fuel cycle and lessens dependence on other countries for nuclear power development
<b>1952</b>	Britain has its first testable atomic weapon and launches Operation Hurricane	UK begins to catch up with the American Manhattan Project to fortify its place as a nuclear 'superpower'
<b>1953</b>	USA President Eisenhower's speech to the UN entitled 'Atoms for Peace'	Clear example of attempts to conceptually distance nuclear power development from nuclear weapons
<b>1953</b>	Government announce the UKs civil nuclear programme to the public	Until 1953 all development had been in secret.
<b>1954</b>	The United Kingdom Atomic Energy Authority is established to take over the responsibility of nuclear power operations from the Ministry of Supply	Move hoped to speed up nuclear development
<b>1955</b>	Britain launches its second nuclear weapons test programme called Operation Mosaic in Australia	UK adamant in nuclear weapons development
<b>1955</b>	Suez Crisis threatens to constrain the transportation of fuel from the Middle East to Europe	Concern over security of supply played a major part in legitimating the move from purely research based reactors to a fully commercial nuclear programme
<b>1955</b>	A White Paper called 'A Programme of Nuclear Power' outlines the first official nuclear power programme.	The paper outlined a ten year plan for the construction of twelve MAGNOX reactors of British design
<b>1957</b>	Britain tests its first Hydrogen bomb	Brings the UK in line with Russia and the USA in terms of nuclear weapons development
<b>1957</b>	The commercial programme is expanded	Construction is going better than expected and more stations are added to the schedule
<b>1957</b>	Central Electricity Generating Board (CEGB) established by the Energy Act 1957	Financially minded operators of all power stations in the UK. Given authority to tender and authorise all new station builds
<b>1957</b>	Environmental opposition to the first nuclear programme occurs throughout 1957 and 1958, during which a number of inquiries are set up to discuss issues arising from local development	Most concern focussed on the impact of the stations on the amenity value of the countryside in which they were to be installed
<b>1957</b>	Campaign for Nuclear Disarmament (CND) is established and is primarily concerned with atomic weapons	CND and the Daily Mirror begin linking nuclear weapons escalation with the nuclear power programme
<b>1957</b>	The United Nations International Atomic Energy Agency is established to disseminate the 'Atoms for Peace' message	The UN challenged the CND by proposing that nuclear power represented the peaceful 'version' of nuclear power
<b>1958-1959</b>	Fuel stocks which were threatened by the Suez Crisis have recuperated	The Central Electricity Generating Board came into conflict with the Ministry for Power and UKAEA given the high costs of nuclear power and the lowering costs of fossil fuels

<b>1959</b>	A controversial inquiry over the Dungeness nuclear site ends in a Government report justifying the build	The inquiry illustrated the way in which the Government rejected environmental consideration as of secondary importance to financial and resource security concerns
<b>1960</b>	The White Paper 'The Nuclear Power Programme' by the Ministry of Power re-phases and slows the nuclear development	The Ministry of Power and CEGB agreed that nuclear power costs were too high to maintain expansion in light of dropping fossil fuel costs (Post-Suez crisis)
<b>1960</b>	Indecision over next reactor type slows next programme	Cost and efficiency issues with the first MAGNOX type reactors lead to reconsideration over reactor designs
<b>1962</b>	Nassau Agreement sets up NATO	Cold War intensifies
<b>1964</b>	A new Labour Government under Harold Wilson wins the election	Labour neither disarms the UK nor halts the nuclear power programme despite their manifesto pledging disarmament
<b>1964</b>	Labour publishes the White Paper 'The Second Nuclear Power Programme'	Confirmed a second civil programme with the new British designed AGR type reactors – expected to be more cost efficient than MAGNOX.
<b>1967</b>	Labour releases the White Paper 'Nuclear Power: Britain's Chance is Now' which justifies a new nuclear programme despite past struggles	The AGR had proven difficult to construct and the White Paper hoped to rally support for a third programme
<b>1967</b>	Following the White Paper, the Select Committee on Science and Technology recommends that construction be hastened	A third nuclear programme is outlined for the late 1970s
<b>1970</b>	A new Conservative Government comes into power	The new Government had less enthusiasm for a new nuclear programme given that the AGR reactors were proving troublesome. A review of reactor choices was initiated

# Chapter 5: Introducing Nuclear Power

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## Introduction to the Case Study

The social history of nuclear power and its relationship with the natural environment is a lengthy and complex one. Since the initial construction of the UK's civil nuclear programme in the mid-1950s the environmental credentials of nuclear power have been a subject of impassioned debate. In the early decades nuclear power was considered by some as a threat to countryside amenities. Over time societal perceptions have transformed and nuclear power has been understood as both a fundamental threat to nature and as a celebrated green technology with potential to rescue the nation from impending climate change. Throughout the 60 years within which these altering perceptions of the environmental merits of atomic energy progressed, the nuclear power industry has had to fight for legitimacy in an energy industry which has faced considerable contextual turbulence. Throughout the case study four central contextual themes impacted institutional variance and salience within the industry: volatile international energy markets, militant national trade union pressures, technological and scientific advancements and a move from nationalised industry to privatisation. As a highly controversial technology, nuclear power's continuation given such contextual commotion is fascinating. An institutional perspective is particularly useful in uncovering and explaining the story of a technology which appeared to mean many things to many different people; both marketable and financially suicidal, secure whilst also inestimably dangerous, and as both an environmental saviour as well as an apocalyptic certainty. The institutional approach is analytically equipped to explore the tensions and contradictions which uphold such polarisations in perspective.

Analysis of textual data from both the Government and the newspapers provided insights into institutional value structures within and external to the energy industry. Such structures are referred to as situated institutional logics which represent the localised manifestations of societal institutional logics (Friedland and Alford 1991). In particular the energy industry's decisions over energy options seemed informed initially by societal level Capitalist Market logics and the Bureaucratic State logic. These were manifest in the form of national-market and state-resource situated logics respectively. Initially, an environmental institutional logic was not manifest within the energy industry. Actors external to the energy industry were originally concerned with the effect of nuclear generators on the amenity of the countryside. As new and emergent meanings of

‘environmentalism’ blossomed, informed by cultural imports from an American environmental social movement, increasing pressure was exerted on the energy industry to base energy policy decisions on environmental grounds. However, it was not until the late 1980s that the energy industry began to differentiate between energy options by considering their environmental credentials. However, the nature of what could be considered a ‘credential’ was defined by a situated target-based environmental logic which became progressively institutionalised within the energy industry. This situated logic valued a quantitative understanding of environmentalism which reflected the instrumental rationality of the energy industry. This logic predominantly informed arguments supporting green nuclear power and thus riled the environmental social movement lobby who continued to recognise nuclear power as a fundamentally ecologically damaging technology. By the end of this case study in 2010 nuclear power represented a ‘green paradox’; it was understood as both the saviour and destroyer of civilisation and nature.

This chapter sets up the parameters of the energy industry and examines its inception. It also delineates the institutional structure of the industry to understand how a nascent nuclear energy industry was propelled forward and legitimated to the public. Situated logics within the energy industry, although sometimes in tension, entrenched decision makers within value structures against which nuclear power was discursively legitimated. Such legitimation was often pursued by a pro-nuclear lobby within both Labour and Conservative Governments and tended to draw on the wider economic and political context of the industry. Given the lack of environmental knowledge in the public domain the nuclear energy industry rapidly expanded in the 1950s. This chapter suggests that an amenity approach to environmentalism was taken by the public due to a lack of education regarding the implications of nuclear installations on local ecology. Environmental ignorance was reinforced by the Government and media’s discursive strategies which aimed to distance nuclear energy from nuclear weapons and normalise it so that its legitimacy could be judged on the same institutional norms as all other energy options.

## **The UK Nuclear Power Programme**

‘... it is not too much to say that the exploitation of nuclear energy may come to be regarded as the most important step taken by man in the mastery of nature since the discovery of fire’ (Paymaster General 1953 p.5)

War is a powerful impetus for innovation, especially in the field of technological weaponry. The power of splitting an atom (fission) to release energy was part of this technological push towards

increasingly more devastating arms during the Second World War. This created an important pretext for nuclear power; civil uses of fission were born from atomic bomb development. The power released from nuclear fission was discovered in 1938 when Otto Frisch and Rudolf Peierls revealed that a fissile atom (an unstable isotope), once bombarded with neutrons, splits and produces free photons, neutrons and a large amount of energy. By the early 1940s MAUD, a committee inspired by Frisch's findings, was formed under the UK's Air Ministry department to work out the basic principles of fission bomb design and uranium enrichment. In 1941 Britain's first atomic bomb began construction under the code name 'Tube Alloys'. In the same year a special division called the Department for Scientific and Industrial Research was established to take responsibility for early nuclear technological development. During the following four years the UK dispatched scientists to aid the US based Manhattan Project which was tasked with creating the world's first atomic bombs. Two bombs were built by the project and were detonated over the Japanese Cities of Hiroshima and Nagasaki ('little boy' and 'fat man' respectively) in August 1945. In a memorandum on nuclear to his cabinet the British Prime Minister Clement Atlee commented;

'There is now a weapon of transcendent power against which there can be no real defence. Its use in war can only lead to mutual destruction and the collapse of civilisation...The only hope for the world is that we should all lay aside our nationalistic ideas, and strive without reservation to bring about an international relationship in which war is entirely ruled out'  
(Cabinet 1945 p.1)

Merely a year later the first general assembly of the United Nations met in London in January to establish the United Nations Atomic Energy Commission charged with the task of eliminating all weapons of mass destruction. Instead of convincing the world to abandon nuclear arms, American ownership of atomic bombs had only spurred armament in other nations including the UK. In 1946 the responsibility for the UK's nuclear weapons programme was transferred over to the Ministry of Supply signalling the beginning of a post-war nuclear programme. The UK Government officially decided in 1947 that the country would go ahead with the development and acquisition of nuclear weapons, but this was not announced publicly until 1953.

Although the nuclear bomb had taken much of the nuclear development interest, nuclear power for civilian uses became an important possibility in the latter half of the 1940s. In August 1945 Clement Atlee convened a secret cabinet committee on atomic energy to establish nuclear policy under the code named GEN.75, also known as the Atomic Bomb Committee. An advisory group called the Advisory Committee on Atomic Energy (ACAE) was also established to consider the UK's nuclear power options. GEN.75 convened in December to consider the reports of the ACAE and



recommended the building of one or more nuclear reactors, marking the start of the UK civil nuclear power programme. 1946 saw the launch of the first Atomic Energy Research Establishment (AERE) directed by John Cockcroft. The AERE was based in Harwell and became the site of the UK's first non-commercial nuclear reactors nicknamed BEPO (Britain Experimental Pile 0). BEPO went on the grid in 1948 and was the first large reactor outside of the USA. Early reactors such as BEPO were vital to the development of the civil power programme, but were primarily for producing materials for the expanding nuclear weapons programme.

Meanwhile, the development of a commercial and civilian nuclear power programme continued. In 1947 an atomic site in Windscale was announced and the two Windscale piles (small reactors) went critical (activated) in late 1950 and mid-1951. By 1952 a reprocessing facility had been installed on site to produce fuel and plutonium in-house for the reactors. It was not until 1953 that the Government dropped the wall of secrecy and officially announced that a civil nuclear programme was in progress. Soon afterwards an additional four larger reactors were commissioned at the Windscale site. The slow speed at which the Ministry of Supply was progressing on the nuclear programme frustrated the Government and led to a transferral of responsibility for the entire nuclear programme to a newly created United Kingdom Atomic Energy Authority (UKAEA) in 1954. The non-departmental UKAEA was presumed to be more flexible when researching and developing the '...frontiers of knowledge' (Paymaster General 1952 p.3). Nuclear innovation was developing at pace and enticed a higher degree of optimism in its practicability: '...however crude and primitive our first nuclear power reactors may appear to future generations, we can look forward with confidence to the time when industrial power from the atom will be a major factor in the world's economy' (Paymaster General 1953 p.5).

The first official civil nuclear programme was announced in a 1955 Energy White paper labelled 'A Programme of Nuclear Power' (Ministry of Fuel and Power). Intended for public consumption, the paper enthusiastically outlined a ten year plan for the construction of twelve nuclear power stations at an estimated cost of £300 million, and suggested further developments thereafter. Construction of two gas cooled MAGNOX reactors was to start in mid-1957 (to be operational by 1960-61) followed by two further stations 18 months later. Additional stations were anticipated with perhaps four more to begin construction in 1960 and then a further four starting 18 months later, although the reactor type for these remained unspecified. Initial nuclear capacity of between 1,500 and 2,000 Megawatts (MWs) would be equivalent to roughly five million tons of coal a year by 1965, alleviating stresses on coal production and substitutive fuels. Reactors were to be designed and built by private industry for the nationally owned Electricity Authorities and would be funded via

public financing. By February 1957 a memorandum by the Minister of Power suggested that progress on the MAGNOX reactors had been considerably more rapid than expected and as such the programme was expanded further: 'I am advised by the Atomic Energy Authority that, in the light of the technical progress that has been achieved since February 1955, it would now be reasonable to plan for a nuclear capacity of 6,000MWs...would include the commissioning of nineteen nuclear stations on sixteen different sites before the end of 1965' (Ministry of Power 1957). The white paper offered little scope for hesitation, making clear that nuclear power's progression should be unhindered:

'This formidable task must be tackled with vigour, imagination and courage. We must not be put off by setbacks or uncertainties. The stakes are high but the final reward will be immeasurable. We must keep ourselves in the forefront of the development of nuclear power so that we can play our proper part in harnessing this new form of energy for the benefit of mankind.' (Ministry of Fuel and Power 1955)

Increasing Government spending on the nationally owned nuclear industry's civil practices developed it as a key player within the wider energy industry. Freed from its isolated role as a military research industry, nuclear power was rapidly transforming into a recognisable force and gaining comparability to incumbent electricity options.

## **The Nuclear Industry and the Energy Industry**

It is important to consider the nuclear energy industry as an integral part of a wider energy industry in the UK. Isolating it and analysing its development without consideration of alternative energy industries would have little utility given that the legitimacy of nuclear power was continually dependent on its perceived relative 'value' when compared against energy alternatives. These values are denoted by the institutional logics to be discussed. Of interest to this case are the energy industry actors which engaged in a direct relationship with the nuclear energy industry. Thus when the 'energy industry' is referred to as the main unit of analysis it is predominantly referring to those actors and organisations which deliberate over energy choices and the constitution of the energy mix. The nuclear industry is also referred to specifically and is a general term for actors and organisations involved directly in the development and operations of atomic energy.

Actors involved in nuclear power within the energy industry can be presented in five categories: Decision-makers, Regulators, Researchers, Constructors and Operators (see Table 6). Decision-

makers are responsible for decisions over whether nuclear facilities are constructed. These actors are central in the energy industry as they determine energy mix proportions and control which energy technology will receive funding. Regulators are related to the nuclear industry directly through their specialisations in nuclear safety for example, and operate for the State whilst remaining primarily independent. This category also includes short-term independent committees established to inform key decisions on issues such as waste disposal and environmental effects. Researchers include specific nuclear establishments which focus on the research and development of nuclear power generators. For example, the UKAEA was set up in 1954 as a non-departmental organisation independent of the Ministry of Supply to take over nuclear research and development (as well as fuel procurement, fabrication and processing). These actors remain state owned for a lengthy period of the case study. Constructors have undergone many changes. Initially they were amalgamated into numerous consortia which would take on whole plant builds tendered by the CEBG. They have been closely controlled by the State for many decades. Finally, operators represent the companies formed to run nuclear power after the dismantling of the CEBG.

A focus on nuclear energy within the context of the broader energy industry also brings into view alternative energy generating technologies which compete with nuclear power for investment and Government interest. Given contextual oscillations within the energy markets, during different periods the nuclear power industry finds itself struggling against various other energy options. For example, the National Coal Board and energy based unions such as the National Union of Mineworkers enter debates around nuclear power in the 1970s and 1980s when the programme for nuclear energy appeared threatening amidst mine closures. This illustrates the debates around nuclear energy should always be considered within the context of the wider energy industry. Nevertheless, all industries are typically understood as aiming to at least appear legitimate against the same institutional criteria embedded within the mind-sets of decision-making actors, and thus the situated logics of the energy industry as a whole will affect the arguments encouraging or challenging all industries. Hence at the level of the energy industry a distinct set of institutional logics is harboured, against which all industries attempt to appear

**Table 7 Actor Categories within the Energy Industry**

	<b>Decision-Makers (the first two span multiple energy industries)</b>	<b>Key Regulators (national)</b>	<b>Researchers</b>	<b>Constructors</b>	<b>Operators</b>
<b>Nationalised 1950-1996</b>	<p><b>Department of Power, Ministry of Defence</b> (with guidance from both ministerial and independent task based committees)</p> <p><b>Central Electricity Generating Board</b> (CEGB)</p>	<p><b>Health and Safety Directorate and its Nuclear Installations Inspectorate</b> (HSE &amp; NII created by the Nuclear Installations Act 1965)</p> <p><b>National Radiological Protection Board</b> (NRPB created in 1970 - present)</p>	<p><b>UKAEA</b> (UK Atomic Energy Authority accountable to the Department for Trade and Industry)</p> <p><b>AERA</b> (Atomic Energy Research Establishment aka Harwell – as part of UKAEA)</p> <p><b>AWRE</b> (Atomic Weapons Research Establishment founded in 1950 by the Ministry of Supply. Transferred to UKAEA in 54, and production capacities transferred to <b>BNFL</b> in 71. In 73 the remaining parts of AWRE were transferred to the Ministry of Defence)</p>	<p>Formed 1955-57: <b>Nuclear Energy Company</b>, (NEC) <b>British Nuclear Design and Construction Ltd</b> (BNDC) <b>Atomic Energy Group</b> (AEG) <b>Nuclear Power Plant Co</b> (NPPC). <b>Atomic Power Constructors</b> (APC)</p> <p>1960, NEC and NPPC joined to create <b>The Nuclear Power Group</b> (TNPG), and AEG and APC joined to make the <b>United Power Company</b> leaving three surviving consortia</p> <p>By 1970 only BNDC and TNPG were operating</p> <p>In 1973 the <b>National Nuclear Corporation</b> (NNC) was set up to make a single construction entity, and controlled a subsidiary called the <b>Nuclear Power Company</b> (NPC) that would design and construct stations. NNC would be held by the GEC, UKAEA and the British Nuclear Associates – 7 companies left from old consortia</p>	<p>Stations operated at plant level but accountable to the CEGB and the Department of Power.</p> <p>During energy privatisation the plants were split into separate companies who then operated the plants.</p> <p><b>Nuclear Electric</b> (set up in 1990 after CEGB was disbanded. Nuclear stations initially part of <b>National Power</b> which was to be privatised were withdrawn and held in public ownership in Nuclear Electric.)</p> <p>Fuel reprocessing plants were operated by the UKAEA and then BNFL, and research establishments were operated by the UKAEA, all on behalf of the Government.</p>
<b>Post nuclear privatisation 1996 +</b>	<p><b>Government</b> – makes overall strategic direction (retains power to vary attractiveness of industries) private industry chooses how to</p>	<p><b>Nuclear Decommissioning Authority</b> (NDA)</p> <p><b>Environmental Agency</b> (EA)</p> <p><b>HSE &amp; NII</b></p>	<p><b>NDA</b> (research into waste disposal) <b>AWRE</b> and <b>AERE</b> research centres continue</p> <p>Nuclear research is shared internationally with more detailed public and private research occurring abroad rather in the UK.</p>	<p>Private companies construct plants. Within the UK it is highly likely that all plants to be constructed in the future will be done so by foreign public or state owned companies.</p>	<p>Private companies operate owned plants</p> <p>BNFL dissolved</p> <p>Public owned DNA responsible for running MAGBOX reactors until end of lifespan, and then to decommission them. All other plants</p>

	<b>Decision-Makers (the first two span multiple energy industries)</b>	<b>Key Regulators (national)</b>	<b>Researchers</b>	<b>Constructors</b>	<b>Operators</b>
	meet Government goals	<p><b>UK Safeguards Office</b> (UKSO works closely with the IAEA)</p> <p><b>Office for Civil Nuclear Security</b> (OCNS)</p> <p><b>The Office for Nuclear Regulation</b> (ONR) was created in 2011 as a merger of the above 3 regulators)</p>	<p>UK based research is not as necessary as new reactors will be of foreign design</p> <p>The UK works on an international scale to develop nuclear Fusion with both CERN (the European organisation for nuclear research) and with the EFDA (European Fusion Development Agreement) with which the UK is home to the Joint European Torus (JET) experimental laboratory.</p>		<p>are the full responsibility of the companies in ownership</p> <p><b>British Energy</b> (1995 – a merger of Nuclear Electric and Scottish nuclear, minus the old MAGNOX reactors. Was then sold to the City)</p> <p><b>Magnox Electric</b> was founded in 1996 to manage the MAGNOX reactors and remained in public ownership (combined with BNFL in 98 and then acquired by US company Energy Solutions when BNFL was split and sold off)</p>
<b>Relation with energy industry</b>	Initially CEBG and Government departments span energy industries. During and after privatisation decision-makers also operate. Government controls energy targets	Specific to nuclear industry. All accountable to the Government though not all have statutory rights	Specific to nuclear industry - focuses only on atomic research	Specific to nuclear industry – specialised in nuclear construction (makes them vulnerable to low levels of orders)	Specific to nuclear industry during nationalisation, more integrated during privatisation as operators can now choose...
<b>International context</b>	<p>The European Atomic Energy Community (EURATOM from the EU EURATOM treaty 1957 – present, set up to ensure all countries in the EEC have means to pursue nuclear power)</p> <p>The International Atomic Energy Authority (IAEA, set up in 1957 to ensure the international peaceful uses of nuclear power. Enforces safeguards on dangerous materials upon member states. Monitors material storage and transport across country boundaries)</p> <p>Nuclear Energy Agency (NEA is an agency within the OECD and assists development of nuclear power through sharing and cooperation in scientific and technological fields. Exchanges a broad array of information and reports on regulation and policy)</p>				

legitimate. It is beyond the scope of this research to understand the individual logics of the various energy industries as they may stand isolated. However, the situated logics of the energy industry as highlighted by the debates and negotiations surrounding the legitimization of nuclear energy will be discussed below.

## **Situated Logics**

In responding to calls in the literature to locate the study of organising in its meaningful context, this thesis applies the concept of 'situated logics' (defined on p.42) to differentiate between institutional logics as generic underpinning norms and conventions grounded in the societal orders as defined by Friedland and Alford (1991), and 'situated logics' which develop through the localised manifestation of those orders, either passively informing or offering the 'tools' for actors to actively reengineer (depending on their awareness and motivation) how such orders affect practice and action within given industry. These findings suggest that the idiosyncratic characteristics of the energy industry and its dominant values, norms and conventions were reflected in two principle 'situated logics'. Such situated institutionalised values echo the unique historical and meaningful characteristics of the industry as understood by industry level actors, thus combining the abstract meaning structures of institutional logics with the physicalities and practicalities of the industry.

## **Identifying Situated Logics**

Throughout the case study actors debating the appropriateness of nuclear power judged its legitimacy by drawing from capitalist market and bureaucratic state societal institutional orders and their concomitant central logics; the local manifestations of which are labelled the national-market and state-resource situated logics (see Table 7) These industry level manifestations of societal level institutional structures provide contending norms and values which inform how actors engage in political struggles and visualize their perceived favourable outcomes. Situated logics also inherit certain rationality propositions from the actors who situate them. In other words, their 'situatedness' implies that they are products of the actor groups who construct, enact and recreate them. Given that these actors are themselves embedded within the institutionalised systems of the particular industry, they exhibit rationality types which will likely be reflected in the nature of any existing or emergent situated institutional logics. Discursive legitimating strategies within textual data illustrate the vacillations in nuclear power's perceived instrumental or substantive rationality

and how each may relate to a specific actor group engaged within the nuclear debate. In the following paragraphs the thesis will look more closely at the origins of the situated logics which informed various pro and anti-nuclear arguments throughout the case study. Although distinctive in their delineation of value and their translation of meaning, they appear in tandem throughout the case study both in competing and complementary relations.

### **National-Market Logic**

Until the mid-1990s the nuclear power industry primarily resided under national control. Only the construction consortia were constituted by private enterprise. Consequently the legitimating discourses and actions of key decision makers such as the Department for Power and the CEBG appeared to reflect the values of a market infused with the idiosyncrasies of the Public sector. Accumulation of wealth and private ownership as central values and conventions of the capitalist-market institutional order (Friedland and Alford 1991) were less visible in the situated value structures of energy industry actors. Both the CEBG and the Government wished to develop an affordable and financially rewarding energy industry, but they pursued such with a level of flexibility that was afforded them primarily through their differences from the private sector. Neither of these actors were fundamentally dislocated from the values imbued by the societal level capitalist market logics; but the sheer size and extent of resources which adorned the nationalised industry offered them a context whereby there was scope to financially legitimate nuclear power even if immediate commercial figures did not lend themselves to its development. An imperative of short-term financial gain and the immediate accumulation of profit were often absent in Government discourse which accepted that nuclear power's financial legitimacy lay in its likely technological development in decades to come. In sum, within the nationalised industry, the norms and conventions of the societal capitalist-market logics became somewhat supplier, offering discursive space for actors to legitimate nuclear power through recourse to market values whilst acknowledging that nuclear was showing neither financial stability nor economic improvement.

The industry level nationalised market logic is understood throughout the thesis as a 'national-market situated logic' because it represented a manifestation of broader capitalist market logics within a more localised nationalised setting. Comparisons between energy options clearly reflected the values of the capitalist market such as profit accumulation and efficacy of investment as the Department for Power defended its nuclear decisions based on export market potential and cheap energy production. The discursive legitimization of nuclear power by the Department of Power in particular only became prominent in the data once the secrecy surrounding civil nuclear power had subsided when Britain's first reactor opened in 1956. The newness of the civil nuclear programme

created ambiguity around the costs of nuclear power, making predictions neither forthcoming nor reliable. Instead, the belief in technological advancement meant that those prepared to defend nuclear power did so based on its assumed potential to offer great amounts of energy for very little cost. When compared to the expectations of other industries, nuclear power's anticipated technological trajectory suggested opportunities which could not be expected from the incumbent energy industries. Indeed, this may account for why other energy industries were less likely to be legitimated in the same way as nuclear. Whereas nuclear power's instrumental rationality lay in its future possibility, coal and oil energy production were understood to have reached their developmental peak. Comparatively then, from a long-term national-market perspective and an instrumentally rational one, nuclear power was proposed as the most legitimate energy option in this early period.

**Table 8 Societal and Situated Institutional Logics between 1950 and 1965**

<b>Societal level Logic</b>	<b>Capitalist market</b>	<b>Bureaucratic state</b>	<b>Environmental welfare</b>
<b>Institutional characteristics</b>	Accumulation of wealth and private ownership	Rationalisation and regulation of state through accountable bureaucracies	Protection of the natural environment regardless of benefactor
<b>Situated level Logic</b>	Nationalised market	State-resource	Amenity
<b>Institutional characteristics</b>	Public ownership Profit relative to priority of national goals	Regulation and control of energy resources reinforce state invulnerabilities	Protection of nature insofar as the amenities it provides for its public
<b>Level</b>	Nationalised energy industry	Nationalised energy industry	Often local communities resisting nuclear builds
<b>Actors involved</b>	Department of Power, CEBG	Department of Power UKAEA (push for British designs)	Local community groups, Small national groups

### **Fantatising the Market**

Throughout the late 1950s and early 1960s the instrumental market rationality of nuclear power was supported and conveyed to the public audience via discursive strategies which relied on futuristic market assumptions. Official Government white papers were the primary sources of information for the press at this time, and thus both Governmental documents and media texts displayed similar expectations regarding the future nuclear marketability. Comparisons between



energy options were based on future market fantasies, against which it would have been difficult for other energy means to compete. The use of the term 'fantasies' refers to the imaginative conceptualisation by actors of extravagant and sometimes wondrous future rewards which would come from immediate investment in nuclear power. Although initially expensive to build and operate, it was assumed that the early costs of nuclear reactors would be recuperated once the 'first of a kind' costs had subsided and the reactors were delivering abundant and efficient energy.

### **Uncertain Financial Fantasies**

'...the economic virtues of all this are plain. In round numbers, a decade from now the annual cost of generating the country's electricity will be £10 million less' (Maddox 1964b)

Initially nuclear power was not an economic endeavour. The Government assumed that nuclear power would only, if built and operated faultlessly to schedule, generate electricity at a slightly lesser cost than traditional fossil-fuel plants run at continuous baseload capacity. Unsurprisingly, for a 'first of a kind' endeavour, the first stations at Bradwell and Berkeley cost three and a half times as much to build as a conventional coal burning station of the same capacity (Ministry of Power 1957). These costs were projected to be offset by the relatively low cost of running the stations, although low operational costs were yet to be proven on a commercial scale. During the mid-1950s the Minister of Power and the Chairman of the CEGB were frequently quoted in the media as expectant of an unprecedentedly cheap atomic industry which would eventually generate electricity at a cost much lower than the lowest pounds per Kw/h (kilowatt hour) to date. As long as the industry was allowed to develop and expand, low cost expectations would be met through continual technological developments which would steadily reduce fuel and operating costs. Consequently market legitimacy relied on technological optimism and expectations of progressive change:

'...developments moved forward so rapidly that already their forecasts of a year ago had been overtaken by events. "Indeed the power of creative technology is to-day so great that, given a clear goal and no political impediments, progress is certain to be more rapid than can be foreseen or guaranteed. I believe that nuclear power will be making a major contribution to Britain's economy a decade from now...addressing members of the Istituto di Studi in Rome yesterday, [Sir John Cockcroft] said that the million-kilowatt nuclear power station "is not far off".' [The director of the UKAEA, Sir. Cockcroft, as quoted in The Times] (Special Correspondent 1956 p.11)

Immediate cost deficiencies were not to impinge on the continual development of the civil programme:

‘An estimate can be made of the cost of electricity produced by the two types of reactors likely to be in commercial use in the next ten years although it must be subject to a wide margin of uncertainty’ (Ministry of Fuel and Power 1955 p.16)

‘The exact lines of future development in nuclear energy are uncertain, but this must not deter us from pressing on with its practical application wherever it appears promising’ (Ministry of Fuel and Power 1955 p.21)

Uncertainty opened up space for optimism and fantasising. Fantasising strategies refer to the discursive development of favourable future scenarios based on unproven and possibly unrealistic trajectories of development. Such fantasies were neither verifiable nor refutable but nevertheless constructed a seductive vision of an idyllic future based on the priorities of the present. To encourage public acceptance of nuclear power, the Government and the UKAEA developed idealistic notions that atomic energy would provide an unlimited and cheap source of electricity by the millennium. Fantasies were supported by the previously mentioned robust belief in the continuing momentum of technology and science – a belief engrained within the psyche of those actors pushing nuclear power forward not just as an industrial endeavour, but as a scientific one;

‘Britain expects in eight years to be producing more electricity from nuclear power stations than the country’s total consumption at the outbreak of the Second World War. This was stated by Sir John Maud, permanent secretary to the Minister of power... [who] said that the British nuclear power industry would have achieved in less than a decade what had taken the conventional electrical industry more than 60 years...when fusion could be commercially exploited, Sir John Maud said, it should be possible to provide ample power for everyone...’ (Energy Correspondent 1958 p.6)

‘The official justification for the nuclear power programme is that nuclear technology must be kept moving. And a nuclear power industry kept ticking over until 1970. By then the generating costs of nuclear power stations are expected to break even... diminishing rapidly over the following decade’ (Anon 1962)

Fantasising strategies were particularly evident in texts which hoped to reinvigorate interest in a second programme of nuclear plants after the slowing of the first programme’s extension in 1960. The new British Advanced Gas-Cooled Reactor (AGR) technology was to constitute the second programme and provided an opportunity for the Government to dispose of scepticism caused by

the disappointment of the MAGNOX fleet, and focus attention on the new exciting financial possibilities of the AGRs – the UK's most likely export design:

'Sir William Penney, leader of the United Kingdom delegation to the conference of the International Atomic Energy Agency, said in his address today that nuclear power was entering a new phase where it could be competitive with conventional power...looking ahead, there was no doubt about the important contribution nuclear power would make in adding to the energy available to all countries' (Energy Correspondent 1964 p.17)

'The UKAEA member for reactors told me that there was full confidence in the new design. He thought there would be no need to go through an intermediate stage in design, and that the first commercial station based on the AGR principle...could produce power for the grid at less than a halfpenny a unit' (Special Correspondent 1963 p.5)

The values and conventions of a national-market logic within the energy industry meant that nuclear power's instrumental rationality could be evaluated by the Department of Power based on expected future scenarios which they themselves often constructed with help from the UKAEA. However, the scenarios were only comprehensible in light of the surrounding scientific and technological discourses which promoted an expectation of continual change and development, and were backed by the UKAEA when justifying its huge research and development subsidy (over 90 per cent of all British energy research money).

### **State-Resource logic**

'Our civilisation is based on power. Improved living standards both in advanced industrial countries like our own and in the vast underdeveloped countries overseas can only come about through the increased use of power....The coming of nuclear power therefore marks the beginning of a new era...' (Ministry of Fuel and Power 1955 p.3)

Interest in nuclear power was also predicated on its ability to enhance the interests of the sovereign state. Nuclear power was often supported because of its potential for reinforcing State control over energy resources and guarding against international energy supply vulnerabilities. Informing these arguments was a situated version of Friedland and Alford's (1991) State Bureaucracy institutional logic. According to the authors, this institutional logic values the bureaucratic form in ensuring effective state control over a public. The material and symbolic content of the bureaucratic state logics include the rationalisation and regulation of activity, structural hierarchies for control and the conversion of micro level issues into mass consensus – the enactment of which reinforces the

definition of the State as director and administrator of national plans and activities (Thornton et al 2012).

At the industry level, the security of energy resources through invulnerable supplies of both electricity and its constituent fuels would allow for stricter regulation and rationalisation by the Government, thus reinforcing the rituals of the bureaucratic state. The Government and media, to varying extents, appeared to take for granted that an energy option's viability rested on its potential to alleviate state liabilities, with such immunities leading to opportunities whereby the state could appear self-sufficient whilst bettering the standard of living at an acceptable rate. Nuclear power in particular appealed to such interests because it represented large scale technocratic and centralised energy sourcing. Within a context of international fossil-fuel ownership and importation liability, nuclear energy had the potential to deliver the largest sum of electricity from the smallest possible amount of fuel. Additionally Uranium for reactors was imported from friendly countries such as Australia or Canada, or from the UK via technology developed to refabricate new fuel elements out of reprocessed ones. Hence, the situated form of the bureaucratic state logic is understood here as manifest as a 'state-resource logic' of the energy industry; it represents an overarching understanding that energy options should strengthen the energy sovereignty of the State and reduce vulnerabilities to energy control. As such it implies instrumental rationality in the sense that options should be quantitatively compared in order for the most 'secure' energy choice to be chosen; and substantive rationality in that the logic places high value on nationalism and sovereignty as overall guidelines of action.

### **Reacting to Resources**

'...since the war the production of coal from deep mines has increased from 175 million tons in 1945 to 214 million tons in 1954. But the demands of our expanding home industries have been rising even faster...the increasing demand for fuel cannot be met without exploiting to the full any new and economic technique' (Ministry of Fuel and Power 1955 p.11)

After WWII the growth of home industries meant that conventional resources were progressively unable to cover the energy requirements of the UK. As coal mines closed, causing heavy economic and social impacts on communities, the importation of fuel began to form the basis of a growth in international exchange. The UK was rapidly becoming a net importer of energy generating fuels which meant that the threat to the availability of oil caused by the Suez Crisis in the mid-50s had a profound effect on the Government's approach to energy sourcing. After a series of international

political contestations over allegiances and Egyptian investments the President of Egypt, Gamal Abdel Nasser, announced his plans to nationalise the Suez Canal in 1956. Nationalisation of the canal would severely constrain the transportation of fuel from the Middle East to Europe which prompted British forces (along with France and Israel) to invade Egypt. Britain pulled out quickly after international disapproval but thereafter serious questions were raised about the reliability of Middle Eastern oil supplies. It was in response to this crisis that the UK Government established the Nuclear Power Working Party which recommended the expansion of the nuclear programme.

A year after the Suez crisis a memorandum by the Minister of Power advised that it would be reasonable to triple the 1956 planned nuclear capacity by the end of 1965. In the following white paper entitled 'Capital Investment in the Coal, Gas and Electricity Industry' the increase in nuclear build to between 5000 and 6000 MWs was made official and was to be met by the commissioning of nineteen new stations on sixteen different sites. The white paper stressed that a full years operation of the now intended 6000MWs would save 18 million tonnes of coal, lessen the reliance on imported oil and stabilise the supply of energy. Nuclear fuel would come from politically stable countries such as Australia, America and Canada thereby lessening worries over energy fuel dependence from increasingly hostile Middle Eastern territories. Immediately a new fleet of MAGNOX power stations were ordered at Berkley, Bradwell, Hunterston, Hinkley Point, and Trawsfynydd (about 2000 MWs in total). Government white papers exhibited little mention of financial imperatives for nuclear power, instead imbuing a sense of urgency through claims of necessity for nuclear power to strengthen indigenous electricity supplies. The CEBG appeared content during this period to accelerate the speed at which tenders were submitted and accepted, and much of the media appeared supportive of such actions. However, by the early 1960s the urgency for nuclear power had dissipated and the media were far less kind in their reminiscing. Retrospective media texts were now sceptical of an industry which appeared a 'knee jerk' reaction to a supply crisis in a previous decade:

'Then in 1957, shaken by Suez, expecting an oil crisis, and deluded by rosy visions of a world [of] British-made nuclear power stations, the Government announced a dramatic programme to install 6000 megawatts...and industry was prodded into forming a massive consortia to build nuclear power stations' (Anon 1962)

'...far from there being a fuel crisis, coal stocks were soaring, oil prices were dropping, and the gap between nuclear and conventional power costs was, if anything, widening' (Anon 1962)

An unexpected move by UK industry to oil after the Suez Crisis led to large coal stocks in the UK. Thereafter resource based arguments were absent in the legitimating discourse for nuclear power put forward by both the media and the CEGB. Coal in particular was enticing to the CEGB who saw it as a cheap alternative and who recognised no reason to continue nuclear tenders given such a scenario. Clearly state-resource and national-market logics were intrinsically linked given that supply vulnerability drove up prices of traditional fuels in short supply which allowed nuclear power to come across as relatively affordable. Once vulnerabilities dissipated, the costs of these fuels declined and nuclear appeared increasingly expensive. Whereas nuclear power had been legitimate as an expensive yet necessary reaction to supply shocks, it was now emerging as both unnecessary and more expensive than originally hoped. In response to the instrumental irrationality of nuclear power as it now came to pass, the Government and pro-nuclear media redirected their legitimating discourse to its future market promise based on the development of a successful British nuclear industry; an amalgamation of future market and nationalistic values.

## **Nuclear power as a Relative Industry**

Throughout the data set nuclear power is always discussed as one energy option of many. Government energy investment decisions were based on the alignment of an energy option, relative to that of another, with legitimate characteristics informed by values and meaning systems denoted by the industry's institutional logics. The prominence of pro-nuclear discursive legitimating strategies pertaining to the values of one situated logic rather than another is an outcome of both context and the potential for that context to provide a means to view nuclear power as the most appropriate energy option. The political incentives to keep nuclear power legitimate with the public by the Department of Power in particular led to tensions within the industry. In contextual conditions of cheap and accessible fuels such as coal, the Department was in conflict with the CEGB; the former was politically vested in the continuation of nuclear power but was struggling to legitimate it in line with the aforementioned situated values, and the latter saw little reason to continue the expansion of the programme. Ultimately this section highlights three key points that re-emerge throughout the case study: Legitimacy is fragile and needs constant 'work' to sustain it, the sources (or discourses) of legitimacy fluctuate given internal and external contexts, and legitimacy of an option within the energy industry is always in comparison to others. To further demonstrate this point, coexistence and tension between situated logics will be discussed below.

## Situated Logic Coexistence and Tension

### Coexistence

The situated logics identified above manifested in tandem in the mid-50s during energy concerns of both an internal (low coal stockpiles) and external (balance of payments) nature. During the initial push for public acceptability of the civil nuclear programme the UKAEA and the Conservative Government reinforced much of the utopian belief in nuclear power by conveying atomic energy as an unlimited source of electricity, demonstrating that an aspect of nuclear power's legitimacy rested on state-resource institutional values. Even though atomic power plants were fuelled by finite sources of imported uranium, those drawing from the state-resource situated logic championed nuclear fuel as invulnerable to international control. Contextually, Britain at this time was suffering from a concerning mix of energy demand increases, unsustainable coal mining and limits on the provision of miners. Moreover, the Suez crisis in 1955-56 highlighted the country's dependence on international oil supplies. For the standard of living to continue its escalation in the post war era, despite fuel supply threats, the energy choice had to combat immediate security of supply issues. State regulation and control over resources became highly valued. In particular, those actors deeply embedded in the nuclear industry and subsequently alienated from the wider energy industry (such as the UKAEA) vocalised a belief in nuclear power as the most 'secure' energy option:

'If we cannot get coal for all the power our industry needs, cannot afford oil for it, and cannot make fuel economies on a sufficient scale, then we must find some other way...we used our coal resources lavishly, and we now have reached the time when they will no longer sustain further increases in the "creation of our riches"...in atomic energy there is a new world to conquer, a world in which the scientists and engineers concerned are already rapidly expanding the frontiers a community in which there is no despair, only confidence'

[This was written by UKAEA chairman in The Times (Plowden 1956 p.ii)]

Supply vulnerabilities created the possibility for what the Government called 'energy gaps'. That is, where the available supply of fuel needed to generate enough electricity to meet demand was either not secure enough to ensure that forecasted demand would be met, or not sizable enough to supply future expected demand increases. At a time when neither coal nor oil could be relied on to fuel continuous electricity production, nuclear power offered a solution to the 'impending energy gap':

'...it is imperative that we should do everything possible to slow down the rate at which this energy gap is widening, and to start to reduce it at the earliest possible moment by the use

of nuclear' ... 'the increased security which a nuclear programme offers the economy when compared to dependence on the availability of growing quantities of oil or coal from abroad' (Ministry of Power 1957 p.2)

Legitimation based on a national-market logic also appeared to value endogenous electricity generation namely because it aided a more settled balance of payments for Britain. Fuel importation was a key element of energy generation in the UK, but excessive importing not only increased vulnerabilities but meant large sums of money were being spent abroad. By utilising less tonnage of fuel than generators running on coal or oil, a full year's operation of the extended 1957 programme of 6000MWs could save the importation of around 18 million tons of imported coal (Ministry of Power 1957) whilst running in most cases on fissile material already owned by the UK from the weapons programme. Again, the institutionalised values of the market within the energy industry were exposed by official publications during this period:

'...supplies of indigenous fuels cannot be increased sufficiently to meet these growing requirements which will therefore involve rapidly increasing dependence on imports...nuclear power can eventually make a very appreciable contribution towards improving the balance of payments.' (Ministry of Power 1957 p.11)

This small example illustrates that within the energy industry the situated logics identified coexisted and were also important in actors' comparisons of legitimacy between energy options. Together the alternate logics denoted the rational myth that energy should be nationally secure for both economic and state welfare reasons. However, Friedland and Alford (1991) note that institutional logics are also fundamentally in tension. In the example below institutional conflict is clearly evident, and the opposing arguments constituting the debate illustrate the contradictions between the different logics being drawn on.

### **Logic Tension**

As illustrated above, the Ministry for Power argued that the nuclear industry offered potential to generate affordable energy within secure national boundaries. For other actors in the industry such as the CEGB, nuclear power's inability to provide the best option for financial investment was a cumbersome impediment. Fossil-fuel stocks had recuperated after the Suez crisis and nuclear power appeared relatively superfluous to the management of the CEGB. Amidst the buzz around nuclear power in the mid-1950s the CEGB had been noticeably absent in its advocacy. Allowing the Government to publicly enthuse over nuclear, the CEGB discretely distanced itself from the official hysteria relating to nuclear possibilities. Comparatively, the Ministry of Power had enthusiastically



associated itself with nuclear power and was thus reluctant to publicly humiliate itself through admittance of unviability. As the 1950s drew to a close, the CEBG problematized the financial viability of nuclear power and convinced the Minister of Power to lessen the pace of the nuclear programme. Contextual factors paired with nuclear power's comparative costs to other energy industries meant that the Government struggled to legitimate continued nuclear expansion on market grounds, and instead defended nuclear development on state values.

### **Loss of Marketability versus State Values**

The CEBG in particular was concerned that nuclear power was not living up to its economic expectations, and became increasingly inclined to tender and build fossil-fuel energy plants over new nuclear in the post-Suez crisis era. The CEBG were imbued with a market-centric approach to energy judgements and in times of low supply vulnerability, would evaluate energy choices based on cost. They were created as part of energy nationalisation from the Energy Act 1957 with a role to '...oversee the operation of electricity generation and transmission facilities and all related investment decisions' (Energy Act 1957). They were the main operators of nationally owned power stations; autonomous enough to offer tenders for new power plants but still obliged to conform to the Government's policy decisions. They were also bounded by political ties. In 1957 the CEBG were committed to contracts with oil companies to increase their total use of oil generation plants (Ministry of Power 1957) as well as limited by Government imposed protectionist tariffs which obliged them to continue coal fired plant construction and remain a key customer to the NCB. Expansion of the nuclear industry would further restrain the choices of the CEBG, committing a substantial portion of their budget to nuclear power and restraining their freedom to structure the energy industry around market returns. In an attempt to overcome the contradiction between CEBG market interests and nuclear power's high costs, Lord Hinton (previously of the UKAEA) had been made the first Chairman of the CEBG in 1957. Possibly it was hoped that he would be predisposed to find a compromise between the instrumentality of the CEBG's energy judgements, and the Department of Power's keenness to develop nuclear power further.

Nevertheless, in 1957 Hinton demonstrated his unease regarding the expansion of the MAGNOX fleet and expressed his concerns to Sir Percy Mills, the Conservative Minister of Power at the time. As a result the time-scale of nuclear expansion was revised and announced three years later in a 1960 white paper to avoid losing 'political face'. In 1960 the white paper 'The Nuclear Power Programme' (Ministry of Power) admitted that the programme was unnecessarily large and that there were plentiful reserves of conventional fuels that would allow power costs to be 25 per cent less than nuclear costs. By 1960 it appeared that both the CEBG Chairman, Lord Hinton, and the

Minister for power then Mr Richard Wood, were in consensus that nuclear power no longer offered the most economically attractive option. Recession in the late 1950s had caused rising inflation, which was now to be countered through Government imposed capital investment restrictions. These involved the re-phasing of the extended nuclear programme and the prolonging of the deadline for the completion of the first programme from 1965 to 1966.

“...it is because the point at which nuclear power generation breaks even with conventional power generation is going to be farther in the future than was first expected – that is the sole reason for the change I have announced”, said Mr Wood.’ (Political Correspondent 1960a p.8)

The concomitant ‘recession in nuclear power’ (Energy Correspondent 1959 p.10) was based on two interlinked contextual and institutional factors: Concern over the security of energy supplies lessened after the British and French forces pulled out of the Suez Canal in 1956. In the following years, texts which drew meaning from a state-resource logic became much rarer in the data set, and instead there emerged an increasing number of texts in the media which questioned the market feasibility of nuclear energy. In other words, legitimacy based on supply security characteristics had become subordinate to that based on national-market values. The shift in sources of legitimacy within the industry, as a response to lessening supply anxieties, meant that the Government could no longer convince the financially minded CEGB that large scale nuclear expansion was necessary. Subsequently, the CEGB expressed its eagerness to tender cheaper forms of energy:

‘...the white paper is expected to express frank recognition that the economics of power production have changed in recent years against the nuclear station and in favour of conventional stations. Whereas in 1955, then the programme was first announced, there was a persistent shortage of coal, the main preoccupation of the Ministry and the National Coal Board now is to find an outlet for the huge stocks of coal which have been building up’ (Political Correspondent 1960b p.12)

‘...the placing of contracts for the construction of conventional nuclear power stations had slowed down somewhat. This was mainly due to a large-scale switch of industry from coal to oil which had resulted in a temporary surplus of coal’ (Energy Correspondent 1959 p.10)

However, the Minister of Power for the Conservatives, Mr Richard Wood, was keen to suggest that this was only a minor revision, and did not reflect a permanent declining interest in nuclear power:

‘Mr.Wood seemed taken aback by the roar of laughter which greeted his account of what was being done. “rather than this being a cut-back”, he declared, “it is a deferment of the acceleration which was planned in 1957”.’ (Political Correspondent 1960b p.12)

The Conservative Ministry of Power recognised the role of nuclear power in recovering national pride after the Suez Crisis and the loss of British colonies after WW2. Additionally, the successful development of a nuclear reactor design was believed to have the potential to excite international interests as it would trigger the development of a lucrative and growing British nuclear industry. With such nationalistic values in mind, the Government and UKAEA began considering the development of a new ‘type’ of nuclear reactor in the late 1950s that could offer the CEGB a more competitive product. Lord Hinton and the CEGB were compelled towards the cheap and proven North American CANDU (CANada Deuterium Uranium) or HWR (Heavy Water Reactors) designs. The Ministry for Power illustrated their wider and more substantive goals by wishing to keep the reactor type British to lessen international vulnerabilities whilst boosting British design and construction consortia. As such, the Government eventually backed the UKAEA’s Advanced Gas-cooled Reactors (AGR) which were to be tendered, designed and constructed in the UK

## **Summary of Coexistence and Tension**

The two sets of circumstances explored above illustrate the dynamics between actors complying with two central situated logics embedded within the energy industry. As the exogenous context of the industry altered and shifted, industry level actors went from collusion to conflict. The Suez crisis initially meant that, comparatively speaking, nuclear power appealed to both the values of the state-resource logic and those of the national-market. However as the crisis drew to a close alternative energy options began to fulfil the criteria of supply security with lower costs than nuclear power. With oil and coal stocks no longer under threat, nuclear power’s legitimacy as the correct energy option for the UK was under contention by the CEGB.

So far the Chapter has analysed institutional structures and the ways in which they have played out within the energy industry. However, there were broader societal concerns which were often mobilised by external actors who hoped to impact the choices of the industry. In particular, the environmental repercussions of nuclear power’s expansion were the cause of anxiety within the public. Early environmental concerns implicating the nuclear energy industry will be discussed in the following section.

## **Nuclear Power and the Natural Environment**

‘Lord Chorley, honorary secretary of the Council for the Preservation of Rural England, put the matter as vividly as anyone. England, he said, still gaped with the sores inflicted by the first industrial revolution, and the damage inflicted by this new revolution might be even more serious. If this programme went on in the way people feared, Lord Mills and his department might finally toll the death knell of England’s green and pleasant land.’  
(Parliamentary Correspondent 1957a p.7)

Aside from aforementioned internal industry actors, there were also external actors with additional conceptions of how the energy industry should conduct itself. During the initial two decades of the civil nuclear power programme in the UK, concerns regarding the relationship between nuclear generators and their natural settings were minimal within the Press. Environmental apprehensions voiced by these actors were typical of an ‘industry versus countryside’ mentality. Natural settings were celebrated for their amenity which was considered under threat from all types of large industrial development including nuclear stations. The protectionist values of an environmental societal logic informed debates over the legitimacy of nuclear power much in the same way as it did for all other large developments outside of industrial centres; the beauty of the public’s countryside amenities should be protected insofar as the look of the natural setting should appear untouched by industry. This chapter notes that the environmental values and conventions of the dispersed group of actors questioning the environmental legitimacy of nuclear power from outside of the industry constituted and represented a situated environmental amenity logic.

### **Environmental Concern**

The media provided a platform upon which debates surrounding the relationship between nuclear power and nature could unfold. Whilst the first civil nuclear programme took shape, the press broadcasted the public’s environmental anxieties which concerned the expansion of the national grid and its connection to nuclear plants primarily constructed in isolated and rural areas. The tension between Government and an environmentally concerned public centred on the latter’s frustration that neither the CEGB nor the Department of Power had consulted communities neighbouring the new plants. Many of these communities were reluctant to welcome a large and cumbersome nuclear construction onto their local landscape:

‘There is great disturbance on grounds of amenity regarding the siting of these stations. It looks to be very much as though the National Parks Act is being torn up...Lord Lucas of

Chilworth asked for “some far better machinery to listen to the legitimate complaints of citizens against the destructive nature of the erection of the huge grid’ (Parliamentary Correspondent 1957b)

‘...the prospects of a £25m power station in this quiet Essex area and especially an atomic one with all the construction work involved, has stirred over 400 objectors’ (Special Correspondent 1956 p.7)

Primarily, concerns relating to nuclear power and its impact upon the environment were founded on a dislike of Government siting choices. Objectors mobilised against designated nuclear sites at a secular local level. Their opposition was often met with formal local inquiries into new stations. Interestingly, they argued that nuclear power stations should be located within established industrial sites and not scattered throughout the British countryside:

‘...there seemed little doubt that Lord Mills, Minister of Power, had failed to-day to satisfy those peers who are deeply worried about the effect of the siting of new atomic power stations on the amenities of the countryside...the question posed by Lord Lawson was why the stations should not be placed within the industrial areas which they were chiefly to serve. Why choose unspoilt tracts of countryside and the few remaining coastal areas?’ (Parliamentary Correspondent 1957a p.7)

The above quote illustrates that the public was naïve to the unique risks posed by nuclear power in comparison to traditional industries. Those concerned with nuclear station siting were not anxious because it threatened the biodiversity or ecological systems within the countryside, but because it threatened to ‘spoil’ its natural attractiveness. Evidently, new reactors posed an unpopular physical impediment to the perceived objective beauty of the countryside. The following quote relates to the environmental concern around Hinkley Point in Somerset:

‘Somerset County Council were clearly concerned mainly to have some guarantee that the Central Electricity Authority would give proper regard to the amenities of Bridgwater Bay...when the project was announced a newspaper reporter telephoned a local farmer and sought to discover whether a place of beauty was to be sacrificed on the altar of nuclear power. What, he asked, did Hinkley Point look like? The farmer considered how best to describe the district, and then said: “well, if you were here now, you’d say you were lost”.’ (Special Correspondent 1958 p.5)

Bradwell, Berkeley and Hinkley point stations were primarily objected to on the grounds that nuclear stations lessened the amenity value of the countryside by spoiling its tranquillity.

Conversely, the most contentious site from an environmental perspective was the planned MAGNOX station at Dungeness in Kent because of its distinctive effect on natural geology. If built the reactors would impinge upon a geologically important shingle structures on the Dungeness coastline. For this particular siting the environmental backlash was not purely based on amenity, but also over the conservation of a known area of natural significance:

‘...physiographically, there seems to be no possible compromise which will avoid the sacrifice for all time of by far the most important feature of the most important single structure in the British Isles and probably in Europe, which is of world-wide significance for the study of coastal physiography’ (Special Correspondent 1958 p.3)

‘The Lord President said that Dungeness was a unique geological feature, the scientific study of which would be adversely affected by the construction of a nuclear power station. It was also a favourite area for bird watchers. Nevertheless, on general grounds, he also supported the proposal to give consent for the project’ (Cabinet Conclusions 1959 p.5)

Conservationists’ efforts were countered by a Commons meeting in 1959 in which MPs supported the siting at Dungeness. A follow up 1959 Government report published the justifications for the Dungeness plant. It argued that the characteristics of the site (bar the shingle structure) made it more appealing than alternative locations, and that the majority of the shingle structure would remain untouched by the development. The Commons’ refusal to cancel projects on the grounds of amenity and conservation complaints rested on its low prioritisation of the kind of environmental complaints it was receiving – it was not the role of the energy industry to make sure the country looked pretty, but to ensure that it had sufficient supplies of power:

“...everything that can be done to protect our countryside and the life of individuals is being done. If it is decided that we go forward with this programme I think we shall have to put up with the fact that there are so many more power stations in the country and we cannot just have blue skies with nothing in them” [CEGB Chairman quoted in The Guardian (Parliamentary Correspondent 1957a)]

## **Amenity versus Industry**

‘An expansion of the nuclear power programme on the scale proposed (1957) would probably involve considerable disturbance to the amenities of the countryside’ (Cabinet Conclusions 1957a p.4)

Coverage of the developing tensions between concerned community actors and the Government in regards to the appropriateness of rural sites for reactors illustrated an emerging understanding of the relationship between the environment and nuclear power; one which borrowed from the traditional polarisation between natural amenities and industrial progress. Any damaging interactions between atomic power specifically and the natural environment were either muted or simply not within public consciousness. Rather, trepidation was grounded on the possibility that industrial extension and its technological development would forever continue without consideration of natural amenities:

‘... although they [nuclear plants] had a long and useful life ahead and further improvements could be made in them, would be fairly soon superseded by more advanced developments. [the public] do not want to see some of the most beautiful parts of the countryside littered with the decaying carcasses of these leviathans’ (Political Correspondent 1961 p.6)

There seemed an institutionalised acknowledgment that the environment should be protected, but what was to be protected was based on a rather anthropocentric understanding of ‘nature’; that one must protect those elements of the environment which provide the most services and comforts to mankind. Thus, an environmentally orientated societal institutional order manifested within groups of actors concerned with the connection between nuclear and nature in a way which emphasised and valued environmental amenity. As such, throughout the thesis this approach to nuclear power will be understood as informed by a situated amenity-environmental logic (see Table 7).

Minimal public knowledge of nuclear power processes and outputs meant little occurred to elaborate on the situated amenity environmental logic. Both nuclear power’s secrecy and newness contributed to environmental anxieties which fundamentally failed to affect the nuclear plans of the State. Solutions to most amenity complaints were neither unmanageable nor intolerable, and resolutions were often settled without need for a siting rethink. For many contentious stations solutions involved local landscaping to hide the installation. At Dungeness, the shingle structure near the plant was (for decades) maintained by trucks which moved the shingle after it had naturally drifted north, back south to near the plant. Indeed, the relationship between nuclear power and the environment as posited by the ‘amenity logic’ did not produce any qualms with the fundamental nature of nuclear power.

## **No Worries Nuclear**

‘...after twenty years in which the atom had been feared as a weapon of war the world was beginning to know its hope as a powerhouse of peace’ (Geneva Correspondent 1964 p.7)

Supplementing the pro-nuclear discourses of the energy industry was a series of more implicit and subtle legitimating strategies. Nuclear power as a typical energy industry was a concept maintained by strategies which downplayed its uniqueness and dangerous characteristics. Limited public education on the technology provided an opportunity for nuclear advocates to generate a sense of normalcy which surrounded the atomic industry, as well as a feeling of distance from its original position as a weapons technology. These findings are integral to further sections of the case study because they protected nuclear power from scrutiny until the 1970s when the environmental movement finally challenged them. With their dismantling came a period of societal fear around nuclear power and its legitimacy became severely questioned in light of transformed and intensified environmental public values. For now however, the strategies maintained a relatively innocuous amenity based environmental anxiety within the public.

## **The Ordinary Atom**

‘...society may now be able to regard atomic power as commonplace’ (Maddox 1964b)

As the Conservative Government endeavoured to convince the public of the requirement and promise of the nuclear industry, it also hoped to assure them that nuclear power was a typical technology. This was vital if nuclear power’s legitimacy relative to other energy options was to be based solely on its future financial promise or its immediate supply security. A problematic uniqueness would create additional variables against which nuclear power could be irrationalised by undecided or opposing actors such as those defending their interests in regards to other energy industries. To eradicate apprehensions concerning the particularity of nuclear power, the Government and pro-nuclear media attempted to normalise it. Normalisation for Vaara et al (2006) is a discursive legitimisation strategy through which a practice is rendered as something normal or natural. In regards to nuclear power, normalisation strategies manifested as technology based arguments referring to nuclear power as having become, or being in the process of becoming commonplace:



‘...nuclear power had become a subject on which ordinary conferences will be held, ordinary commercial plans will be made – and ordinary answers will be expected’ (Editorial 1955 p.7)

‘...the advent of nuclear power had become so much commonplace that it was easy to overlook the speed at which science had advanced’ (Energy Correspondent 1957 p.10)

From the perspective of those employing this brand of technological normalisation nuclear power, although new and strange at conception, was just another machine:

‘By the end of the century it will be no great surprise is as much as a quarter of the nation’s energy is obtained from nuclear power...the only certainty is that nuclear power stations will be as familiar as are internal combustion engines now’ (Maddox 1964b)

‘...there are some cheerful signs that society at large has learned to live with civilian nuclear power. A reactor is no longer a piece of magic’ (Maddox 1964a)

With little public education and few knowledge sources to convey nuclear details, normalisation numbed fears and misgivings about nuclear technology. It appeared to do so successfully as there was an evident lack of nuclear criticism in the newspapers which could not be countered by amenity based solutions. Such discursive strategies were necessary given growing unease on an international scale regarding nuclear 'power' in its rawest sense. Thus an additional ‘distancing’ strategy emerged within the discourse of both the Government and the pro-nuclear media. Distancing strategies used narrative mechanisms to develop a conceptual separation between nuclear energy and a more fearsome nuclear power witnessed in 1945 at Hiroshima and Nagasaki.

## **The Peaceful Atom**

As Britain began its first serious venture into harnessing nuclear power the industry became increasingly frustrated with its own pace of progress, and was concerned with advancements witnessed in other ‘super power’ nations. During the final year of WWII the UK had sent its key nuclear scientists to America, effectively concluding most of the nuclear research based in the UK. Additionally the American Government had made a decision not to share weapons technologies and thus the new UK atomic weapons programme represented an almost completely fresh start (Paymaster General 1953). Seven years after the war and three years after the Russians had tested their first fission bomb the UK had yet to test an atomic explosive. It was not until 1952 that the

British had a testable atomic (fission) bomb. They subsequently launched Operation Hurricane (aka the Montebello tests) in Australia. By this time the United States had already detonated the world's first Hydrogen (fusion) bomb, a far more developed and colossal nuclear weapon, during a series of tests at the Marshall Islands. In 1955 the UK conducted its second Australian test with TOTEM bombs at Emu Field in the Great Victoria Desert, and in 1956 a series of atomic tests in Maralinga in Australia christened 'Buffalo' were part of a series of Australian tests nicknamed Operation Mosaic. Eventually, in 1957 Britain tested its first hydrogen bomb. In the same year the Prime Minister at the time, Harold Macmillan was quoted as saying:

'We have made a successful start. When the [nuclear] tests are completed, as they soon will be, we shall be in the same position as the United States or Soviet Russia. We shall have made and tested the massive weapons. It will be possible then to discuss on equal terms' (Ministry of Power 1957 p.10)

Increased international nuclear development and heightening political tensions between the US and Russia had initiated the Cold War. Additionally the United States feared the imposition of Communism which further encouraged them to keep pace with Russian progress. The threat of nuclear war was steadily and globally increasing, and nuclear power was once again quietly lingering in the shadow of its explosive parent. Nuclear energy generation had begun as a by-product of the nuclear weapons establishment, with the first 'civil' power station at Calder Hall only producing electricity as a side-effect of its primary function as producer of weapons grade uranium. As international tensions rose between the nuclear armed super-powers, there was a growing public fear and distaste of nuclear weapons. Controversially, at the outset of the UK nuclear programme when commercial nuclear plants were mere ideas, the Prime Minister Anthony Eden had made very clear that nuclear development would go ahead unhindered by fear of weapons proliferation:

'...no attempt should be made to restrict the development of atomic energy by any country, in view of the impossibility of effective control' (Cabinet 1945 p.4)

Initially it was suggested that in post Suez times the H-bomb was detonated to rally the British people after a post-war belittlement of the British Empire (Special Correspondent 1945). The Government had believed that a signal of nuclear standing would excite the public and reignite a fading belief in the strength of Britain. Nonetheless, media responses showed that the opinions of the public were erring more towards caution than pride. This cautiousness manifested in early opposition to weapons testing, as noted by Cabinet papers in the late 1950s which concluded that the public should not be 'reminded' of the tests:

‘The Foreign Secretary said that the more extreme elements of public opinion, both at home and abroad, appeared to be mobilising in opposition to the next nuclear weapons test’ (Cabinet Conclusions 1957b p.3)

‘The Foreign Secretary said that the central office of information had sponsored the production of a film of the recent United Kingdom thermo-nuclear tests in the South-Pacific. It would be inopportune, however, to release this film for public exhibition at this time’ (Cabinet Conclusions 1958 p.10)

The media reflected a gradual public conflation of nuclear power and nuclear weapons technologies. The concern was that any progress in nuclear technology would simultaneously mean progress for weapons equipment. In particular, The Daily Mirror encouraged conceptual linkages between nuclear power and nuclear war. The paper acted as a soap box for the organised group 'Campaign for Nuclear Disarmament' (CND) which had been established in 1957. The CND and the Daily Mirror supported the oppositional Labour Party who had used the concern over nuclear weapons and its international proliferation to demarcate its anti-nuclear position for the upcoming election. Labour claimed that Britain could not remain an independent nuclear power, and that British defence policy should instead be revised so that Britain contributed to Western defence (NATO) through traditional arms. Throughout the 1950s the paper was embarrassed by Britain's obsession with nuclear armament and unrealistic multilateral disarmament hopes:

‘How ridiculous we must look to everyone except ourselves as we struggle along, far, far behind the Russians and Americans to build a little pile of British H-bombs...we are ruining ourselves economically by our effort to compete in the race of the two Super States for the ultimate weapon’ (Crossman 1957 p.4)

As worries over nuclear weapons capabilities rose, questions concerning the relationship between the destructive capacities of nuclear weapons and the properties of the nuclear power processes began to emerge:

‘The history of the development of nuclear energy has made everyone aware of its destructive possibilities and it would be natural to ask whether there were any special dangers associated with nuclear power installation...’ (Ministry of Fuel and Power 1955 p.5)

‘...nuclear power was not yet accepted by the people as a friend: it was connected with sinister happenings of the past and it must therefore serve a period of probation’ (Cabinet Conclusions 1957b p.3)

If the civil nuclear programme was to continue being judged on the same playing field as other energy industries, the Government needed to conceptually distance nuclear power from its historical role as a destructive capacity. The Times, in support of the Conservative Government, reassured its readership that alarm over nuclear energy was irrational. It stressed that fear of nuclear energy was a misconception and that nuclear constituted the 'peaceful' form of nuclear technology:

'Nuclear energy is the energy of the future. Although we are still only at the edge of knowledge of its peaceful uses, we know enough to assess some of its possibilities...the peaceful applications of nuclear energy now demand attention' (Ministry of Fuel and Power 1955 p.6)

'Just a decade had passed since the first awful use of atomic power. But now there are clear indications – even hard figures – to support the fact that scientists and engineers; notably in Britain, the United States, and Russia, have succeeded in harnessing the atom in the interests of humanity' (Industrial Correspondent 1955 p.xvii)

A developing discourse began to polarise nuclear power and nuclear weapons; the former represented a new international cooperative which was united through technology, and the latter represented an increasingly powerful yet unnecessary threat. The affirmative approach to nuclear power was backed by an internationally supported discourse of 'atoms for peace' ("Atoms for Peace" was the title of a speech delivered by U.S. President Dwight D. Eisenhower to the UN General Assembly in New York City on the 8<sup>th</sup> December 1953) which was adopted as the principal slogan for the 1957 UN International Atomic Energy Agency (IAEA), which itself represented the 'Peaceful uses of Nuclear Power'. The IAEA was a key actor in conceptually distancing nuclear power from nuclear weapons from a supra-international level, and was formed specifically to persuade nations to reconsider nuclear power as a peaceful and passive technology. Those working in the nuclear industry began to vocalise the differences between atomic power and its related weapons:

'...nuclear power stations like Bradwell are absolutely safe. The very word nuclear seems to terrify people, who always immediately associate it with bombs and explosions. This, Mr Weeks emphasised, is a misconception. "I could not blow this place up if I tried", he said, "In the event of abnormal conditions obtaining the result would be for the plant to shut down, not explode".' (Special Correspondent 1962 p.6 quoting Mr Weeks, Manager at Windscale)

In 1964 the Labour Government won the election and was under pressure to carry out its pre-election promise to bilaterally disarm the UK and re-configure the 1962 Nassau Agreement which had contracted the UK to arm itself with nuclear based deterrents as part of its role in NATO. The new Harold Wilson Government did not disarm as first promised and continued its predecessor's favouring of nuclear power. By the mid-1960s the Wilson administration was under heavy criticism for its unexpected nuclear armament but was able to continue with the nuclear energy programme in relative peace despite heightened public concern over the Cold War because nuclear power continued to be understood as an essentially separate industry.

## **Conclusion**

This chapter delineated the institutional structure of the energy industry within which those who supported the nuclear power competed against alternative energy choices for relative legitimacy. In debates over the legitimacy of nuclear power, both the media and energy industry actors drew on the situated national-market and state-resource institutionalised logics of the energy industry. In doing so, these actors also had to consider the oscillating energy contexts and fashion their arguments accordingly. An example was given which showed that when resource anxieties lessened after the Suez Crisis, the CEBG became more concerned with the financials of the industry and pushed for cheaper forms of electricity production such as coal. The Ministry of Power had to fight back with claims that a new round of AGR reactors would strengthen UK industry and resource invulnerability.

During the 1950s and 1960s there was a limited number of knowledge sources which the media could draw from to convey opinions that differed from that of the Government's official line. Consequently, much of the press rhetoric drew on the nationalised market or state-resource logics to legitimate nuclear power and hence echoed the Conservative (and later the Labour) Government's future market fantasies or their immediate concerns over state energy resources. The Times and The Guardian in particular were in support of the Conservative Government of the 1950s and appeared keen to relay the Government's discursive distancing and normalising strategies to nullify the fear of nuclear power. These strategies permitted nuclear power to compete with other energy industries for public and industry support purely on its perceived resource and market potential.

The actors embedded within the energy industry did not consider environmental problems to be a hindrance to the continuation of the nuclear energy programme. Instead, external actors drawing from an environmental societal logic problematized the industry on amenity grounds. Interestingly,

the discourse vindicating nuclear power may be seen to aid the industry's detachment from more perturbing environmental concerns. For example, market fantasies rested on the expectation of continued technological development, possibly rendering concern over environmental outcomes as trivial and as glitches likely to be solved in the near future. Additionally, technological normalisation challenged the mysticism of nuclear power, basing its reality in mechanics and industry, and thus developing its conceptual identity as similar to other accepted industries. Normalisation texts represented nuclear energy as no different in environmental effect than any other large scale enterprise, and thus, relatively speaking, nuclear power was no less legitimate on environmental grounds than any other energy generating technology. Similarly, distancing strategies enabled the perception of a difference between nuclear power pollution and nuclear bomb (testing) pollution. Overall, environmental priorities were unable to encroach on embedded industry understandings of what was considered appropriate and necessary because nuclear power's unique risks were unknown to a larger public. Thus the legitimisation of nuclear could be achieved by vested actors through recourse to the traditional market and state expectations of the industry.

This chapter ends in the mid-1960s during which the Government was consulting with the CEGB and the UKAEA on the specifics of the next nuclear programme:

‘...the question has been under review for several months, but it has now become urgently necessary to know the scale on which nuclear power will be exploited in the immediate future in Britain. Already the last contract in the current phase has been let...Already the manufacturers, not to mention the CEGB, are anxious to know what is now expected of them’ (Maddox 1964a)

In 1964 a Labour Government white paper entitled ‘The Second Nuclear Power Programme’ confirmed 5000MWs of new plants to be built between 1970 and 1976. This number increased to 8000MWs by 1965. New plants were to be the more efficient Advanced Gas Cooled Reactor design (AGR), the new standard for the UK nuclear fleet favoured by the UKAEA. To aid and sustain the industry's growth a reprocessing plant was opened at Windscale with the dual purpose of producing plutonium for nuclear weapons and for developing enriched uranium for fast breeder reactor fuel from previously used reactor fuel. The technology and expertise put into the nuclear energy programme in the UK was of a high standard and became a key export product by the mid and late 1960s. The export market for nuclear goods, equipment and knowledge grew as UK began sharing their nuclear developments with countries such as Japan, Italy, Sweden, Israel, Taiwan, West Germany and Australia, and with cooperation also being discussed with Argentina, New Zealand, Spain, Finland, Greece, Austria and South Korea (Ministry of Power 1960). Consequently the UK

Government was embroiled in a large international nuclear market and was making millions on nuclear fuel reprocessing and export contracts. However, public disenchantment with the industry had been growing since the early 1960s:

‘...so clumsily has the Government fumbled its policy on atomic energy that the white paper published yesterday is not the joyous proclamation of success it might have been, but rather a kind of ambiguous apology. .... In particular, it will tend to be forgotten that the White Paper is in its firm belief that atomic energy will be competitive with conventional electricity in the early seventies, and cheaper after 1975. Thereafter the growth of this industry will be still more rapid’ (Maddox 1964b)

Dissatisfaction with nuclear power was to continue and further intensify into the coming decade. The following chapter will examine a period in which the environmental effects of nuclear power became the primary force behind calls for its abandonment. Amidst the intensifying public distaste for nuclear energy the industry and its vested actors fought to push a new programme forward despite minimal market successes and an increasingly growing and vigilant anti-nuclear lobby.

<b>Table 9 Overview Timeline for Chapter 6: Nuclear Power and the Environmental Movement Covers the period 1970 to 1980</b>		
<b>Date</b>	<b>Key Event</b>	<b>Details</b>
<b>1969</b>	Friends of the Earth is founded	Established as an anti-nuclear organisation
<b>1970</b>	Conservatives win the election under Edward Heath	
<b>1970</b>	Non-Proliferation Treaty is signed	Puts limits on the international production and trading of fissile material. Aim to stop any other country from developing nuclear arms.
<b>1970+</b>	An American Environmental Movement begins to gather influence in the UK	
<b>1971</b>	Greenpeace is founded. The Organisation questions the UKs energy mix	Both Greenpeace and Friends of the Earth educated the public of nuclear power's links with radioactive waste and arms proliferation
<b>1972</b>	The National Union of Mineworkers rejects the Government's proposed pay increase and calls a strike	The strikes lead to interruptions in power and fuel deliveries. A national state of emergency and a three day week is announced. The strikes highlight the dependence of the UKs energy mix on coal and point to a need for a more diverse energy mix
<b>1972</b>	Landmark UN conference on the Human Environment takes place	The conference reflected increasing international recognition of the relationship between economic growth and the degradation of nature
<b>1973</b>	The OPEC oil crisis places a strain on oil supplies from the Middle East	The values of crude oil escalated and production was slashed leading to a UK energy crisis. After the crisis the Government showed an increased interest in energy production technologies which would reduce reliance on imports
<b>1973</b>	The Government commissions a report by the Royal Commission on the Environment to explore the effects of nuclear power on nature	Increasing environmental awareness and knowledge of the nuclear power generation progress puts pressure on the Government to explore the implications of nuclear power
<b>1973</b>	A reprocessing plant called THORP is announced as a possible installation at the Sellafield (Windscale) site pending inquiry	The possibility of THORP creates tensions between environmental groups and the energy industry. The former see THORP as contributing to global proliferation and pollution, whereas the latter see THORP as a means to make money from lucrative international reprocessing contracts
<b>1974</b>	The National Union of Mineworkers strike a second time	Another state of emergency and three day week is announced
<b>1974</b>	Conservative Heath Government call for an unexpected general election which is subsequently lost	A new Labour Government under Harold Wilson was established and acceded to the demands of the mineworkers
<b>1974</b>	The new Labour Government establishes a Department for Energy	The new Department was tasked with developing strategies which were less vulnerable to national and international fuel supply conditions – In light of the the strikes
<b>1975</b>	The Daily Mirror begins its series of 'Doom Watch' articles on nuclear power, THORP and nuclear arms	Fears over the escalation of the Cold War enhanced concerns that expanding the nuclear programme and THORP in particular would aid proliferation of nuclear arms. Environmental awareness pertaining to the effects of nuclear substances added to the anxiety.



<b>1976</b>	The Royal Commission on the Environment releases their report on Nuclear Power and the Natural Environment (The Flowers Report)	The report reconfirmed concerns over the relationship between nuclear power, THORP and arms proliferation. Focussed more on nuclear arms than environmental considerations
<b>1977</b>	Energy 2000 is established by Arthur Scargill and Union colleagues to argue against the expansion of nuclear power	Energy 2000 argued that nuclear power threatened the coal industry and that new plants should be coal and renewables. The group use their links with the Labour party to convince key politicians to abandon nuclear power
<b>1977</b>	The Government publishes its response to the Flowers Report entitled 'Nuclear Power and the Environment'	The Government argues that the Flowers Report was generally favourable to more nuclear power as long as more safeguards were introduced to mitigate the risk of the UK aiding global proliferation
<b>1977</b>	The Government allows the THORP plant to go ahead and	The energy supply security from nuclear power, as well as the financial gain from the technology and reprocessing contracts legitimates the continued running of nuclear power programme. Environmental concern is barely audible in Government nuclear legitimisation
<b>1978</b>	Strategy Arms Limitation Talks (SALT II) falter and fail to be ratified by President Carter, USA	Increased media attention on a possible nuclear war ensues. Concern that the UK would be in the centre of a 'limited' nuclear war
<b>1979</b>	Margaret Thatcher's Conservative Government comes into power	The new Government prepares to introduce a new American style PWR reactor into the UK along with a more significant AGR based programme
<b>1979</b>	Three Mile Island accident, Pennsylvania, US	A PWR style reactor suffers a catastrophic failure but there is no escape of radioactive material. America halts all nuclear builds and never restarts

# Chapter 6: Nuclear Power and the Environmental Movement

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This chapter addresses an increasing intensity in the relationship between an emerging environmental social-movement and the UK energy industry. A social-movement often labelled as 'new environmentalism' by scholars (Deudney and Matthew 1999, Torsello 2012) gained momentum in the UK during the 1970s. It presented a revamped, mobilised and intensified version of a previously more sedate and less organised environmental lobby. The 'new environmentalists' pressed for a dramatic rethink of nuclear energy and its relationship with the natural environment. The ordinariness of nuclear power was deconstructed by environmentalists who began to publicize the particularities of the nuclear energy process and re-emphasise its links with nuclear weapons and proliferation. Social-movement organisations in particular provided the media with critical, prepared and educated knowledge which countered the previously Government-centric rhetoric of the industry. As a result the 1970s witnessed heightened social awareness of air pollution from both fossil-fuel wastes and radioactivity caused by energy industries. To large social-movement organisations (SMOs) such as Greenpeace and FOE, the abandonment of nuclear power was a central part of their manifestos. For the first time the energy industry experienced tension between its embedded institutionalised logics which informed energy legitimacy, and the developing external institutional pressures questioning the limited nature of these values in the selection of energy options.

Informed by the social-movement's substantive and ethically focused environmental logic, public debates emerged which problematised aspects of nuclear power previously admissible. These debates centred on issues of radioactive-waste and proliferation; the former represented a breakdown of nuclear normalcy, and the latter illustrated a strengthening suspicion of the conceptual distance between nuclear power and nuclear weapons. In the context of the escalating Cold War these issues stirred public outrage and political protests across Europe. In 1973 the Conservative Heath Government gave in to pressure from the environmental movement and commissioned an independent report to be carried out by the Royal Commission on the Environment on the effects of nuclear power on nature. The report was overseen by Sir Brian Flowers (previously a member of the Atomic Energy Authority and the president of the Institute of Physics) and became widely known as the Flowers Report once published in 1976. Whereas the social-movement organisation FOE saw the findings from the report as an unequivocal reason to

abandon nuclear generation, the Government interpreted it as a list of concerns which could be mitigated through advisory boards and emissions monitoring. Their unwillingness to stop nuclear generation should be understood in the country's wider energy context. A series of economically crippling mining strikes and threats to energy supplies led Tony Benn and the Labour Government to fully support the escalation of the UK nuclear programme despite its environmental implications. This section will first discuss the nuclear concerns of the 1970s. It will then detail how, throughout this turbulent period, the energy department continued to legitimate nuclear power with some success and media support. Despite pressure on the industry to become 'green', the lack of alternatives meant that nuclear power was considered by the Government as a legitimate energy option.

## **Nuclear Power's Turbulent 70s**

'Britain's nuclear power station builders and planners have learnt to live with sporadic barrages of criticism. Many of the harsh words have been justified. The nuclear power station building programme, hailed in the 1950s as the break-through into an era of cheap electricity, has failed to live up to its expectations' (Vielvoye 1972 p.23)

Controversy over nuclear power must be set within a context of Cold War escalations and industrial indecision. The late 1960s witnessed a resurgence in nuclear optimism in response to the nearing completion of the first programme and completion of the new AGR designs which were to gradually take a dominant share of the energy mix: '...There is very little chance that a conventionally fired power station will ever be built again for base load operation' (Editorial 1967 p.25). A 1967 Labour Government report entitled 'Nuclear Power: Britain's Chance is Now' gave a confident forecast for the industry, suggesting that although it had suffered a tough ride after the first rush of rather excessive enthusiasm it was now able to be truly competitive (Rippon 1967 p.1). Later that year, the Select Committee on Science and Technology (which had been drafted in during the late 1960s to provide advice on the future of the programme) recommended that construction should be hastened and outlined a third nuclear programme for the late 1970s to add some 25,000MWs to the 1975 generating capacity of 13000MWs. However, a new Conservative Government took office in 1970 and was slow to make decisions given that AGR reactors were proving more troublesome to construct than initially thought. This slowed the second programmes development considerably (please see Appendix 1 for a detailed overview of the decisions regarding a new nuclear reactor design).

Essentially similar arguments to those which characterised the late 1950s and early 1960s were playing out in the 1970s. Both the Labour and Conservative Power Ministers were striving to buffer a fragile British nuclear industry by backing the new UKAEA designed reactors (SGHWR), and then the old AGRs when plans for the former fell through. With few threats to security of supply the choice between reactors boiled down to the CEGB's cost focus versus the Government's will to retain State dominance over energy resources; a British designed SGHWR nuclear reactor would '...give the country an indigenous capability in all fields of energy' (Anon 1974 p.17). Further legitimacy of a nuclear programme lay in the market and resource possibilities of a future Fast Breeder Reactor (FBR) programme which was exciting the press; it would be exportable, efficient and would minimise importation fuels. However, as the 1970s progressed the industry became increasingly pressured to respond to escalating concern that nuclear power had unique environmental implications. Judgements based solely on energy supply or market considerations were becoming problematised.

## **Nature versus Nuclear: Energy Becomes Public**

A detrimental relationship between the energy industries and the natural environment was evident in news articles which vocalised the perspectives of environmentalists who criticised energy generating practices on the grounds of ecological degradation. Environmentalism was central in a broad counter-culture movement which reconsidered the old reliance on technology as saviour, was sceptical of centralised and technocratic governance and felt discomfort with global inequality whilst often promulgating strong anti-capitalist rhetoric (Deudney and Matthew 1999). A landmark UN conference in 1972 on the Human Environment (UNCHE) illustrated the political impact of emerging global concern regarding the relationship between economic development and nature. Specifically, international recognition of air and water pollution from continued industrialisation established a strong connection between the environment and the energy industries, as did increasing concern over the depletion of natural resources. In an echo of the American environmental movement which blossomed in 1962 after Rachel Carson's 'Silent Spring' uncovered the impacts of the chemical industries, those pursuing the reformation of the energy industry in the UK recognised parallels between the nuclear and chemical industries and their effects on nature. The very essence of nuclear technology and its pollutant by-products infuriated an international environmental movement. Their tactics were more militant than seen previously, and as such their novel and confrontational rallies attracted media coverage which aided the diffusion of their anti-nuclear and anti-industrial discourses to wider and less combative audiences throughout the UK:

‘If there is a common theme it is that of distrust: distrust of a technology that is big, new, complicated and potentially dangerous; and distrust of the centralised, technocratic institutions that have developed and promoted it. For many, nuclear power has become a symbol of what is most frightening, and intimidating about modern industrial systems’ (Anon 1978)

## **Organised Environmentalism and the Media**

Key to the diffusion of environmental concerns was the organised nature of the environmental movement (Deudney and Matthew 1999). In the early 1970s influential environmental movement organisations (EMOs) began operating in the UK having emerged out of the burgeoning social-movement already gripping America. Both Greenpeace and Friends of the Earth, two EMOs often referred to in both press and Government data, began life with a fundamental understanding of nuclear technology as an environmental misdemeanour. In 1971 Greenpeace sailed into existence as a group of people on a small boat lobbying against nuclear bomb tests in the Pacific Ocean. Friends of the Earth was founded in America by David Brower in 1969 after he split from the Sierra Club (of which he was a founding member and executive director) partly because they were reluctant to confront the construction of atomic energy stations in the US. As such, an anti-nuclear stance was engrained in the mantra of the most prevalent EMOs. Although their ideals were predominantly imported from the American movement of the 1960s, they were the largest green organisations in the UK with substantial and growing national support (Deudney and Matthew 1999). These EMOs captured the interest of the media because they provided coherent, compelling, and unique contestations which challenged energy policy and which constructed and reflected a growing public anxiety towards nuclear power. As these organisations attempted to discursively delegitimize nuclear power on their own substantive grounds, the media further facilitated the dissemination of their nuclear concern.

## **Consequences of an Environmental Movement**

EMOs inculcated an institutional framework against which nuclear was to be understood as illegitimate. This framework appreciated that environmental protection and conservation were not purely to protect the amenities of rural UK but were to fundamentally guard fragile and complicated natural eco-systems against the damaging nature of an industrial and capitalist society. These values implied that any damaging dynamic between nuclear power and its natural environment could not merely be dealt with through landscaping or conscientious siting. Nuclear power was

perceived as illegitimate because of its intrinsic process; its fuel and wastes were radioactive to the point of being perilous, its stations were cumbersome and leaked radiation and its development represented the epitome of environmentally ignorant centralised and technocratic industrialism. In other words, it explicated that no environmental compromises between nature and industrial development were permissible. Table 9 illustrates the new emergent meanings pertaining to what it was to be 'environmental' which emanated from what can be referred to as a situated social-movement environmental logic.

**Table 10 Extended Societal and Situated Institutional Logics**

<b>Societal Institutional Logic</b>	<b>Capitalist market</b>	<b>Bureaucratic state</b>	<b>Environmental</b>	
<b>Institutional characteristics</b>	Accumulation of wealth and private ownership	Rationalisation and regulation of state through accountable bureaucracies	Protection of the natural environment for its own sake	
<b>Situated Logics</b>	<b>National- market</b>	<b>State-resource</b>	<b>Amenity</b>	<b>Social-movement</b>
<b>Institutional characteristics</b>	Public ownership Profit relative to priority of national goals	Regulation and control of energy resources reinforce state invulnerabilities	Protection of nature insofar as the amenities it provides for its public	guard natural systems against capitalist industry and humanity
<b>Level</b>	Nationalised energy industry	Nationalised energy industry	Often local communities resisting nuclear builds	Societal level – informing social-movement
<b>Actors involved</b>	Department of Power CEGB	Department of Power UKEA	Local community groups	Global social-movement organisations to local community groups

*Source: Table 7 (p.85)*

Environmental actors and their sympathetic societal cohorts problematised both the normalcy and peacefulness of the nuclear programme and began pressurising the Government to internalise a more environmentally responsible set of values and conventions. The following section will explore the specific environmental problems of the nuclear industry as identified by the environmental social-movement.

## Public Debates: Radioactivity and Waste

The uniqueness of the nuclear industry and its methods of pollution were being dissected for public inspection by the environmental lobby in a bid to challenge the pro-nuclear defence of the 1950s and 1960s. Normalising and distancing discursive strategies of previous decades had minimised public dissent towards nuclear power by framing it as an energy option like any other – the strategies had maintained a ‘level playing field’ upon which nuclear could be compared with other energy options on market and resource grounds. However, environmentalists contended that nuclear power was fundamentally unlike from other energy options because of two key and interlinking considerations: its radioactive-waste production and its links with nuclear armament. These considerations represented the centrepieces of two public debates regarding nuclear power. The first was particularly focused on the radioactive nature of nuclear waste and its impact on the environment. The second addressed the links between nuclear power proliferation and nuclear weapons given their similar requirement in technology and materials. They were linked because radioactive-waste could be used for nuclear armament. Both debates represented the ethical apprehensions of the environmental movement. As these public debates challenged normalising and distancing discursive constructions, factions of society sympathetic to the environmental movement became aware of the contradictions between an environmental logic and the criteria of legitimacy within the energy industry. The public were prompted to reconsider both the acceptability of nuclear power and of the energy industry’s legitimisation criterion.

Public anxieties over the relationship between Industrial progress and nature resonated with the unique problems of the nuclear power industry – primarily, uncertainty over what to do with its waste. Environmental awareness in respect to clean air, pollution and early concerns over chemical and pesticide contamination (Carson 1962) had reinforced anxieties over the implications of nuclear waste’s radioactive properties. Whilst environmental social-movement organisations publicised the dangers of radioactive-waste through their own campaigning, newspaper texts demonstrated emotive appeals against radiation. For example, The Times published several articles in 1970 which drew quotes from an American book clearly antagonistic to nuclear energy. The book was called ‘The Perils of the Peaceful Atom’, and its use in the media reflected the public’s negativity towards nuclear waste:

‘...meanwhile millions and millions of gallons boil furiously inside their frail tanks, tanks whose seams groan under strains metal was never meant to bear, and men go on building power plants to feed ever more of this corrosive ichor into its nuclear garbage dumps...’  
(Herbert 1970 p.10)

The issue was shown with particular gusto in the Daily Mirror which raised concerns over the volume of foreign nuclear waste present and planned for in the UK. Windscale Reprocessing facilities (THORP: Thermal Oxide Reprocessing Plant) were planned to be constructed by BNFL during the second nuclear power programme and were designed to separate the Uranium and Plutonium from radioactive-wastes in order to reprocess the former into mixed oxide (MOX) fuel for MAGNOX reactors. The latter would be stored on-site given that no long-term solution for either storage or disposal of radioactive substances had been established. This process had been in practice at the site since the 1960s, but the proposed plans significantly expanded the operations in order to attract international business. Newspapers were cynical of the Government's attitude towards waste and its THORP solution, labelling it 'archaic' and claiming that it '...showed management to be out of touch with modern environmental awareness' (Wright 1977 p.2). Speculation over international contracts being formed between the UK and Japan and the US for nuclear waste reprocessing enraged the Daily Mirror in particular, who used it as a chance to mercilessly criticise the environmental stresses that radioactive-waste management was imposing on the UK:

'By 1982 – if the 4,100 ton contract gets the go-ahead, a total of 750 tons will have come to Britain through the Tokio Electric deal...our ships have already become the free world's nuclear dustcart fleet. Besides bringing waste to this country we are carrying more for France to deal with' (DM1975doomwatch) [titles of articles from the DM included 'Britain World's Nuclear Dustbin' as part of the 'Doom watch' series...'do we really want Japan's dirty washing' (Anon 1975 p.2)

'There are fears that Britain is fast becoming the nuclear dustbin of the world. The Japanese want to send us 4000 tons of lethal waste – because their own laws do not allow them to treat it. But many top men in Britain's nuclear industry are totally opposed to the plan because the waste is so dangerous' (Bonnett 1975 p.1)

Central to waste arguments were the generational issues presented by the prospect of long-term waste management. Longevity of radioactivity threatened not only those obtaining the benefits of atomic energy in the present, but those many centuries into the future who would still have to contend with the waste created:

'The problems they [radioactive-wastes] create have interested the more philosophically-minded of nuclear engineers since the first piles started operation 30 years ago, but have never been allowed to ruffle the surface of official optimism...whether a society has the



right to saddle its descendants with dangerous materials it does not itself know how to dispose of is a question that permits no simple technical answers' (Hawkes 1975)

'In nuclear waste, man has stumbled on a kind of immortality. Unlike any other human product, the ashes from nuclear power stations will survive for a time which stretches beyond history and into the realms of geology. In a million years, today's wastes may be declared safe; but whether mankind will still be around for the ceremony is a question with no certain answer...' (Hawkes 1975)

No other energy option made wastes that would threaten the environment and humanity for such an inconceivably long time. With no plans as to how disposal of nuclear wastes might work, the nuclear power industry could provide no solution to the problems outlined by environmentalists. The only option was storage, which posed persistent risks to storage sites.

### **The Loss of Normalcy**

Apprehensions regarding radioactive-waste implied a concerning uniqueness to atomic energy; no other energy production technique created a by-product which could cause severe illness from mere proximity and environmental harm for such long periods of time. The normalising legitimating strategies identified in media accounts during the early years of nuclear power were being questioned by an environmental mentality which examined the raw properties of nuclear processes and their interactions with the natural environment. Newspapers stopped disseminating Government messages of nuclear normalcy and instead began to apply critical environmental perspectives. A cynically presented cocktail of uniqueness and human imperfection framed nuclear power as a risk to society and its environment:

'...nuclear power creates unique risks which cannot be assessed, let alone overcome, according to a report published in London yesterday by Friends of the Earth...the safety of nuclear technology is ultimately limited, not by care, ingenuity, dedication or wealth, but by inescapable human fallibility.' (Lovins 1974 p.20)

Any commonalities found in the relationship between nuclear power and its conventional fossil-fuel counterparts were eroded by continual reminders of the unparalleled substances utilised by the nuclear industry. Consequently, the technology and the science which undergirded nuclear power was questioned: was the UK really advanced enough to deal with the nuclear problems it had taken on, especially in terms of protecting the environment? (Lovins 1974). It was becoming increasingly stated within the press that nuclear power could not be considered under the same

criteria as traditional energy industries because its complexity complicated its legitimacy. These considerations were far removed from those of state-resource or national-market viability, and as such were distressing for a Government who had previously not had to defend its energy choices on such grounds. Issues around nuclear power's wastes were beyond the established arguments of the energy industry. Compounding apprehensions were the concerns over the safeguarding of nuclear wastes amidst an escalating Cold War. Public debates surrounding wastes were linked to proliferation because of the radioactive properties of the high level wastes (HLWs) which if taken could be used to fashion primitive nuclear bombs.

### **The Proliferation Threat**

‘...how to expand nuclear power without simultaneously perpetuating the spread of nuclear weapons. This problem seemed manageable in the relatively stable international climate of the fifties and sixties...but the transition in the seventies to a more fragmented and insecure world order made the management of nuclear affairs much more difficult...’  
(Walker and Lonroth 1980)

As concern regarding the outputs of nuclear generation intensified, the ability of those within the nuclear lobby to sustain a conceptual distance between nuclear weapons and nuclear energy diminished. By 1973 the Conservative Heath Government gave in to environmental pressure and commissioned an independent report - officially the 6<sup>th</sup> report of the UK Royal Commission on the Environment, but previously referred to as the Flowers Report. Its objective was to examine the relationship between the natural environment and the nuclear industry. The report was expected to concentrate on the immediate and direct implications of nuclear power on natural systems. However, the conclusions were particularly important in the delineation of linkages between nuclear generators and nuclear war. There were three central strands of proliferation concerns highlighted by the report which will be discussed below. First, the Flowers Report developed the concept of a ‘plutonium economy’ which problematised the use of FBR reactors. Secondly, the context of the Cold War reminded society that nuclear power generally was borne from the nuclear bomb. Thirdly, commentators were concerned that the THORP reprocessing plant placed the UK as a central facilitator of international proliferation of fissile material.

## Fast Breeder Reactors & the Flowers Report

‘Over the last few years there have been signs of increasing anxiety in many countries about projected growth in nuclear power and about the environmental risks that this might imply for the future. Early in 1974 we decided that this was a fitting subject for us to investigate and we announced the terms of a study of radiological hazards with particular reference to the development of civil nuclear power’ (Flowers 1976 foreword)

The Royal Commission on Environmental Pollution began their report, under the leadership of Sir. Brian Flowers, into ‘Nuclear Power and the Environment’ in 1973 under the Conservative Government as a response to escalating environmental apprehensions related to nuclear power. It was presented to the Labour Government in 1976. It aimed to examine the relationship between the natural environment and the continuation of the UK’s nuclear programme at a time where it seemed to the commission that the UK was on the threshold of increased nuclear investment without a full appreciation of social, environmental and ethical issues (Flowers 1976 p.4). The concluding report published a multitude of concerns. The Commission suggested that ‘Nothing would be more disruptive to the environment than nuclear warfare and we feel bound to comment on the spread of civil nuclear power in relation to the proliferation of nuclear weapons’ (Flowers 1976 p.74). They proposed that civil nuclear expansion would lead to global dispersal of nuclear technologies:

‘Our conclusion [is] that the spread of nuclear power will inevitably facilitate the spread of the ability to make nuclear weapons, and, we fear, the construction of these weapons’ (Flowers 1976 p.67)

The report feared that a programme of reprocessing and FBR reactors in particular would result in a ‘plutonium economy’ wherein the prevalence of plutonium would threaten national security and demand constrictive safeguarding to avoid ‘plutonium terrorists’. Security could not be passive and would be required to carry out ‘clandestine operations’ (Flowers 1976 p.82):

‘...A belief that the necessary vigilance and continuity could not be adequately guaranteed in any normal organisation led Alvin Weinberg to postulate a "nuclear priesthood"; this would be a dedicated, self-perpetuating body of people forming a technological elite which would be entrusted through the generations with the task of safeguarding society from the hazards of nuclear power. The idea of such a "priesthood" may seem untenable, but it is an indication of the extent of the anxiety felt by some responsible people about the hazards’ (Flowers 1976 p.82)

Such measures, the commission argued, would lead to gradual but inexorable infringements on personal liberties. The report was concerned that the Government so far had not considered the management processes of safeguarding such materials, categorising it as 'just another problem...as one which can certainly be solved' (Flowers 1976 p.85). Conclusions from the report emphasised that nuclear fission should not continue to go ahead unchallenged, and that there should be evidence that there is no '...reasonably certain economic alternative' (Flowers 1976 p.85). Abandonment of nuclear power was not the ultimate conclusion, and the economic benefits of nuclear power were duly noted; but until all the issues had been fully appreciated and weighed in light of wider public understanding, the commission believed that there should be no commitment to a large nuclear programme. The commission recommended that the FBR programme be delayed for as long as possible, and that investment be redirected towards alternative sources of energy whilst issues of waste management were resolved. Evidently nuclear power's claim to represent the 'peaceful use of the atom' (IAEA) was challenged by a troubling reality that the fundamental materials used in nuclear power fuel-cycles could be facilitative of irreparable global ecological damage. Resultantly nuclear arms and nuclear power were becoming conceptually conflated:

'...the connection between civil and military uses of nuclear power is obvious; there is the possibility that great expansion of civil use would make more difficult the eventual acceptance and introduction of measures to secure disarmament' (Flowers 1976 p.82)

'...There is a wide growing feeling, not only in Great Britain but throughout the Western world, that this drift into the plutonium economy not only involves a danger to civil liberties but could involve a drift into the dangers of nuclear war' (Secretary of State for Energy 1974 p.13)

## **Implications of a Cold War**

The Commission's publication skewed a concern with the relationship between the environment and nuclear power into a report focused on the connection between nuclear energy and armament. This likely reflected societal unease as the fragile equilibrium between nuclear-laden global superpowers induced increasing levels of anxiety. The Non-Proliferation Treaty (NPT) in 1970 required all non-nuclear weapons states to sign up to IAEA safeguards, yet still tensions between the heavily armed Russia and the US did not ease. Press articles referred to the state of continual weapons development as a balance based on Mutual Assured Destruction (MAD). That is, the maintenance of peace was dependent on the belief that an offensive would be suicidal because all nuclear power capabilities between hostile countries were alike. Consequently any counterattack

would be deadly for the aggressor. However, in 1978 President Carter failed to ratify the SALT (Strategic Arms Limitation Talks) II treaties and the détente between East and West faltered. It was feared that the break down in relations would manifest in what was termed a 'limited nuclear war' played out in Europe whilst the Superpowers tested each other's resolve (Pilger 1978 p.1). The UK hosted a number of US missile sites which bolstered anxieties that the UK represented a prime target for the Communist states: 'Britain has been called "America's unsinkable aircraft carrier"' (Mirror Report 1980 p.1). Moreover, nuclear technology was spreading to new nations who were either pushing or altogether ignoring the non-proliferation measures taken in previous decades. The media claimed that the UK's nuclear progress had been integral to this predicament, reflecting public concern that the atomic energy industry was only adding to Cold War hostilities:

'...confidence in existing, internationally agreed, non-proliferation measures collapsed in the wake of the Indian nuclear explosion in 1974, and the Germans and French agreements in 1975-6 to supply "sensitive" nuclear technologies to Third World countries that were considered proliferation risks...meanwhile the worst acts of weapons proliferation are being committed by the five existing nuclear weapon states (not least the UK), which continue to expand and modernise their nuclear arsenals' (Walker and Lonroth 1980)

'Controversy over nuclear power never seems to die. The fears connected with its development, and the knowledge that, however peaceful a modern power station appears, the process by which it is making electricity was first developed as an instrument of war bringing terrible destruction to property and human life have ensured a level of public disquiet and official vigilance not seen elsewhere' (Hirst 1980 p.iv)

The public debates explored above were very much interlinked. Their interwoven nature can be illustrated most vividly in the way arguments around the building of the nuclear THORP reprocessing plant at Windscale (renamed Sellafield in 1981) were framed in the media. The plant, as previously discussed, would facilitate international contracts for reprocessing and would either keep the wastes or transport some or all back to the exporting country. However, the struggle between the nuclear industry and environmental groups over the THORP build highlighted the overriding values of the energy industry and its rejection of environmentally grounded anti-nuclear debates. Politically, the Government sought the financial gains from international contracts, regardless of the environmentalists' views that it constituted state profiteering irrespective of environmental consideration.

## **THORP: Fear and Loathing**

Disputes over the nuclear reprocessing facility at Windscale provide an explicit illustration of the tensions between anti-nuclear argument and the interests of the Government. In America concerns over a plutonium economy and the role of reprocessing in its making led the Administration to abandon nuclear reprocessing altogether. President Carter called for an international halt of all reprocessing activities until an International Fuel Cycle Evaluation (IFCE) had taken place to determine the extent of proliferation facilitated by the process. Controversially the UK Government chose not to restrain until the IFCE and against US wishes continued to plan the construction of the THORP facilities. In March 1976 the Minister of Energy Mr Tony Benn announced that BNFL would accept more overseas reprocessing work. BNFL then made an official submission for a planning application to Cumbria council for the THORP works. Unexpectedly, the Council referred the matter to the Secretary of State for the Environment, Mr Peter Shore who called in the THORP proposals for his own inspection and a public inquiry. The inquiry was likely a result of the press uproar after the formal BNFL submission became known publicly in late 1976. The quotes below are from a Government report explaining the need for the Inquiry:

‘There is legitimate and growing public concern over the reprocessing of uranium oxide fuel...it is essential to make an early announcement that the Windscale application will be the subject of an inquiry. This will enable the environmental and safety issues at stake to be properly and responsibly considered’ (Secretary of State for the Environment 1976 p.9)

‘Unless the public can be provided with some real reassurance about the nature and safety of the proposed development at Windscale, opposition to nuclear programmes will increase to a point where there may be strong political pressure against further developments of any kind... but I nevertheless believe it is the right course’ (Secretary of State for the Environment 1976 p.9)

The Windscale Inquiry was chaired by Mr Justice Parker and decisions to proceed on the project would ultimately be decided by Parliament. The inquiry was attended by BNFL who accounted for the majority of proponent ‘air time’, and numerous objectors including the Town and Country Planning Association and FOE. It was the longest running Inquiry of its kind in UK history and hosted a lengthy battle between the State owned BNFL and both local and global environmental organisations. Justice Parker’s report concluded with the advisement that BNFL’s proposals created no significant increase in radiological risk, that the security risk was not unmanageable and that environmentally it offered a better option than mere storage. Additionally, the report suggested

that the reprocessing of foreign fuel would not run counter to proliferation prevention efforts and international policy. The final decision was made by parliament in a 1978 debate opened by Peter Shore. Two parliamentary debates ended in favourable voting towards the construction of THORP. Construction was hastily convened amidst concerns that any further delay to the proposals would put the contract for the reprocessing of Japanese Uranium oxide fuel (of which the Japanese were banned from performing after WWII) at risk, thereby damaging the UK's international reputation (Secretary of State for the Environment 1976). In 1978 the concluding Windscale inquiry report (Parker 1978) was published, officially outlining the THORP justifications.

The Daily Mirror in particular remained sceptical of the effects of THORP on proliferation. In pursuing its construction, the Labour Government had argued that the international presence of plutonium would be lowered and concentrated within the UK, thus abetting disarmament. For the Daily Mirror, THORP would instead place Britain in the centre of international proliferation, facilitating the spread of nuclear weapons via the production of their environmentally unsound raw materials and the shipment of reprocessed fuel back to exporting countries. The UK would then be left with the wastes of this process earning it the title 'nuclear dustbin':

'...the report maintains that unless Britain goes ahead with Windscale, other countries might produce their own plutonium...And if it works, Windscale will be the world's first – making Britain not only a "nuclear dustbin" but a major supplier of the means of making the atomic bomb' (Pilger 1978 p.1)

Disapproval of the Windscale report was also aired by the environmental organisations in attendance. A 1978 report by Walter Patterson, Friends of the Earth's (FOE) primary energy specialist (1972-1978) responded to the official Windscale report with a scathing review of the Government's ability to praise itself for handling the civil nuclear dispute via a flawed and biased public inquiry. FOE was frustrated that BNFL had not only got everything it asked for, but that the means by which the debate had been handled additionally meant that the Secretary of State for Energy was able to make a 'special development order' to hasten the plant's construction. Patterson argued that the inquiry was blatantly plotted as a means to accept the THORP construction in a way that facilitated the bending of usual planning protocol, rather than as a means to promote fair public debate. In his acceptance of the THORP proposal, Justice Parker had rejected each point made by the environmental opponents. As such, Patterson argued that the FOE perspective was not considered and that Parker's suggestion that nuclear power was environmentally sound was grossly misplaced - one among many 'absurdities' posed by the report. BNFL had argued that concentrating reprocessing in the UK would be 'greener' than leaving it to be

stored around the world. FOE fervently rejected this supposition and began mobilising support for anti-nuclear rallies in response:

‘Objectors in the meanwhile are organizing what may be the largest Trafalgar Square rally about nuclear policy since the heyday of the Campaign for Nuclear Disarmament nearly 20 years ago. The aftermath of the Windscale Inquiry Report may well jolt the British Government rudely out of its nuclear complacency’ (Patterson 1978 p.4)

## **Implications of Public Debates**

First and foremost the public debates initiated by the environmental movement undermined the normalising and distancing legitimisation strategies of the pro-nuclear lobby. By challenging the legitimacy of nuclear power from its own substantive concerns the environmental movement created space for the public to problematise nuclear power on the grounds of its unique environmental threats and relationship with nuclear weapons. Nuclear power could no longer be considered as ‘just another’ energy option. Instead it demanded additional consideration given its environmental dangers. Consequently pressure was mounting on the Government to consider environmental values when making energy choices:

‘Decisions should not be taken simply on the basis of technological or economic advantage and the assumed necessity of securing steadily increasing energy supplies. The social and ethical issues involved are real and important, and should be widely appreciated and discussed’ (Flowers 1976 p.83)

Despite the growing environmental anxiety within the public domain, and from the Royal Commission on Environmental Pollution and the press, the energy industry ultimately appeared to reject the concerns. At best one could suggest that a compromise was made whereby the Department of Energy introduced a number of advisory boards and committees to satiate the demands of the environmentalists. This move illustrated that the Energy Department remained unwilling to compare energy options on the basis of environmental credentials, but would instead monitor the pollution and emissions of plants once installed to ensure that pollutant levels remained satisfactorily low. The following section will explore this ‘greening’ of the energy industry post-Flowers Report. It will argue that the structural changes made merely reflected the passing of responsibility to organisations which continued and possibly even exacerbated the State’s ignorance of the values and rationalities of the environmental movement.



## **A Post Flowers Era: Has Nuclear Gone Green?**

‘Lord Sherfield, opening a debate on the sixth report of the Royal Commission on Environmental Pollution on nuclear power and the environment, said the commission found relatively little to criticise about the development of the nuclear industry in all its aspects up to the present’ (Anon 1976 p.6)

In late 1977 the Labour Government printed its official response to the Flowers Report in the white paper entitled ‘Nuclear power and the Environment’. It stated that the Royal Commission had concluded that ‘...In many respects the reports endorse[d] existing practices or activities’ (p.4). In regarding the report as a green light for nuclear continuation, the Government interpreted the Royal Commissions’ worries over nuclear power’s social, environmental and security effects as concerns relating to insufficient regulation. A principal recommendation by the report was that nuclear waste should be handled away from the ministerial department with vested nuclear interests. The Secretary of State for the Environment, Peter Shore, reflected in a commons sitting that the Government reaction should be to develop a long-term strategy for nuclear waste independent of the energy department. Subsequently, the Department of the Environment was to take over responsibility for regulating and monitoring all nuclear waste from both the Department of Energy and the UKAEA. Additionally, a Nuclear Waste Management Advisory Committee (NWMAC) was endorsed by the Royal Commission and was to be established at a later date pending the decision on whether it would have statutory powers or not. A Nuclear Waste Disposal Corporation was also recommended, although the Government did not see the need to make a decision on its formation immediately. Ultimately the environmental implications of nuclear power were to be closely supervised and controlled through safeguards and advisory structures:

‘Will a “plutonium economy” damage the fabric of our society? No, it will not because it will not be allowed to. Plutonium will not be stolen from the plutonium store because that is as secure as we choose to make it”.’ [Quote by the AEA chairman Sir John Hill in The Times (Hill 1976 p.12)]

‘The Government agree with the commission’s conclusion that the risk of serious accident in any single reactor is extremely small, and note their view that hazards posed by reactor accidents are not unique in scale, nor of such a kind to suggest that nuclear power should be abandoned for this reason alone...overcome the security problems consideration would be given to proliferation possibilities at the design stage of nuclear installations: ‘designing security into nuclear systems’ (Secretary of State for Energy 1977 p.11)

Nevertheless, the media illustrated public distrust in the strength of the regulation and maintained deeper concerns over the morals and environmental ethics of atomic energy. It seemed that the Government had failed to encapsulate the environmental anxieties of the public in its restructuring.

### **Just Not Getting It: Rising Distrust of the Industry**

‘...their [the Government’s] cleverness was apt to outrun their wisdom. Like precocious children they gave themselves expensive toys and started them up without reading the instructions. Then we are surprised when they go wrong and are lucky if they do not blow up our own faces’ (Anon 1976 p.6)

Conversely, the media did not interpret the Flowers Report as a general ‘go ahead’ for nuclear power. Primarily they had apprehensions surrounded the capabilities of new regulatory bodies in controlling the nuclear machine. For example, The Times (which backed the oppositional conservative-liberal coalition at this time) focused on an interpretation of the report which problematized national safety. Its journalists questioned whether safeguards could be operationalized successfully given the requirements of the nuclear industry. Nuclear power’s ‘uniqueness’ was conjuring up all kinds of apprehensions which questioned how much society and industry actually knew about atomic processes. Nuclear power was framed as an uncontrollable and uncontainable technology; one which the Government had yet to truly understand given its failures in recognising the plutonium and waste problems endemic in nuclear electricity generation:

‘...man’s inability to foresee all the failure mechanisms that could lead to a serious incident makes it impossible to introduce appropriate safeguards. Reactor technology is complex and man is fallible, and with such potential hazards of failure an acceptable level of safety cannot be guaranteed’ (Wright 1976a p.4)

To inform its perspective The Times drew extensively from the FOE report published in 1976 as an alternative response to the Flowers Report. The quote below was one of many directly cited by The Times from FOE which re-emphasised concerns of the Flowers Report and queried the Government’s ability to face the issues satisfactorily:

‘They pose questions of a different kind. How could the Government prevent thefts of the plutonium so essential to a nuclear programme using fast breeders? What security measures might prove necessary? What impact might such measures have on political and civil liberties to which we are all accustomed? (Wright 1976b p.4)

In defence of the industry, MPs in support of the Minister for Energy's advocacy for the Windscale THORP plant criticised the media for distorting the reality of atomic energy and instilling anxiety into society from an ill-informed and inconsistent perspective:

'Very little was said by the critics of nuclear energy against reprocessing until fairly recently. Much of the opposition started when one of the newspapers – I think it was the Daily Mirror – referred to the possible winning of the Japanese contracts and the bringing here of Japanese spent fuel as turning this country into a nuclear dustbin. That was the start of the recent strong agitation against Windscale' (Commons Sitting 1978 p.20)

'In one Sunday newspaper...In an authoritative article it said that, by the year 2000, there would be 1 million reactors in the world, and that, because of the probability of accident was postulated at one million to one, it was therefore probable that there would be one reactor accident every year. If the public are served with that sort of ludicrous and misleading information, it is no wonder that there is concern' (Commons Sitting 1978 p.10)

The Government and the UKAEA believed that the anti-nuclear pervasiveness within the press was an example of sensationalist journalism, and framed it as so in their attempt to avoid any direct confrontation with troublesome public debates. Indeed, responding to the concerns of the environmental lobby was no longer as easy as some well-placed landscaping or chimney minimisation. The nuclear industry would need to accept a whole new range of regulators that perhaps did not share their enthusiasm for atomic energy. The Department for the Environment, in particular, became heavily involved in the energy industry, taking responsibility for monitoring and enforcing safe waste management. Their new found centrality to the operations of nuclear energy generation forced operators to concede to practices consistent with the agency's environmental norms and values. Whether this was enacted with a genuine alteration in mentality or just ceremonially to appease the Environmental Agency is unclear. Indeed, the creation of regulators with environmental priorities, values and conventions did not appear to mean that decisions over energy choices would deliberate environmental implications; there was little to suggest that decision-making actors within the energy industry had internalised the environmental movement's values, as they instead relied on the coercive regulatory powers of the new actors to enforce environmental considerations upon them, alleviating them from the need to adopt the mentality themselves. Decisions made relating to the energy mix by the Minister of Energy remained focused on market and resource considerations, with the environmental bodies there to ensure that these decisions were then enacted in a way that fitted the regulations.

Conversely, the Press interrogated the possible efficacy that could be gained by such regulators. They argued that something as unknown and potentially volatile as nuclear power could never be fully fortified. It seemed that the energy minister had failed to grasp society's environmental conscience. Regulation did not make the fundamental nature of nuclear power environmentally friendly; it did not turn radioactive-waste into something less toxic, nor did it deplete the explosiveness of plutonium isotopes when bashed together. In sum, the Flowers Report had recommended a number of independent committees and advisory boards to monitor and regulate the nuclear industry's methods of waste and proliferation management. However, the instigation of these bodies failed to appease environmentalists who felt that they represented a biased compromise and would act in the interests of the nuclear industry.

Nevertheless, the nuclear industry managed to continue throughout the 1970s with a number of new stations from the second programme going online, as well as the THORP plant. Although the environmental movement had been able to generate public apprehensions over nuclear power leading to both a substantial THORP inquiry and an influential Royal Commission report, it appeared that nuclear power was still considered valuable in relation to the institutionalised expectations of the numerous energy ministers over the mid and late 1970s (Labour under Wilson; Eric Varley 1975-76, and Labour under Callaghan; Tony Benn 1976-79). Increasingly it became evident that pressure on the Department of Energy to modify its institutionalised principles to include environmental concerns as key rationalising conditions appeared unlikely to lead to the abandonment of nuclear power. Below, the chapter will discuss how actors within the energy industry continued to legitimate nuclear power despite its declining favour within the public and environmental spheres.

## **Continuity of Nuclear: Strikes and Crisis**

The above sections have focused primarily on the environmental values of a social-movement which problematised the nuclear industry and its relationship with nature. However, the political landscape of the energy industry during this period was not without its own dramas. The following section will explore how the political climate of the 1970s contributed to the continuation of nuclear power despite its environmental criticisms. Importantly the decade was characterised by a number of crippling strikes by the National Union of Mineworkers (NUM) which demonstrated the nationwide vulnerability to an energy mix dependent on coal. Additionally, the UK was suffering manufacturing and economic decline with industrial protests erupting around the country in response to Government spending cuts. As such, the energy industry was placed within a national context which warranted the instigation of an energy mix which offered financial potential and

immediate solutions to energy supply susceptibilities. Legitimation of nuclear power by the Minister of Energy and the CEBG came from its relative perceived necessity as aligned with the National-market, and predominantly, the State-resource situated logics within the energy industry.

## **Conventional Fuels Fight Back**

‘...even with the promise of nuclear energy to back up the hard pressed conventional sources of power, a major energy crisis is possible well before the year 2000’ (Anon 1972a p.15)

The Conservative Heath Government in the period of 1970-1974 displayed a fascination with nuclear energy, but struggled to provide an efficient nuclear programme given the difficulties presented by the AGRs. Energy policy at the time was expressed as ‘COCONUKE’ which stood for conservation, coal and nuclear. However, the period was to test the accepted energy mix and its dependency implications. In January 1972 the National Executive Committee of the NUM, following months of negotiation with the National Coal Board (NCB), rejected the Government’s proposed 7-8 per cent pay rise. Miners from all over Britain not only picketed at their coal mines but disrupted activity at many types of power station and fuel mobilisation hubs. After a month, the lack of power generation from coal partnered with interruptions in fuel and material transportation led to the announcement of a national state of emergency and a three day working week to conserve energy. It was not until mid-February that NUM and the Government came to an agreement and the picketing ceased with Miners securing a significant pay rise. Mining strikes highlighted the fragility of the UK’s energy mix and its economic dependence on the coal industry. Consequently, the Government turned to the nuclear industry in the hopes of diversifying the energy mix. However, the MAGNOX stations were beginning to suffer from corrosion and a reduced operating efficiency, and the follow up AGR programme was inundated by cost overruns, technical problems and delays:

‘Britain led the world in the introduction of nuclear power in the 1950s, but recently, while other major industrial countries, not least in the European Economic Community, have been installing unclear plants on a large scale, our own experience has been very disappointing both at home and abroad’ (Secretary of State for Trade and Industry 1972 p.5)

‘...the British consortia that build the reactors are in disarray and the morale of their staff is probably at its lowest ebb. This is partly because the groups are only just learning to live with the failures of the first and second generations of nuclear power stations to achieve their much publicised targets or to sell British designs overseas’ (Anon 1972b p.25)

Given that the settlements between NUM and the National Coal Board (NCB) were viewed as a significant victory for the mining unions, little further trouble was expected (Kershaw 1972) and the Government began to slowly restructure the construction side of the nuclear industry. However respite was not to last as a year later the OPEC (Organisation of the Petroleum Exporting Countries) oil crisis placed strain on oil supplies from the Middle East. During the Yom Kippur War between the Arab States and Israel, Arab members of OPEC refused to transport petroleum to nations (including the UK) seen to be giving support to Israel. Consequently the value of crude oil escalated and production was slashed leading to a UK energy crisis and a push for national energy production. After the crisis both media and Government texts demonstrated an increasing interest in changing the configuration of energy sources; incorporating new technologies such as gas and revamping and expanding the nuclear energy contribution:

‘...the era of cheap oil is past, and the development of alternatives will be costly. Gas, however, has been an important source of energy in the developed countries and the oil price crisis can be expected to spur further exploration... by 1985, it is estimated nuclear power will account for half, followed by coal (30 per cent), natural gas (9 per cent), oil (8 per cent) and hydroelectric (3 per cent)’ (Owen 1974 p.iii)

The rampage against British energy supplies continued with another miners strike in 1974. Tensions between the Conservatives and trade unions had escalated since 1972 due to pay-freezes aimed at aiding the failing economy. Additionally, the 1973 oil crisis created a strong bargaining context for the coal union by increasing both the cost of coal as well as its fossil-fuel alternatives. In February 1974 NUM called another strike over pay which led to another state of emergency and shorter working weeks to limit national power consumption. The Edward Heath (Conservative) Government called a sudden General Election in the early months of 1974 asking the public to use their votes to show the mining unions their frustrations. Unexpectedly the general election led to a hung parliament and after numerous disagreements over a possible coalition Government Harold Wilson was able to form a Labour Government to take over leadership. Two days after the Heath Government was voted out, the new Government appeased the NUM and ended the month long strike. It was another resounding victory for the miners as they received nearly twice as much as they would have under the Heath Administration (Winterton and Winterton 1989). Nevertheless, the strikes had left a sour taste by displaying to Government and society a politically volatile and ‘selfish’ (Hawkes 1974) side to the coal industry which detracted investment:

‘...companies...will not spend money converting plant to coal burning...so long as there remains the threat of further disruptive industrial action’ (Editorial 1974 p.17)

The official Labour response was to establish a Department for Energy to take over energy responsibilities from the Department of Trade and Industry and to develop energy strategies which were less vulnerable to national and international fuel supply oscillations. In June 1974 the NCB issued 'The Plan for Coal' which outlined a template for massive coal investment and infrastructure, duly committing the Department of Energy to create additional mining capacity to cover that which was being lost (Derek Ezra, Chairman of NCB). The boost for coal was coupled with calls for nuclear power to supplement and diversify energy supplies. As fossil-fuel reserves continued to both dissipate and become internationally and nationally politicised, the press began to argue that nuclear power was necessary to take over the main burden of electricity generation from coal and oil during the coming decades. Indeed, within the press nuclear energy's legitimacy appeared contradictory considering the continual criticisms of disappointment, environmental concern and uncertainty regarding its marketable achievements. However, although increasingly alarmed by the environmental implications of nuclear power, the press also illustrated an attraction to atomic energy's supply security in relation to alternative energy options. With the Government struggling to adequately control the supplies of fossil-fuels, particularly given climbing energy demand in the UK, reinvestment in nuclear power seemed the only 'rational' option:

'...why, then, do leaders of the electricity industry, as well as energy planners, persist in advocating nuclear power as the only source of fuel that can bridge the energy gap that could emerge towards the end of the century? The answer is simple. There is no real alternative' (Anon 1974 p.15)

'...taking into account the relatively abundant fossil-fuel resources of the United Kingdom, there was still a gap between supply and prospective demand, which nuclear fission offered the only practical possibility of filling' (Wright 1975 p.5)

The Government's reorganisation of the industry continued in a bid to strengthen the construction consortia into a single entity that would collaborate in the design of a single British reactor. It was hoped that this would not only strengthen and protect the companies within the consortia by minimising competition, but would develop a coherent organisation which could develop a reactor type which would be competitive overseas. Such work was in anticipation for a third nuclear power programme which was expected to be announced in the later years of the 1970s:

'By 1985 it is estimated nuclear power will account for half, followed by coal, natural gas, oil and hydroelectric...we need nuclear capacity and we should like to see it coming into the system from the new programme of nuclear development in 1980 and onwards.' (Owen 1974 p.iii)

It should be noted that The Times seemed to offer contradictory accounts between the environmental opposition shown previously and the current pro-nuclear stance. This change may be attributed to the paper's Conservative support during 1970 and 1974.

The coal industry fought back against the instigation of nuclear power. Indeed it was not purely environmental groups developing a dislike of nuclear power. Interestingly, in the latter part of the 1970s the coal lobby were one of the first groups to suggest that renewable technologies could replace the need for 'dangerous' nuclear power.

## **An Unlikely Alliance: Coal and Renewables**

The Department of Energy's push towards nuclear power in reaction to coal and oil threats incited anti-nuclear action from the miners' union in particular. Aside from industrial decline and issues surrounding miners' remuneration, nuclear power threatened the influence of the coal union by lessening the proportion of UK energy production that coal would supply, thus decreasing the union's bargaining power. In 1977, central members of the National Union of Mineworkers, namely Arthur Scargill, coordinated the creation of a group called 'Energy 2000' from the North of England which set out to prove that dependence upon nuclear power would be both unnecessary and economically damaging (Kershaw 1977 p.14). Energy 2000 represented the first organisation from within the energy industry to align itself both with the interests of a specific energy industry and the values of an environmental lobby in a bid to oust nuclear power:

'An all-party group of MPs yesterday opened an early-day motion calling for measures to prevent Britain from becoming committed to an "unacceptable" degree of dependence on nuclear power. The first 14 signatories to the motion came after a lobby of Parliament by more than two hundred leading scientists, members of conservation and environmental groups...they gathered under the label Energy 2000' (Wright 1977 p.4)

Energy 2000 hoped to further the economic interests of the coal miners by aligning their concerns over nuclear dependence with anxieties about the dangers associated with the plutonium economy (Wright 1977 p.4) as well as radioactive-waste disposal and storage issues. In particular, Energy 2000 was significant because it represented one of the first anti-nuclear organisations to seriously suggest that renewable energy production could offer a substitute to nuclear power. With the backing of scientists and environmental group representatives, Energy 2000 favoured a mix of coal and renewables to constitute Britain's future energy mix:



‘....The motion had called for a halt to all future nuclear development other than for the safe disposal of waste from existing works; for spending more money on saving energy; for an energy policy that recognised that oil and coal reserves were finite; and for more research into wind, wave and solar energy. It stated that it was criminal to jeopardise the future of children with the unknown dangers of radioactivity’ (Anon 1977 p.4)

Using Energy 2000 as a vessel from which to dispute nuclear power, key members of NUM exploited their trade union’s political ties to try and influence both the TUC and the new Labour party to support the abandonment of nuclear power. Drawing from the environmental social-movement and piggy backing on the environmentally grounded anti-nuclear sentiment stewing in the public domain, Energy 2000 challenged the idea that only nuclear energy could ‘fill the energy gap’. As a nascent and untested technology, renewables were yet to offer a serious alternative in the eyes of many; but for the members Energy 2000 they provided a much less threatening route towards securing national energy supplies than the instigation of numerous baseload nuclear plants. They also offered a means to attract and associate the coal lobby with the snow balling environmental lobby. Nevertheless, although it attracted print space in both The Guardian and The Times, Energy 2000 failed to have the required political success. Their suggestions were rejected by a sceptical TUC and further fell on deaf ears once the pro-nuclear Thatcher Government came to power in 1979. Although not successful in its initial attempts to stop the nuclear industry, Energy 2000 sowed the seeds for the ‘nuclear versus renewables’ debate which would come to flourish in later decades.

## **No Choice but Atomic Energy**

The values and conventions of the energy industry’s state-resource logic were clearly evident in the discursive advocacy of nuclear power during the 1970s. Given the troublesome supply context of the energy industry and because nuclear power was generated within the UK and dependent upon fuel supplies from friendly countries, it became prevalently legitimated by ‘energy crisis’ discourses. Additionally, the idea of an energy crisis with its associated ‘energy gap’ was vital to the incitement of state-resource rationales, and for international leaders it had cemented the importance of nuclear power. The world leaders (of the US, Japan, France, Germany, Canada and Italy) who met at the Downing Street Summit conference on 7<sup>th</sup> May 1977 (also known as the 3<sup>rd</sup> G7 summit) to discuss a number of international issues, including the implications of the Flowers Report, agreed that nuclear power was necessary both for the stabilisation of the world economy and to buffer the energy shortages likely in the future:

‘Unless the energy gap was bridged, the world economy would lack confidence. The development of nuclear energy in the interim was the answer’ (Commons Sitting 1978 p.7)

‘How bad is the present situation? If we go on at the present rate of oil consumption then I think long before the end of the century there will not be enough oil left to meet our demands...do you consider nuclear power inevitable? Yes.’ (Mirror Report 1980 p.4)

However, it is important to note that such press interest constituted the minority of media coverage related to nuclear, and illustrated that the supply side celebration of atomic power by the Government was often in direct tension with a mobilising environmental movement. In a bid to defend themselves against the environmental lobby, those espousing nuclear powers legitimacy in regards to its supply security began to directly confront the environmentalists. They believed that their bases of legitimacy were far more important to consider than the problematisations of the environmental movement. A number of publications began to reject the legitimacy of environmental arguments against nuclear – shunning them on the grounds of irrelevance and triviality given the larger energy debate. In sum, for its supporter’s nuclear power did not have to be environmentally friendly, it was required merely to provide secure energy at a ‘reasonable’ price.

## **Energy Policy and the Utopian Environmentalists**

The battery of criticism regarding nuclear power brought out a journalistic army of pro-nuclear supporters hoping to legitimate it given the contextual conditions of the era. Specifically articles which centred on the issue of an ‘energy crisis’ tended to imply that the arguments of environmentalists were ‘irrational’. Indeed although the environmental movement appeared ubiquitous throughout society, by the closing years of the 1970s there were numerous articles which criticised the movement for its unrealistic, illogical and utopian ideals. Such criticism manifested in discursive struggles between actor defined ‘rationality’ and idealism; apparent in arguments between the self-proclaimed realistic nuclear-lobby, with its legitimisation based on the institutionalised principles imbued by the conventional logics of the energy industry, and the accused ‘idealistic’ notions of EMOs with their perceptions of an energy situation which could not exist. Whereas the environmentalists had directly problematised the processes of nuclear power, the pro-nuclear lobby were more focused on questioning the values of the environmental movement – perhaps they accepted the material problems, but were frustrated that the morally armed critics gave no workable solutions. Most noticeably pro-nuclear lobbyists labelled the environmental agenda an emotional response to the problems of nuclear power, not able to keep a ‘...sense of proportion about nuclear hazards’ (Parker 1978 p.40)

‘...what is certain is that any rational assessment of nuclear risk makes it clear that civil nuclear power poses a far lesser risk in terms of death or injury than do activities we hardly question, like driving cars, building and construction, and mining. It is still to be proven that a single death in this country derives from the civil nuclear programme’ (Waldergrave 1979)

‘There are, of course, a minority among the objectors, who, faced with the dilemma – the menace and the benefit inseparable and inherent in nuclear power – that I described at the beginning, will say “no” to all new development. Logically they would wish to close down the nuclear installations that we already have and they are quite courageously prepared to accept the immense economic consequences of such an act of self-denial...But I believe the majority of our peoples...will take a different view, and they will approve – perhaps with reservations – the open and cautious approach that we have adopted. They will have confidence – but not blind faith – in the skills and integrity of our scientists and engineers. They will be fully conscious – but not paralysed by – the great risks as well as the benefits that increased nuclear power can bring’ (Commons Sitting 1978 p.9)

‘I was brought up to believe that our natural environment was of paramount importance. But even with this background, I cannot avoid the conclusion that the current exaggerated, if not maniacal, attitude of some people towards our environment is very damaging to our future well-being. Zero growth, the econuts’ panacea, won’t bail out anybody’ (Rothschild 1978 p.14)

In addition to anti-nuclear activists and their ‘idealist’ environmental cause, those defending nuclear power in the public media drew on the anti-capitalist nature of their sentiment. In 1979 The Guardian published an article by energy committee backbencher and Conservative William Waldergrave who gave two reasons why people may have been against nuclear power. The first was that those opposed to nuclear power were ‘catspaws’ of the Soviet Union, wishing for increased soviet power as an outcome of a weakening energy supply in the West. Secondly, Waldegrave argued that a dislike of nuclear power tended to be presented by those who held antipathy towards the basic nature of industrial society. Such sentiment, also found in a number of other less brash articles, framed anti-nuclear individuals as opposed to Western capitalist values and progressive industry. For Waldergrave and his sympathisers in both the press and in Government, nuclear power represented more than just electricity provision. It reflected the sovereign values of industrial progress and western culture. It would ensure reliable energy for the continuation of state development and maintain, if not escalate standards of living. For a pro-nuclear lobby which had emerged to defend the industry, the rationality of nuclear power lay in its

appeal as a 'solution' to an energy crisis which reflected nationalist goals and industrial progress. Those who did not understand the importance of such notions, and who criticised nuclear on emotive grounds without offering any real solution to energy issues were framed as 'irrational' anti-capitalist 'hippies' (James 1979).

The above illustrates the intensifying division between the value sentiments of environmentalist sympathisers and actors who supported the Government in its pursuit of nuclear energy. For decision-makers within the energy industry the solutions to environmental contestations were already dealt with through regulatory pressures on the industry which were implemented after the Flowers Report. Nevertheless, these bodies reacted to the ecological threat of nuclear through monitoring and coercion and as such environmental values remained dislocated from the decisions made between energy options. In other words, the fundamental question of what process should be generating Britain's energy paid little homage to the environment, instead basing legitimacy primarily on reinforcing coordination and control within the Government and likely future cost comparisons:

'...the supporters of nuclear energy believe in a society dedicated above all to the production of wealth, in which efficiency, cost effectiveness and the needs of industry are the touchstones of policy. If the environment takes a knock or two, or if society takes some calculated risks, then this is the price we pay for the pursuit of the greater good' (Rothschild 1978 p.14)

## **An Overview: Heading into the 1980s**

'The dilemmas in the search for new sources of energy are many. But none as emotive as nuclear power. The hopes and fears for the future lie happily and dangerously within it. Hope because along with oil, it is THE only developed alternative to producing electricity. Fear because of the dangers of radiation, the problems of disposing of nuclear waste and the spread and misuse of the atom bomb' (Mirror Report 1980 p.5)

The nuclear power industry had certainly been set aback by escalating concern over the natural environment during the 1970s. The years following the Flowers Report was characterised by low industry esteem, drastic attempts at restructuring, the cancellation of a proposed SGHWR programme and an only half finished second programme of AGR's which were plagued with unforeseen and expensive complications. EMOs implicated themselves in the business of energy production by rethinking and diffusing new ideas regarding ways in which the environment and

industry related to one another. The nuclear industry epitomised all that the environmental movement despised including centralised, technocratic and environmentally risky electricity production. Via the 'soap box' of the media the movement educated society on the unique processes and materials involved in nuclear power production that were previously not common knowledge. However, neither radioactive-waste nor proliferation could be 'fixed' by the industry through mere siting compromises and 'fixing' amenity threats.

Nevertheless, within a context of industrial decline, international energy supply vulnerabilities and trade union strikes nuclear power managed to remain legitimate to the energy department. The Government sustained a rhetorical battle between 'idealism' and 'rationality', arguing that environmentalism contradicted the rational goals of economic prosperity and energy security, particularly given that it provided no attainable alternative to meet supply and economic needs.

More specifically the Government finally decided that the NNC's recommendation that CEBG and SSEB (Scotland) should go ahead in 1977 with a number of AGRs and PWRs (Pressurised Water Reactors) rather than any other designs (SGHWR). The last of the seven AGR stations were ordered for Heysham and Lancashire to complete the 8000MW programme that made up the previous (second) nuclear programme. Indecision over nuclear power's future appeared to be over by 1979 when the pro-nuclear Margaret Thatcher came to Government as Prime Minister for the Conservative Party. In that same year her new Energy Minister David Howell delivered a statement to the House of Commons encouraging the CEBG to consider the possibility of ten new PWRs in a bid to reinvigorate the dying industry and quell concern over the 'energy crisis'. Two years later the Government published a slightly less ambitious yet still enthusiastic (third) white paper on nuclear power which announced a slightly smaller build of five PWR stations. Thatcher's new Conservative Government had inherited from its predecessors an agreement to submit any proposed PWR to examination at a public inquiry. As such, the Sizewell inquiry was initiated in 1983 to publicly and transparently assess the arguments behind the building of the first PWR at Sizewell. The inquiry illustrated the Government's eagerness to establish more nuclear power plants against a 1980s backdrop of escalating Cold War tensions and the Chernobyl nuclear disaster which was seen as 'proving the environmentalists right' (Anon 1986d). Of particular interest in the following chapter is the way in which the Government were able to claim that nuclear power was 'green' during the latter years of the 1980s in a bid to revitalise some public support for the (eventually approved) Sizewell development.

<b>Table 11 Overview Timeline for Chapter 7: The Environmental Defence of Nuclear Power</b> <b>Covers the period 1980 to 1990</b>		
<b>Date</b>	<b>Key Event</b>	<b>Details</b>
<b>1983</b>	The Sizewell Inquiry is initiated by the Conservatives to discuss the planned PWR reactor for Sizewell	The Government owned BNFL argue in favour of the plant based on positive economic and supply arguments. They meet significant environmental opposition
<b>1984</b>	A group of miners break away from the NUM and strike as a response to accelerated pit closures. They are defeated and the unions begin to go into decline	Nuclear power was used to mitigate some of the impact of the strikes and was hailed for 'keeping the lights on'. Growing frustration with the strikes aided the Government's defence of nuclear power
<b>1986</b>	A PWR reactor in Chernobyl (USSR) suffers a full-scale melt-down and releases radioactivity	The accident provides a real life demonstration of the environmental implications of nuclear reactors, as well as proving the fallibility of the reactors themselves
<b>1987</b>	Sizewell Inquiry report is finally published a year behind schedule	The Sizewell PWR is accepted on financial and resource grounds despite global PWR accidents
<b>1987</b>	Arthur Scargill's bill for nuclear abandonment is defeated at TUC conference	The TUC chooses to review the nuclear option for another year before taking a firm position
<b>1987</b>	The International-Range Nuclear Forces Treaty eliminates long-distance, ground-launched missiles	Progress is made in calming Cold War tensions between the USA and Russia
<b>1987</b>	A general election is won by the Conservatives and Thatcher remains in power	The Labour Party take a strong position against nuclear power in the run up to the elections but the Conservatives win and continue their nuclear expansion plans
<b>1988</b>	The first concrete for the PWR is poured into the new Sizewell plot	
<b>1988</b>	The Intergovernmental Panel on Climate Change (IPCC) is established by the UN and World Meteorological Organisation	Tasked with assessing the magnitude of the Climate Change problem. Illustrates that Climate Change is beginning to gain international recognition
<b>1988</b>	International Downing Street Conference on Climate Change	The Conference sets non-binding target for the reduction of greenhouse gasses, proving that the Conservative are serious about carbon reduction
<b>1989</b>	Soviet Union and USA sign the Strategic Arms Limitation Treaty	In December the Cold War was declared over by US President G. H. Bush
<b>1989</b>	Margaret Thatcher's UN speech on Greenhouse Gasses and the nuclear solution	Margaret Thatcher clearly stated that the UK would use a programme of nuclear power to mitigate carbon emissions
<b>1989</b>	Energy Privatisation begins but nuclear privatisation fails. Nuclear stations are then formed into a public owned company called Nuclear Electric	It becomes evident that nuclear power is unable to compete in the new energy markets and is halted pending a five year moratorium and review
<b>1990</b>	Moratorium on nuclear power begins and all new construction is halted bar the Sizewell PWR	
<b>1990</b>	Electricity Act introduces the Non Fossil-Fuel Obligation and the Fossil Fuel Levy	The aim is to raise money to cover the newly discovered costs of nuclear power. In particular, it's decommissioning costs.
<b>1990</b>	IPCC publishes its first assessment report on climate change which becomes the main basis for the following second world climate conference in Geneva	Confirms that Climate Change is a serious threat and provides figures to be used in the creation of carbon limits

# Chapter 7: The Environmental Defence of Nuclear Power

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The following chapter seeks to understand how nuclear power began to be championed as a 'green' technology by the end of the 1980s. Previous decades had witnessed an intensifying hostility between an environmental social movement and the nuclear power industry. Nevertheless, the energy industry's differentiations between energy options and their legitimacy in comparison to one another continued to centre on the taken-for-granted assumptions that energy choices should satiate the norms of the national economy and, as much as possible, reinforce the stability of the State as an independent entity by lessening vulnerability posed by fuel importation. Nevertheless, as the institutional structure of the energy industry remained relatively stable, the press increasingly pulled away from accepting the conventions of the energy sector. The intensifying Cold War and a number of high profile nuclear incidents during the 1980s reinforced to the public that nuclear power was neither isolated from atomic weapons nor provided a 'normal' energy option. Instead nuclear power posed risks which warranted its evaluation on very different value criteria compared to the alternative energy options.

In 1988 an opportunity to rebuild the public image of nuclear power presented itself when Climate Change was recognised by the UN. Key members within the Conservative's energy department began to promote nuclear power as 'green' in a bid to re-popularise the technology. By claiming nuclear power was green the Thatcher Government promoted an understanding of environmentalism which was based on the quantifiable measurement and monitoring of certain properties such as carbon. Resultantly a situated target-based environmental logic began to emerge within the energy industry which instilled the idea that fundamental decisions between energy options should consider the environment, albeit from a calculable perspective. Future commitments to carbon mitigation became enforced and embedded within the industry through the development of regulative pillars which were negotiated within international and scientific communities. This supported the logic despite the financial collapse of nuclear power during a failed nuclear privatisation attempt in 1989. Afterwards renewable energy options began to be discussed and the liberalisation of gas markets allowed for cleaner gas turbines. Nevertheless, the target-based environmental logic continued to influence discussions over future energy options, but nuclear power was not considered as legitimate by the Department of Energy because of its economic problems up until the mid-to-late 2000s.

The initial part of this chapter will examine the key issues facing nuclear power during the 1980s: the Sizewell Inquiry, the Cold War and the Chernobyl crisis. These created a political context in which anti-nuclear sentiment prospered and dominated the Press. As a result a widening rift occurred between the values of the Conservative Government and the public in relation to the legitimacy of energy options. Throughout the 1980s the Government continued an inquiry into a new PWR reactor, and thus the second part of the chapter will dissect the defence of nuclear power and how the controversial battle for a PWR was justified whilst visible opposition remained unrelenting. The chapter will thirdly discuss the emergence of a situated target-based environmental logic within the energy industry and its application in bridging the opposing value structures of the public and State. This situating formed the basis of the 'green paradox' of nuclear power which became increasingly evident in discursive struggles over whether nuclear was environmentally friendly. The final section will examine the decline of nuclear power after privatisation and the instigation of a more liberal-market logic which drove the nuclear industry into decline. The chapter ceases at the beginning of the 1990s when nuclear power entered its five year moratorium after a humiliating period of cost revelations and industry confessions. In sum the four parts of the chapter come together to provide discussion of how the pro-nuclear Conservative Government attempted to legitimate nuclear power, eventually on environmental grounds, despite continued contestation and political turbulence.

## **Sizewell Inquiry: A Statement of Intent**

In the 1980s nuclear power was set to be the cornerstone of the Conservative's energy policy. Margaret Thatcher was a well-known advocate of the role of science and technology in furthering the prosperity of the nation. Enthusiastic for a new PWR reactor, Thatcher established the leadership of the energy industry to forward her goals of increased nuclear power generation and to combat the power of the miners trade unions (Winterton and Winterton 1989) Nigel Lawson, appointed as the Energy Secretary in a reshuffle during 1981 (replaced David Howell) was a core Thatcher radical (Political Correspondent 1983) and was tasked with developing an energy strategy which included nuclear power and could be introduced to market forces by the end of the decade. Additionally, his support for nuclear power was also political; he wanted to demonstrate that coal was no longer fundamental to the economy (Political Correspondent 1983). Lawson was also pivotal in the appointment of pro-nuclear Charles Marshall (after the protracted miners' strike in 1984, he was rewarded with a peerage for 'keeping the lights on' and he became Lord Marshall of Goring) as the Chairman of the CEGB in 1983 after his stint as chairman of the UKAEA from 1982. As a leading



theorist in atomic properties and a firm supporter of nuclear power he was ideally suited to instigate Thatcher's PWR programme. Marshall's initial task was to get the first PWR built in Britain. To allow public discussion and appease anxieties the CEBG launched the Sizewell public Inquiry in 1983 to be headed by a planning lawyer, Sir Frank Layfield. The chief executive of the CEBG, John Baker, was assigned to lead the PWR case at the inquiry on behalf of the CEBG.

The inquiry was centred on four main topics: whether the PWR would secure fuel supplies whilst lowering the cost of procuring fossil-fuels; whether there was a need for the capacity CEBG sought (especially if the boards predictions on coal and oil were unreliable); whether a PWR be safe considering it was a PWR that partially melted in the Three Mile Island incident in 1979; and whether it could maintain UK coastline to an acceptable standard. Thus it attempted to integrate the financial and resource interests of the Government with wider societal and environmental concerns aired by actors such as Friends of the Earth and local planning councils around the Sizewell area. Regardless of appearing inclusive those opposing the Government's plans were required to organise and fund themselves. They were also denied access to the CEBG plans in advance of preparing their cases. Nevertheless, many objectors found a platform in the media and numerous articles were published on the unfeasibility of the Sizewell PWR. Environmental organisations such as Greenpeace contended that the finances earmarked for the development of nuclear power could be better spent on renewable development and conservancy (Barnaby 1983). A group called the Committee for the Study of the Economics of Nuclear Electricity, comprised of scientists, economists and environmentalists challenged the CEBG's proposed spending plans arguing that accounting techniques had made nuclear look more promising than it was. It seemed the CEBG's supposition that a PWR would offer the cheapest and most efficient solution to energy needs was not attracting widespread backing.

Whilst the PWR inquiry played out, gradual and radical events in society exposed the negative environmental effects of atomic energy and reinforced public apprehension. Firstly, the gradual escalation of the Cold war generated apocalyptic images in the press which linked nuclear technology with scenes of burned and barren destruction. Secondly, an unprecedented accident in a nuclear power plant in Chernobyl, USSR (Ukraine) illustrated to society exactly how nuclear fallout could endanger both humankind and nature. The latter was responsible for delaying the outcome of the Sizewell report even further into the late years of the 1980s as the Government struggled to rebound from the accident's implications upon their PWR plans.

## The Cold War: Going from MAD to NUTS

‘....they are the worst thing that has ever happened to the planet, and they are man-made, and mass-produced, and not expensive. They distort all life and subvert all freedoms. Not a soul on earth wants them, but here they are...The mushroom cloud above Hiroshima was a beautiful spectacle, even though it owed its colour to a Kiloton of human blood...The Soviet strategic force alone could destroy six planets. But we only have one...Human beings are unanimous about nuclear weapons. Human institutions are not.’ (Amis 1985)

The 1980s witnessed intense nuclear war anxieties due to a mixture of proliferation and stifled international cooperation which tempted thoughts of due atomic conflict. The non-proliferation treaty (NPT) and the IAEA safeguards were primarily instigated to dampen the hostilities between the US and USSR out of concern for the stability of East and West relations, and as such they provided limited control over the North-South expansions of nuclear trade which had occurred during the 1970s. Perpetual proliferation and continued unwillingness by new nuclear nations to sign the NPT discouraged civil nuclear progress and excited a now well established environmental movement which had close links with the disarmament movement. To appease the public pressure weighing upon their decision for nuclear armament, the Conservative Government voluntarily acceded to the IAEA safeguard procedures conventionally enacted by non-weapons states. However, the UK continued to develop its own nuclear capabilities throughout the 1970s and 1980s given the escalating belief that the US were considering the possibility of a ‘winnable war’: ‘American policy was shifting gradually from the doctrine of deterrence to the thesis that nuclear war can be fought and won’ (Barnaby 1992). The change in mentality was referred to by the media as a move from MAD (Mutual Assured Destruction) to NUTS (Nuclear Utilisation Targeting Strategy). According to the Press, America now believed that missile targeting advances tipped the suicidal balance of nuclear missile power between East and West in their favour. Hence during the mid-1980s there was a high volume of emotive articles which focused on the environmental fallout of nuclear war. Even a small nuclear exchange, the papers argued, would lead to an uninhabitable wasteland in which humans would be unlikely to survive. This scenario was dubbed the ‘nuclear winter’ and meant that life would be unsustainable until the Earth recovered from the damage of nuclear radiation:

‘The phenomenon of a “nuclear winter” could well cause, through freezing and starvation, as many ultimate casualties as the immediate war itself, while the long-term environmental injury, especially in terms of our capacity to feed ourselves, could readily prove equally

critical...nuclear winter would mean an end to civilisation in the northern hemisphere, if not throughout the world' (Myers 1982)

Furthermore, the modernisation of nuclear technology continued to produce more flexible and accurate missiles which were changing the face of the Cold War by allowing either side to specifically target each other's strategic weapon positions (thus NUTS). For the UK many of its missile sites were American owned thus reinforcing the worrisome concept of a 'limited nuclear war' occurring on British turf. In such a scenario, a war between the US and the USSR would primarily devastate the British Isles. Hence the public were bombarded with armament updates which located Britain in the centre of nuclear catastrophe. As fear over nuclear weapons escalated so too did reservations over the relationship between a civil programme and armament. With the Sizewell Inquiry illustrating Government interest in continuing a nuclear programme, the press became concerned that additional atomic stations could only worsen proliferation of nuclear materials for armament. The conceptual conflation of nuclear weapons and nuclear power was due to assumptions of technological similarity (such as the use of centrifuges to refine uranium for reactors and missiles) and the understanding that radioactive damage to the environment generated by one would not be dissimilar to that generated by the other:

'The connections between nuclear power and nuclear weapons are becoming increasingly clear. Since the technology for bomb building is widely available, the only impediment to nuclear Ayatollahs or Irish Republican Armies is the lack of fissionable material. Nuclear power erodes this impediment' (Shuman 1985)

'...nuclear power had never been conceived as a cheap energy source but as a convenient spin-off from the weapons programme. Every nuclear power station had the potential to produce weapons grade plutonium which was exported to the USA and found its way back to Britain in Cruise Missiles..."let us demonstrate that we understand and reject the whole nuclear cycle. We cannot dis-invent it but we can immobilise it"' (Lewis, Linton and Hencke 1986)

Given the continuing anxieties relating to nuclear energy and weapons, and with the Sizewell Inquiry ticking along in the background, the Press questioned whether it was appropriate to contribute to the development of any nuclear technology in light of international nuclear tensions. The Government countered by arguing that a PWR would not accelerate the arms race or jeopardise the delicate balance of MAD because all nuclear materials would be safeguarded within the UK. However, in 1986 the concept of the 'nuclear winter' and related imageries were somewhat substantiated by a nuclear accident of unseen proportions in Chernobyl, USSR. The accident

illustrated that radioactive fallout from a nuclear power station could devastate an entire town and negatively impact the environment on a global scale.

## **Has Chernobyl Proved the Environmentalists Right?**

The Sizewell Inquiry had initially come to a close in 1985 and the Government were awaiting the concluding report which was expected by the end of 1986. Before the report was issued an old PWR reactor in Chernobyl suffered an almost full-scale core meltdown (when the central vessel holding the fuel rods melts and can no longer enclose the core's radioactivity) causing it to explode radioactive chemicals. The incident was on a much larger scale to that of the 1979 Three Mile Island (TMI) 'partial meltdown' (no radioactive release) in Pennsylvania USA which had attracted relatively little media attention in *The Guardian*, *The Times* or the *Daily Mirror*. Unlike TMI, the Chernobyl incident killed plant workers and released radioactivity which travelled thousands of miles via weather systems. Chernobyl not only questioned the perceived infallibility of atomic technology and its safety systems but highlighted the massive environmental destruction possible from human error within an atomic station. Its huge geographical scope and long-term effects were problematic for the Government's nuclear intentions as they occurred before any official ruling could be made on the Sizewell PWR. Delays on the inquiry's decisive report followed given that safety protocols required reconsideration. Concern in the press focused on whether environmental organisations had been correct in their perception of risk and that perhaps the technology had gained undue attributions of infallibility:

'...With Chernobyl, the inevitable accident that the environmentalists had been warning about had indeed happened. Public opinion across Europe was jolted into a radical reassessment of the virtues of nuclear power' (Quayle 1986)

Chernobyl was a severe blow to the international nuclear industry, particularly in Western Europe as the incident was the first example of radioactive release on a global scale from any power reactor in the world. It became apparent that radiation was not only a threat from local stations but from those hundreds of miles away. The *Guardian's* foreign correspondent noted that radiation was now evidently 'boundaryless' (Steele 1986) as well as uniquely invisible and intangible. For the UK public the threat appeared close and personal despite occurring on the borders of the USSR:

'...It might be argued that the British Nuclear industry had an outstanding safety record, but that alone was not enough. Nuclear power, by its very nature, involved intangible hazards. It frightened people and that had to be recognised' (Anon 1986c)

‘...in every country in the heart of Europe, except France, a ban on the sale of milk and leaf vegetables has brought the crisis into every home’ (Steele 1986)

The most significant consequence of the accident upon the environmental reputation of nuclear power was the emerging attribution of uniqueness in terms of both the properties retained within the shell of the plant and the mechanics of the plant itself. When exposed the reactor’s properties were unlike any others used in energy production. Ordinary and traditional power stations created pollutants which were often visible, known and expected. Alternatively, nuclear power created pollutants that could infect nature with no noticeable traces and which could remain deadly for generations. Indeed, the environmental movement had previously problematised the process, output and materials used but they had seemingly adhered to a belief in nuclear power’s inability to blow up – shown by no apparent media coverage of plant explosion anxieties throughout the 1970s. Chernobyl, and to a lesser extent TMI, supplemented the anxieties over process with an apprehension regarding the machine itself:

‘...what Three Mile Island did for the American Power utilities, Chernobyl has done for the whole of nuclear science. It has toppled it from its high horse. It has compelled the nuclear community to communicate down-to-earth stuff. And for the first time nuclear engineers have conceded that their “million-to-one infallibility” depended not upon their superb science but upon the continuous reliability of less exotic things like pumps, simple electronics and concrete vessels’ (Atkinson 1986)

‘...for a large proportion, if not all, of the nuclear industries in the West, the accident at Chernobyl is a swingeing body blow. No matter that type of reactor involved is peculiar to the Soviet Union. Public opinion will inevitably perceive nuclear power in less favourable light, if only by recognising the possibility of nuclear related accidents’ (Jamieson 1986)

For those sympathising with anti-nuclear environmentalists, nuclear power had always represented some level of risk be that through waste leakages or material proliferation. For the Department of Energy the safeguards installed through policy, regulation and monitoring were always assumed enough to mitigate those risks. Chernobyl had illustrated a more fundamental risk to the environment; that the technology was only as competent as those who operated it and that human error by those operators could have catastrophic consequences for the environment; or as The Times noted ‘...imperfect technologies and imperfect persons’ (Michaels 1986). This reaction did not bode well for the planned Sizewell plant as newspapers expressed concern that a British PWR may commit the UK to its ‘own Chernobyl’ (Michaels 1986):

‘...Now, with public opinion moving more firmly against nuclear power, the CEBG fears that the planning inspectors forthcoming report on the proposed Sizewell B nuclear station in Suffolk will be delayed. Like the Russian station involved in Monday’s accident, Sizewell B would be a pressurized water-cooled design.’ (Young 1986a)

Whereas the escalating Cold War confirmed that nuclear power and nuclear weapons were not as distanced from each other as previously suggested, the Chernobyl incident confirmed that nuclear power was also dangerously distinctive. Throughout 1986 and 1987 the press continued to propose that nuclear should bow out of the energy race and hang up its uranium rods altogether. Indeed the Cold War and the Chernobyl accident had highlighted the way in which environmental values and nuclear risk were tightly interlinked. Nuclear proliferation as facilitated by the processes and materials of nuclear reactors could lead to an atomic war which would devastate all ecology; and a similar outcome could result from human error and plant melt-down. The public debates outlined in the previous chapter broke down perceptions of normalcy and peacefulness surrounding nuclear energy but were essentially proven in the 1980s. What was predominantly an environmental anti-nuclear case built on speculation and possibility was now bolstered by actualities

‘The Chernobyl tragedy showed that nuclear power is bigger than we are. We can’t tame the monster so we should terminate its existence before it terminates ours’ (Dodd 1986 p.2)

The response to the Chernobyl disaster by the media reflected public concern over the extension of the nuclear power programme. Whilst the CEBG continued to support a new PWR at Sizewell, the Daily Mirror (DM) in particular published an extensive barrage of anti-nuclear news which reflected the general fear of nuclear processes. The paper argued that the sinister and mysterious activities occurring in Sellafield were representative of the Government’s approach to the entire nuclear programme. Suspicion justified a move away from reliance on sources of knowledge from actors such as the Department of Energy and the CEBG who they believed were either hiding the truth or in denial of the industry’s troubles: ‘...after nearly thirty years of lies and cover-ups, how can the nuclear industry authorities expect us to swallow what they say now?? The truth is that they know far too little about this awesome power’ (Foot 1986 p.6). During the post-Chernobyl period DM focused intently on the Sellafield nuclear site after news of small leakages at the plant in 1986 and reported on local citizen’s lives in ‘...the shadow of fear’ (Callan 1986 p.4):

“‘The Nuclear’” is how the locals refer to the trouble prone Sellafield Nuclear Plant – the huge shadow that hangs over their community...They are used to seeing alarming steaming

activities around the great domes – and, more suspiciously, men in pin-stripe suits who pass by in the night in big Daimlers.’ (Callan 1986 p.4)

Many of their stories during this period rejected the official legitimization of the CEGB (to be discussed later) and instead focused on the local lives of residents living near nuclear station. For example, DM turned its focus to stories from families with health concerns for their children:

‘A Mother’s anxiety flowed over as Sue Wilson lovingly threw her arms around her 12-year-old son, and hugged him to her... “I never used to mind the boy playing in the stream” she said “But I do now. Who knows what poison is in that stream”.’ (Callan 1986 p.4)

‘Little Gemma fights for her life to beat the “curse” of Sellafield...as a suspected victim of a deadly nuclear timebomb. Six year old Gemma has Leukaemia and yesterday it was revealed that her nuclear worker father may have been the unwitting cause.’ (Crowther and Hughes 1990 p.1)

The focus of DM was symptomatic of the politics surrounding nuclear power at the time. DM’s sympathies lay with the Labour party in the run up to the 1987 general election. The Wilson and Callaghan Labour Governments in the 1970s had been supportive of nuclear power and had been central in the completion of the second nuclear programme over that period. However, Labour’s interests in unilateral disarmament had illustrated the party’s dislike of nuclear weapons and by 1986 Labour (headed by Neil Kinnock) had become the only political party to pledge a gradual end to nuclear power production in Britain. The news was seen as an integral step towards Labour winning office in the coming election: ‘Mr Scargill and other supporters of the nuclear fade-out policy claimed It will secure the key to Downing Street for Labour leader Neil Kinnock’ (Pattison 1986 p.2). The fact that nuclear policy became a key part of party manifestos illustrated just how contentious the issue had become.

### **Politics: Chernobyl, the Left and Scargill**

‘As a result of the Chernobyl disaster, nuclear power has become a more important political issue than ever before’ (Kettle 1986)

A general election in 1987 brought the subject of nuclear power into the fore of political debate. Within days of Chernobyl Labour ministers had circulated a model resolution designed to stiffen the anti-nuclear stand of the party. Subsequently, Labour pledged the gradual elimination of all Magnox and AGR reactors, the cancellation of the Sizewell PWR, scrapping of the FBR research project and an end to waste importation (although THORP would be completed) (Kettle 1986).

Labour's nuclear denunciation was echoed by a strong anti-nuclear lobby within the trade unions movement. In 1986 the Trade Union Congress (TUC) leadership was constituted by a number of hard-line anti-nuclear power unions pushing for the TUC to strengthen their stance against nuclear power. In particular the NUM was fully opposed to any new nuclear builds, as was the Firemen's union and the National Union of Seamen. Famously NUM leader Arthur Scargill argued that 'Britain was an island of coal set in a sea of oil and had one of Europe's longest coastline with its potential for wind wave and coastal power...there was no need for nuclear power' (Anon 1986d). NUM was not suggesting dependence on coal alone, but rather advocated a mix of fossil-fuels and renewables (echoing Energy 2000). They pushed that the only reason nuclear was continuing was because Thatcher wished to diffuse and defeat the Transport and General Workers union and the NUM in any industrial dispute (Poole 1986a). The anti-nuclear sentiments of these Unions were backed by both Greenpeace and FOE who preferred the use of fossil-fuels and an increased interest in renewables over the continuation of the nuclear programme:

'The Greenpeace environmental group yesterday demanded that all Britain's atomic power stations should be closed between 1988 and 1992...It advocates increased use of coal, oil, gas and energy conservation' (Wright 1986)

'This is a welcome sign but I expect a far more fundamental shift after Tuesday's debate, much further progress and a much stronger final anti-nuclear policy.'" [says My Boyle FOEs energy campaigner] FOE launches a major campaign against nuclear power next week in which the message will be: support nuclear power and you will lose votes' (Young 1986b)

However, although Labour policy reflected an evident nuclear unease in society there were also events which had affected the popularity of anti-nuclear figures such as Scargill. As will be discussed below, Scargill was involved in the eventual defeat and subsequent decline of the NUM in the mid-1980s. One could suggest that the pro-nuclear debate benefitted from the failure of the miners' strike and the consequent distrust of Scargill and his political motives. Scargill had done considerable damage to the way the Unions were received by the electorate and it may not have been seen as politically expedient to follow the line spun by him. Strong associations between the unions and the Opposition parties may well go some way to account for the fact that Thatcher's Conservative Government won the 1987 election despite their pro-nuclear stance. Moreover, at the 1987 TUC Scargill suffered further defeat when the delegates voted overwhelmingly against committing unions to shutting down the nuclear industry. Instead the TUC leadership agreed that although they would not support new builds their nuclear review would consider the controversial issue for another year. The recognition that a pro-nuclear Government continued despite nuclear



power's political and public opposition leads this chapter on to a more detailed discussion of nuclear power's legitimisation and defence throughout the 1980s.

## **Defending Nuclear Power**

Sir Frank Layfield's Sizewell report was delivered in December of 1987. In agreement with the CEGB it concluded that the PWR was likely to be the least cost choice for a new generating plant. The energy secretary Peter Walker was tasked with facilitating the build and the first concrete was promptly poured in Sizewell B in July 1988. Although the press had predominantly portrayed a public scared of nuclear power and its expansion their anxiety did not seem enough to topple an overtly pro-nuclear Conservative Government from leadership. The following section will examine the pro-nuclear argument which based a belief in nuclear legitimacy on three key arguments; the necessity of nuclear power given supply vulnerabilities posed by the unions, problems relating to an 'energy crisis' and to the need to consider economic benefits to the state such as profitable export potential and cheap power. Such legitimations clearly drew from the instrumental rationality of state-resource and national-market logics and reflected the typical historical legitimations of the Department of Energy and CEGB during the Conservative years as seen in the previous chapter.

The following section will examine how and why nuclear power was legitimated over the 1980s. The initial discussion will examine the legitimations which drew from the state-resource logic; that nuclear was necessary to suppress the detrimental power of the unions and that it was the only means to avoid a major energy crisis. Due to the political nature of the struggle between Government and the Labour/ the Unions, the majority of supportive nuclear accounts drawing on the union debacle comes from the pro-Conservative Times newspaper. The last section discusses legitimisation drawing on the values of the national-market which tended to relate to the Sizewell Inquiry and the CEGB's future projections of PWR cost savings. As will be shown, during this period environmentalism was firmly associated with the anti-nuclear argument, and was in no way considered in nuclear power's justification.

## **Suppressing the Trade Unions**

The early 1970s (see Chapter 6) witnessed a series of crippling miners strikes, influencing the Conservative Government's eagerness to reduce the vulnerabilities found in their dependence on the coal industries. With strong expectations for a positive outcome to the Sizewell Inquiry the Government felt more comfortable in challenging the NUM in the knowledge that nuclear power

would be available to take up the slack in supply if the coal industry was to shrink. In 1984 Arthur Scargill called for a national strike without a ballot as a quick response to an accelerated closure programme by the Conservatives. Striking without a ballot had been outlawed earlier that year leading to a number of regions refusing to strike - including the pivotal Nottinghamshire miners. Subsequent energy secretaries (Lawson and Walker) had built large coal stocks in preparation and as such the non-striking coal fired power plants were able to produce electricity during the 1984 winter. Additionally, over the past decade there had been a movement of industry away from coal and towards both oil and gas and so neither industry nor energy production was as vulnerable as it had been during the 1970s strikes. The striking miners were defeated and returned to work in 1985. Non-striking miners eventually tore away from the NUM and thereafter the unions went into steep decline. With the coal workers demoralised by their awareness of the failing power of their unions Thatcher now had space to make more controversial decisions over future energy supplies without facing the reactive wrath of the NUM. Consequently she continued her pursuit of a nuclear powered future and defended her decision by proposing that it represented the cheapest way for the UK to avoid an energy crisis.

## **Averting the Energy Crisis**

‘The chairman of both British Coal and the CEEGB have said that without nuclear power, present levels of electricity supply could not be maintained even if new coal fired plants were built’ (Young 1986b)

The 1980s had begun with growing concern regarding the decisions of OPEC to put up oil prices which jeopardised crucial oil supplies to the European Economic Community (EEC). This was a Europe wide issue and had left the UK with a choice to make between two reactions: A Parliament-backed boost in research on alternative energy sources such as renewables and the stabilising of consumption at present levels through energy conservation, or an investment into nuclear power which would offer ‘abundant and cheap’ energy in comparison to traditional fuels (Anon 1981 p.6). Additionally the CEEGB had advised that ‘even on modest assumptions’ it would need to order at least one new nuclear station a year in the decade from 1982 (a programme of 15000MWs over 10yrs) to meet rising energy demands whilst lowering the dependencies on OPEC countries for oil. Indeed the CEEGB in particular recoiled back to the justification that without nuclear power the UK would face an immediate energy crisis (Anon 1986b). Whilst the legitimacy of nuclear power was facing a harsh battering on environmental and safety grounds the Government and the CEEGB in

particular hoped to prove that there was little alternative and that a mood of nuclear acceptance was required to avoid a national decline in living standards:

‘The West will face a severe recession if it abandons nuclear power, the Secretary of State for Energy, Mr Peter Walker, said yesterday. For the first time in man’s history, a world crippled by a shortage of energy had become a possibility...the eradication of nuclear energy has dangers that cannot be met. The third world could not enhance its living standards; the developed world would plunge to lower living standards’ (Poole 1986b)

‘The lights would go out all over Britain if nuclear power stations were closed...Lord Marshall, Chairman of Central Electricity Generating Board, said yesterday...Commenting on the Labour Party’s plan to phase out older nuclear stations and to close Sizewell B, Lord Marshall said: “If a future Government instructed us to close down all nuclear power stations within a short period of time, we could not maintain secure supplies of electricity to the nation. The lights, literally, would go out”.’ (Townsend 1986)

In addition to the heady warnings offered by those concerned over impending and crippling energy crisis, the nuclear lobby had to further argue that there was no other cheaper alternative to this supply gap. The Sizewell Inquiry was principally pre-occupied with this question as the PWR represented a significant investment in energy infrastructure, and thus needed to be able to justify itself on comparative cost grounds. The inquiry required the Government, represented by the CEGB, to demonstrate the criteria against which they considered a PWR reactor legitimate. Without the necessary proof of marketability it would be likely that the independent inquiry would rule that the relatively less expensive option be chosen, complying with both resource and market conventions within the energy industry.

## **Improving the Industry**

‘Uncontrolled nuclear power has the potential to destroy the world. Controlled and safe, it would be a blessing to mankind...it is the cleanest and cheapest for an industrial nation.’ (Pattison 1986 p.2)

The CEGB’s financial forecasts for the industry showed that in comparison to alternative energy options nuclear power offered the most economical means of generating electricity (although the CEGB’s forecasting methods were severely criticised in terms of their estimations by opposition at the inquiry). CEGB forecasts indicated to the Inquiry that a PWR would cost less than the AGRs based on the assumptions that it would be built to cost and would run efficiently, as had been the

case in America. Belief that the entire PWR project would prove to be an economic success lay in two key supporting financial arguments. The first was that a PWR station would, over the long term, be the most cost effective option. Although expensive to build, it generated electricity at a substantially lower cost when compared with alternative generating technologies especially when spread over its projected 40 -60 year lifespan:

‘...the Central Electricity Generating Board (CEGB) and the Government is now taking the first step in a strategy which would largely displace coal by nuclear power in the first years of the next century...The CEGB argues that the PWR will provide cheaper electricity than any existing or alternative power station...electricity prices would be almost the same as with a coal station.’ (Gudgin and Fothergill 1984)

Secondly, its fuel costs were unlikely to increase at the rate of fossil-fuels because there was no shortage concerns of fissile materials expected in the near decades. Industry experts contended that new reserves would likely be found in the foreseeable future as nuclear production continued to increase. Additionally, fuel could come from the dismantling of nuclear weapons thus offering the UK its own sizeable personal stock. Such arguments linked to the former argument; without nuclear power alternative fuels would become immediately more expensive given the increased demand, as well as gradually more expensive over time given their natural depletion. This latter argument contended that an energy mix which failed to diversify into nuclear energy would become increasingly expensive:

‘Without a growing nuclear contribution the price of power would rocket, the ability to compete overseas would suffer, as would living standards and unemployment.’ (Anon 1986a)

## **Conclusion of Nuclear Contestation**

Repressing union power, avoiding energy crises and endeavouring to benefit from cost savings undergirded the legitimization of nuclear power for the Energy Department during the Sizewell Inquiry. This was echoed in the press coverage of The Times in particular given its political allegiance to the pro-nuclear Conservative party during the 1980s. The discursive legitimization of nuclear power had clearly changed little since the previous decade. Moreover, although the Chernobyl accident had made nuclear a central political theme and increased awareness of its dangers, concerns over nuclear power began to lessen during the latter years of the 1980s. The Cold War threat reduced as the Soviet Union redirected resources away from nuclear armament and towards economic reform. Additional Soviet political and economic concessions relieved tensions between

international nuclear states, leading the Reagan administration in America to renew disarmament talks. By 1987 the International-Range Nuclear Forces Treaty eliminated long-distance ground-launched ballistic missiles and by 1989 the Soviet Union and the USA had signed the START 1 arms-control treaty. By December 1989 the US president George H. W. Bush declared the Cold War over at the Malta Summit. As the fears regarding a nuclear war subsided Labour altered its pre-election approach to nuclear power and withdrew the policy to completely dismantle the UK nuclear programme.

The political 'cool-off' surrounding nuclear should not be seen as fully representative of the public's approach to nuclear power. Many factions of the public remained fearful of the possibility that additional nuclear power would advance proliferation into other hostile countries and further exacerbate environmental problems associated with nuclear radiation (Callan 1986 p.4). Environmental concerns were yet to be overcome by a nuclear industry primarily legitimated on energy supply and market grounds. The following section will discuss the means by which key members of the pro-nuclear lobby within the energy industry utilised an opportunity presented by the discovery and ratification of climate change in the final years of the 1980s to develop a scenario in which nuclear power could be considered environmental.

## **Situating an Environmental logic: When Nuclear went Green**

'The greenhouse effect was the only good thing to happen to nuclear power' (Radford 1988)

During the 1980s climate change science was developing at pace and claimed links with both the environmental movement and the energy industries. Climate change (CC) stipulated that processes such as energy production created emissions such as carbon and methane which could develop an atmospheric greenhouse effect and cause irreparable CC. Not merely an artefact of the environmental movement, the findings were more accountable to an international scientific community specialising in global climate. The beginnings of the climate change movement have been traced to the late 1950s (IPCC). Nevertheless, a lack in scientific agreement and a paucity of clear causal links meant that it was not until 1979 that the world's first major conference on climate change was assembled. This led to the creation of A World Climate Programme, steered by the United Nations Environmental Programme (UNEP), International Council of Scientific Unions (ICSU) and the World Meteorological Organisation (WMO). In 1985 UNEP, WMO and ICSU jointly instigated a conference on the 'Assessment of the Role of Carbon Dioxide and other Greenhouse

Gases (GHG) in Climate Variations and Associated Impacts'. The conference concluded that significant warming was anticipated and sparked a number of further international conferences and the initiation by the WMO in 1988 of the InterGovernmental Panel on Climate Change (IPCC) supported by the United Nations. The IPCC was tasked with assessing the magnitude of climate change and triggered worldwide interest, essentially validated CC. In 1990 the IPCC published its first assessment report on climate change which became the main basis for the following second world climate conference in Geneva (November 1990). The conference led to the establishment of an Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC). The INC finalised its convention in time for the 1992 Earth Summit in Rio de Janeiro in which 150 countries signed the UNFCCC, thus implementing the Conference of the Parties to the Convention (COP) as the convention's ultimate authority. It was COP 3 (3<sup>rd</sup> meeting) in 1997 which adopted the Kyoto Protocol, the first agreement to set individual and legally binding targets for industrialised countries on their emissions of CO<sub>2</sub>.

By isolating specific atmospheric contaminating properties, CC discourse pointedly implicated the energy industry as both the problem and the solution; very few industries develop in their life cycles as many carbon based gasses as the energy industry and its related activities. In reacting to CC the Conservative leadership began to connect the practice of nuclear generation, which produced very little carbon output, with the environmental legitimacy of CC goals. That is, the relationship between CC and environmentalism offered an avenue by which nuclear power could appear as environmentally favourable and thus publicly legitimate on such grounds. Over the following years the cleaning up of energy generation became an increasingly important axis upon which energy options were compared and contrasted and thus significantly altered how the UK Government legitimated the components of its energy mix:

'...major changes are underway in the energy field, and measures to control CO<sub>2</sub> emissions could give rise to substantial further changes. Given the reduced concern about energy scarcity and the increased importance of environmental issues, it is likely that few of the assumptions which originally determined the present allocation of the Department's budget remain valid' (Energy Committee 1989 p.6)

This following section details how a type of environmentalism which focused on mitigating ecological damage through emissions targets began to influence the allocation of legitimacy during energy choice comparisons in the very late 1980s. Thatcher in particular worked to legitimate nuclear power and subsequently instilled an environmental logic into the energy industry which became increasingly embedded throughout the 1990s and 2000s. More specifically a situated

target-based environmental logic emerged in tandem with climate change discourse which narrowed and concentrated understandings of what it meant to be green in a way that facilitated the legitimisation of nuclear power under the banner of 'environmentally friendly'. First the actions of key individuals in crafting the new situated logic will be explored.

## **The Climate Change Movement**

Previously the UK had only set emissions limits on Sulphur Oxide and Nitrous Oxides under the Clean Air Act (1968) during earlier concerns over general air quality and acid rain. Limitations now on carbon dioxide came after a 1988 Downing Street Conference attended by international leaders in November which set a non-binding target for a reduction in greenhouse gasses by 20 per cent of present levels by 2005. The emitting of carbon dioxide was particularly prevalent in the process of producing electricity from burning fossil-fuels, and as such nuclear power was of special interest to the UK Government:

'Mrs Thatcher has recently expressed strong concern about environmental problems, two of which – the "greenhouse effect" and acid rain – have been associated with fossil-fuelled power stations. For the Prime Minister, such concern is compatible with an enthusiasm for nuclear power' (Fairhill 1988)

Fundamental to the push by both the Government and the media towards nuclear acceptance on environmental grounds was the conduct of key actors in the energy industry. As mentioned previously, in 1979 the Chairman of the CEGB (Lord Marshall of Goring) and the Energy Minister (David Howell) had been selected specifically because of their nuclear backgrounds and were tasked with driving forward the PWR programme. Nigel Lawson took over Howells post in 1983 given his advocacy of Thatcher's privatisation policy, followed by Peter Walker (1983-1987) who successfully won out against the Miners in the strikes of the early 1980s and who approved the application for Sizewell B in 1987 following the inquiry. Peter Walker had previously shown support for nuclear power in 1973 during which he was central in the establishment of the NNC as Secretary for Trade and Industry. Lord Marshall of Goring came to the post of CEGB Chairman from previous posts as the chairman of the UKAEA and AERE. Additionally in 1987 core Thatcher supporter Cecil Parkinson was made energy secretary and was keen to both enforce competition on electricity and preserve nuclear power. What this overview illustrates is the consistent construction of a pro-nuclear energy elite within high bureaucratic posts in the energy industry. By the late 1980s individuals in key positions within the industry were predominantly nuclear advocates who recognised and acted on

the opportunity to associate the values of an environmentally conscientious public with carbon objectives and nuclear power. Thatcher and her Government essentially reinforced a relationship between nuclear energy and the mitigation of climate change. Although not in itself proving that the energy industry had adopted any sort of environmental mentality, it illustrated that the Government could continue nuclear power due to reasons of resource supply and market potential whilst projecting an image of 'greenness' to the public. Without binding targets the consideration of the environment remained an obligatory grey area but nevertheless it was the beginnings of an opportunity to fabricate a new environmental image for the industry:

'In recent weeks there had been a debate about the importance of safeguarding the environment, initiated by the PM in her Royal Society speech. There was an overwhelming case for nuclear power. It provided the best 'environmental' method of generating electricity' (Political Correspondent 1988)

One of Margaret Thatcher's most explicit and visible attempts at relating environmentalism with nuclear power was her landmark speech in 1989 to the UN on greenhouse gasses (GHG) and the use of energy policy to stop the continuing damage of carbon release. In her speech Thatcher posited that the UK would be applying mixed energy methods including nuclear power to aid the national decrease of GHGs and carbon emissions:

'Mr President, the evidence is there. The damage is being done. What do we, the International Community, do about it? ...I am thinking of the use of nuclear power which – despite the attitude of so-called greens – is the most environmentally safe form of energy' (Thatcher 1989 speech)

'With regard to energy, we already have a £2 billion programme of improvements to reduce acid rain emissions from our power stations. We shall be looking more closely at the role of non-fossil-fuel sources, including nuclear, in generating electricity' (Thatcher 1989 speech)

More than merely projecting and marketing a 'green image' for nuclear power, Thatcher had begun to demarcate an environmental dimension to energy decisions. As the reduction of carbon became enforced, certain environmental pre-requisites were instilled into the industry. For the first time considerations between energy options were partially guided by environmental concerns. Interestingly the environmental movement and its EMOs were not expected to recognise Thatcher's form of environmentalism: '....In a move that may lose her the support of many greens, Mrs Thatcher says greater use of nuclear power would have spared Britain many of its



environmental problems' (Oakley 1988). In other words, there were signs that the rationalities within and informing the broader environmental movement were in tension and contradiction with the values underpinning the Government's approach to environmental responsibility. Bridging the values of the environmentally anxious public and the Government could thus never be fully achieved because the energy industry was selective in their environmental concern; adopting all facets of environmentalism would have led to the demise of the nuclear industry on a number of grounds. Nevertheless politically supportive papers such as *The Times* sympathised with Thatcher's philosophy, arguing that there was now '...an overwhelming case for nuclear power...To oppose nuclear power would only be to advocate conventional pollution' (Political Correspondent 1988). Similarly, *The Guardian* accepted that although nuclear power had many problems, it was ideally suited to counteract climate change, and that such considerations could overcome all other issues. This was the first time nuclear power had been advantageously discussed on environmental grounds:

'...they haven't been able to demonstrate that fission is invariably cheap, or efficient, or safe. But its worst enemies concede that the nuclear reactor does not contribute in any way to global greenhouse warming, or for that matter the stripping of the ozone layer, or the pall of acid rain' (Radford 1988)

'With increasing environmental restrictions on the generation of electrical power by means of fossil-fuels, nuclear energy would become a much more viable alternative. For that reason alone, development should continue in the private sector' (Anon 1989b)

'The principal British source of the main greenhouse gas, carbon dioxide, is electricity generation by burning coal in power stations. Of the options for reducing it, most emphasis was being put last night in Whitehall on nuclear power. Government sources pointed out that while carbon dioxide was increasing by 0.5% worldwide every year, the additional radioactivity that would be produced even if all Britain's electricity were generated from nuclear power was so small as to be "totally trivial"' (McCarthy 1989)

## **Target-Based Environmentalism**

For nuclear power to be considered as green a number of concessions would need to be made regarding what constituted 'environmental' action. Since the issues of radioactive-waste had yet to be overcome one can assume that certain environmental issues did not require resolution for nuclear to be considered as an environmental energy option by those proposing 'green nuclear'.

Indeed the limitation of carbon release was at the heart of the energy industry's environmentalism which reflected an understanding that measuring and monitoring the release of discharges from different energy industries (and subsequently organising the energy sector around those with the lowest releases) would lead to an environmentally responsible energy mix. Such an understanding represented an industry level manifestation of the broader values and norms of a societal environmental logic which reflected the nature of the industry itself. Because of its focus on the setting and meeting of measurable 'environmental' objectives, the situated and emergent institutional structure being shaped and embedded into the industry is termed the target-based environmental logic. The concept of 'target' is central because it represents the pragmatic and instrumental nature of the situated logic's values, and speaks to how the target-based manifestations of environmentalism melded into the industry through their alignment with its incumbent conventions. In other words, the situated target-based environmental logic did not manifest independent of the other situated logics within the industry, but was aligned with the historical normative expectations of the industry precisely because of its measurable character. Being able to 'measure' levels of environmentalism was more amenable to the processes of industry based decision-making which were already accustomed to judging the legitimacy of energy options with referral to objective measurements such as statistics relating to energy recourses or economic evaluations and market projections.

Centring a concept of environmentalism on emissions targets clarified that the situated logic rejected the decentralised, anti-capitalist agenda of its broader environmental movement counterpart. Environmentalism as manifest within the energy industry was brought out of the broad ambiguity found in the wider social movement and transformed through actor understandings into a clear and precise notion that energy industries could be valued as 'environmental' if they met emissions goals. In other words, for the energy industry in particular the substantive rationality behind the broad environmental movement was stripped away as environmentalism was transformed into an instrumental endeavour. By the latter half of the 1980s neither the national-market nor the state-resource logics were particularly salient in the legitimisation discourse of the Government because there were few threats to resource security or to the market viability of nuclear power; the PWR inquiry had recently quietened down any such resistance by concluding that nuclear power was necessary to quash any supply crisis, and was the cheapest option to do so. The most ubiquitous concerns were therefore those of safety and environmental welfare. Hence the resistance to 'green' nuclear power predominantly focused on such issues.

## The Green Resistance

“...the nuclear industry has an abysmal record of achievement. They are the very last people one would choose to save the world from disaster” (Radford 1988)

Values and conventions of a target-based logic were not in themselves opposed by the environmental lobby. The problem was that the Department for Energy was able to legitimate nuclear power based on their judgement of what constituted ‘environmental’ precisely because of the substantive environmental concerns the situated logic disregarded. Instrumental rationalities represented by the target-based logic were also not inherently predisposed to nuclear power, even though they had initially been heftily applied to the defence of nuclear technology. Its target-centric values could also be applied in support of renewables and other such carbon neutral technologies; what mattered was which option met the targets practically and efficiently. However, because the target-based environmental logic did not infer the consideration of man’s moral obligation towards protecting all aspects of nature, it held the potential to legitimate a method of energy production which created ethically contentious waste products and which slowly irradiated its local environment. In other words, the environmental lobby was not against the target-based values as such because their enactment was still geared towards environmental ends; but rather, they opposed some of the technologies it was able to legitimate because of its focus.

Consequently, the question of what should be classed as ‘green’ and whether nuclear power constituted an environmental misdemeanour appeared to split environmentalists. In particular, the utility of nuclear power in meeting carbon targets came into tension with environmental concerns at the level of local and community nuclear sites prone to leaks and increased levels of radioactivity. Those rejecting a ‘conversion’ to the doctrine of green nuclear power continued to put emphasis on the public debates discussed in the previous chapter. They argued that quantifiably limiting carbon via nuclear did not overcome the fundamental environmental issues of nuclear generation. In particular many anti-nuclear lobbyists were quick to restate the continuing lack of solutions to radioactive-waste storage/disposal problem:

“...there remains no solution to the radioactive-waste problem...so far as the general public are concerned they are dealing with something unknown, invisible, intangible, but deadly and there is also a public distrust of clever scientists”.’ (Political Correspondent 1988)

To advocate nuclear power as an environmentally friendly technology was to ignore the local effects of nuclear life-cycles. Parameters within which radioactivity was considered safe had already been set and targets were not allocated for nuclear waste production because there remained an

expectation that technology would eventually provide a solution to safe and secure disposal: ‘...it is industry which will *inevitably* find the means to treat pollutants and make nuclear waste safe’ (Thatcher 1989). Concerns of the environmental lobby continued to be dealt with via regulatory mechanisms which were enforced upon the nuclear industry by institutions such as the Environment Agency. In many ways the target focused approach was an extension of the ways in which the environment had historically been treated by the energy industries. On the other hand, it differed because it was not enforced upon them by periphery actors but instead represented a key value criterion against which to judge legitimacy within the industry. In any case the environmental considerations reflected in the target-based logic did not imbue the kind of values which necessitated any new forms of response to wastes or local pollution as long as they adhered to legal limits. Thus, a tension arose between the two approaches to environmentalism:

‘... increasing Britain’s reliance on nuclear power is likely to meet bitter hostility from the growing environmental movement, much concerned with the risks attached, not least in the storage of nuclear waste’ (McCarthy 1989)

“Nuclear energy is an inherently dangerous, wasteful and expensive way of generating electricity, which carries with it enormous environmental costs, such as the generation of waste which we don’t know what to do with it...” [Quote from the Director of Greenpeace in The Times (McCarthy 1989)]

Paradoxically nuclear power was seen as both environmentally necessary and ecologically detrimental. Press accounts certainly illustrated an animated battle between those who agreed with the Government and those who refused to consider nuclear power an environmental given its previous ecological convictions. Both sides founded their approaches to nuclear power on environmental values but with differing approaches to, and understandings of the society and nature relationship. Articles opposed to nuclear power often alluded to society’s moral obligation towards the protection and conservation of nature with little room for compromise or environmental sacrifice. Those advocating ‘green nuclear’ understood the environment as measurable; certain properties of nature could be monitored and ranked in terms of impact and importance. Mitigation of the most damaging properties would likely require compromise which was justifiable on environmental grounds. In other words there exists a stark difference between the strong instrumental rationality of those actors who accept green nuclear and the substantive beliefs of those who did not.

With the green argument for nuclear power slowly taking shape a financial breakdown during a failed privatisation attempt in 1989 was exceptionally disruptive for the nuclear lobby. Nuclear

power's subsequent economic illegitimacy was enough to seemingly destroy the future of the atomic industry and provided the perfect opportunity for the environmental lobby to back renewables as the alternative. Privatisation both exposed the financial weaknesses of the nuclear industry and heightened the salience of market values in the determination of energy industry legitimacy. As a result, nuclear power suffered a significant blow.

## **An Era of Privatisation**

The Conservative agenda for energy market liberalisation in the late 1980s was to allow industries to compete almost purely based on comparative costs. It was hoped that by 1990 the private sector would, with the help of certain policy mechanisms, invest and own all energy generators and would ultimately determine the UK's energy mix. The movement of responsibility over energy choices from the public to the private sector had a profound impact on the criteria of legitimacy used to discern between those choices. In particular the national-market values which were archetypal of the nationalised industry were surpassed by a new liberal-market agenda which had a stronger focus on profitability and short-term economic viability. Policy mechanisms such as subsidies and grants would ensure that the social objectives of the Government which included carbon targets and security of supply would be adhered to. However, the transferral of nuclear stations to the private sector was fraught with difficulties. To attract private investment the CEGB and Department of Energy were required to construct and publish a comprehensive financial assessment of the costs associated with nuclear. The accounts showed that the industry had very little knowledge of past, present or future costs. Whilst other energy industries were sold to private enterprises the nuclear industry remained in National hands. Previous reliance on future market 'fantasies' to legitimate nuclear power had led to a paucity of figures and those originally interested in purchasing nuclear stations soon realised that the cost of nuclear power was highly ambiguous and much higher than expected.

Privatisation of nuclear stations was initiated in 1989 with the dismantling of the CEGB into National Power, Powergen and the National Grid which were to be sold. Nevertheless, in March 1990 the nuclear division of National Power was withdrawn from privatisation and placed into a new state owned company named Nuclear Electric (NE) (in Scotland, the nuclear assets of the South of Scotland Electricity Board (SSEB) were placed into Scottish Nuclear in April 1990 and in the following year, the non-nuclear parts of SSEB was privatized as ScottishPower). Consequently, all development bar the PWR was halted and the industry began a five year moratorium whilst the Government underwent an inquiry into how the industry had failed report accurately on its true

cost. With the responsibility for new builds officially handed over to the private sector, and with nuclear power residing within the protective walls of the State it seemed unlikely that any new builds would be forecast for the coming decade. The key objective was to get nuclear stations sold. Nuclear power's 'green' credentials became obscured by an increasing dedication to delineating the legitimacy of energy options via cost. Incidentally, the environmental concerns once outlined as problematic by the environmental lobby now represented the most significant financial woes of the industry; nuclear's environmental issues now became its financial ones:

'...nuclear power fell spectacularly from grace as the real costs became more fully known, fuelled by City concern at the cost of dealing with radioactive-waste and decommissioning' (Milne 1990)

## **Privatisation: The Nuclear Unknown**

'During the 1980s when it was in the interests of the nationalised electricity industry to make it appear that nuclear power was the cheapest form of power available, the estimate for decommissioning costs...was low. Come privatisation....and suddenly the costs shoot up by nearly 100 per cent. The threat of privatisation is removed...Nuclear Electric have reduced the estimates of privatisation costs. Really is this not a case that the Department is treating decommissioning costs and the amounts involved in the same way as humpty dumpty treated words: they mean what you want them to mean?' (Committee of Public Accounts 1993a p.10)

Prior to privatisation the Department of Energy had confidence in the nuclear costing figures of the CEGB which offered little grounds for concern during the 1980s. Private sector firms were expected to continue the expansion of the nuclear programme by investing in new stations across the country, and thus any disruption to the development of a third PWR nuclear programme was unanticipated (Department of Trade and Industry 2003b). Problems began to arise when the CEGB were required to develop realistic figures detailing the likely costs of future nuclear operations, specifically decommissioning plants and storing the wastes. Since no station had yet been decommissioned the costs previously provided by the CEGB had been left ill-examined with an expectation that new technologies would allow a determination of cost at a later stage to be more accurate. Nevertheless, speculative private investors were keen to identify the current estimated costs of decommissioning given that the first Magnox reactors were soon to be coming to the end of their productive lives. As the CEGB's accounts were reviewed the ambiguity saturating the CEGB's estimations for liability costs became obvious. By mid-1989 both the Secretary for Energy Cecil

Parkinson and Lord Marshall Goring of the ex-CEGB were under fire both by Ministers and the press for their inattentive accounting and their propensity for deceit when it suited them:

‘...only as the first commercial nuclear station to be built is closed for decommissioning are the real costs of nuclear power emerging...This hidden cost to the consumer, the existence of which was persistently denied, is now made explicit as the industry prepares to enter the private sector...the bodies principally responsible for these costly mistakes are the CEGB and the Department of Energy’ (Anon 1989a)

‘...the requirements of producing a prospectus had forced a revision of the figures which had long been concealed within the nationalised industry. No one had ever decommissioned a Magnox station, it was pointed out, but when those concerned were asked to put a figure on doing so, all the sums changed’ (Young and Oakley 1989)

In response to the lack of detailed costing of nuclear and subsequent media uproar, the entire process of nuclear privatisation was cancelled in November 1989 by the new Secretary of Energy John Wakeman (July):

‘Mr John Wakeham, the Energy Secretary, has seen the accounts, but refused to elaborate yesterday to the Commons Energy Select Committee. However, he did say it was only on October 11 that he learned the full costs of the nuclear industry and this information led him to withdraw the entire nuclear network from privatization on November 9. He said the prices he was given reflected the City’s view of the costs of nuclear power, and because the timetable for privatisation, he was forced to take the nuclear stations out of the programme’ (Young 1989)

The failed privatisation of the industry was an embarrassment both publicly and politically to a Government which had invested so much effort in reinvigorating the enthusiasm for nuclear power throughout their term. The catastrophic and highly public way in which the privatisation attempt had flunked accentuated the problems of the industry and the deceit of its leaders:

‘My Tony Blair, the shadow energy secretary, condemned the decision as “ignominious” and told Mr Parkinson, to loud Labour cheers, that his privatization plans were now a “humiliating farce”’ (Webster 1989)

Condemned as part of a Conservative nuclear ‘conspiracy’, traditional proponents of nuclear power were held as misleading disciples of a nuclear power ‘cult’ (Callan 1989) blinded to the possibilities of anything other than the infallible science of fission. The press constructed a vision of a

Government which supported nuclear power no matter the cost to tax payers. A Commons Energy Select Committee began compiling a report on the cost of nuclear power and came to a similar conclusion. In February 1990 the Committee's Minutes of evidence were published and suggested that both Cecil Parkinson and Lord Marshall of Goring were facing criticism and persecution:

'Parkinson is facing being censured...for failing to determine the true costs of building Sizewell B nuclear power station and for mishandling electricity privatisation in a report to be published by the Tory-dominated Commons energy committee' (Gunn 1990)

'...the report will criticize "the muddle" made by the Department of Energy under Mr Parkinson, and the CEGB, for failing to monitor, and admit to, the rising costs of nuclear power.' (Gunn 1990b)

## **What to do with Nuclear?**

'The nuclear industry was to be privatized but subject to no competition; sent to market without market forces. The consumer would have to buy a fixed amount of electricity from nuclear sources and yet, for the privilege of being so shackled, would have to pay an additional special tax on bills' (McCarthy 1989)

In 1990 the energy committee called for a moratorium on the construction of all new nuclear power plants in Parliament until more realistic figures could be published and a review on the industry had been completed. To avoid outlaying publicly unacceptable levels of state money into NE the Government introduced the 'fossil-fuel levy', also referred to many times in Government committee minutes as the 'nuclear levy'. This levy was paid by suppliers of non-renewable energy to generate money for the Non Fossil-fuel Obligation (NFFO) which required companies to purchase a proportion of their electricity from nuclear in return for monetary rewards. Both measures were introduced under the Electricity Supply Act (1990) to provide financial support for nuclear generators as they attempted to reconfigure themselves into competitive entities. These market mechanisms were solely to ensure that expensive nuclear power was bought to keep NE afloat so that it could eventually be subject to another privatisation bid. The energy industry's new neo-liberal and competitive approach to judging the legitimacy of energy options evoked in the Government an understanding that nuclear power stations were unlikely to be a legitimate option in the future. This was not perceived as problematic by the State as their social and economic goals could be met by the burgeoning alternatives of gas and renewables. Additionally, carbon targets did not require immediate satiation because of a paucity of binding targets. For the first time in five



decades the costs of nuclear power had crippled the industry and neither its low carbon characteristics nor its uniqueness in securing stable electricity supplies could pull it out of its moratorium.

## **Nuclear at a Crossroads**

‘Nuclear power now stands at a crossroads’, he said [Chairman of AEA Mr. Maltby] yesterday. To regain confidence, it must be demonstrated that nuclear power is “safe, environmentally clean, and economic”. A more favourable attitude to nuclear power was emerging around the world, he said. “we hope it will come to this country as well”. (Tieman 1990)

The lack of binding emissions targets meant that nuclear power’s contentious ‘green’ credentials fizzled out of sight and the liberal-market began to delineate the most dominant values of the energy industry. State-resource and environmental target concerns remained within the value structure of the Government and constituted the foundations of their social objectives. However, given that there were no binding targets set for emissions or immediate threats to security of supply, there was sufficient time to test nuclear alternatives such as renewables. Overall nuclear power’s long-term fate lay with the degree of priority given to climate change and the GHG effect in the coming decades and whether the alternatives could prove to offer enough baseload electricity with low carbon levels:

‘Against these issues must be set the Greenhouse effect, of relatively recent concern. As a main source of non-fossil-fuel energy, nuclear power stations do have the unique advantage over fossil-fired competitors that their operation does not involve the emission of sulphur, nitrogen or carbon. Nevertheless, nuclear power will always harbour inherently greater potential for harm than fossil-fuels...If nuclear power stations could be dispensed with, they would be phased out. Consequently if the greenhouse effect is not shown to be important, then even the greater dependence...on imported fossil-fuels...might be an insufficient argument to prevent the phase out of the technology’ (Malpas 1991)

<b>Table 12 Overview Timeline for Chapter 8: Target-Based Environmentalism and the Nuclear Renaissance</b> <b>Covers the period 1990 to 2010</b>		
<b>Date</b>	<b>Key Event</b>	<b>Details</b>
<b>1993</b>	The Committee of Public Accounts publishes a report called 'The Renewable Energy Research, Development and Demonstration Programme'	The report suggested that the future energy mix should look to renewables to generate its clean electricity given the financial problems of the nuclear power programme
<b>1992-4</b>	The United Nations Framework Convention on Climate Change is established	Opened for signatures at the United Nations Conference on the Environment and Development in Rio de Janeiro. Entered into force in 1994 with climate change commitments and instruments of ratification
<b>1995</b>	Energy privatisation almost complete	Regional Electric Companies disbanded and almost complete electricity market liberalisation was in place
<b>1995</b>	A White Paper entitled 'The Prospects for Nuclear Power in the UK' is published at the end of the 5 year moratorium on nuclear power	It declared that Nuclear Electric would be re-structured so that the seven AGRs and the PWR could be privatised in 1996 under a newly formed company, British Energy, without the Magnox stations. Importantly it announced that the energy mix would focus on renewables. Additionally it promised no more nuclear would be built without a solution to waste management
<b>1996</b>	British Energy becomes privatised	Nuclear power is successfully privatised
<b>1997</b>	The Kyoto Protocol to the United Nations Framework Convention on Climate Change (hereafter referred to as the Kyoto Protocol) is adopted	Supplemented the 1992 framework convention on climate change and was the first agreement to commit member countries to reducing Co2 levels within a specific time limit. Did not mention nuclear power
<b>1997</b>	New Labour Government comes into power, led by Tony Blair	Their manifesto continued to denounce nuclear on financial grounds and supported the mitigation of carbon through renewable technologies
<b>1998</b>	Nuclear Energy Agency of the OECD responds to Kyoto Protocol	The Agency produced a report arguing that nuclear power could be effective in meeting carbon targets
<b>2001</b>	Rules of the Kyoto Protocol are established in the Marrakesh Accord	Implementation procedures were outlined
<b>2002</b>	Renewables obligation replaces the fossil-fuel levy	The obligation signalled a move towards a system which incentivised suppliers to buy from renewables
<b>2002</b>	British Energy faces bankruptcy and requires a State bailout	BE was forced to restructure. The debacle led to speculation over whether nuclear power could operate without state subsidies
<b>2002</b>	A White Paper called 'Managing the Nuclear Legacy - A Strategy for Action' was published	Provided limited clarity regarding the waste management programme given that no long-term solution was proposed. Waste continued to be the main element of anti-nuclear environmental concern
<b>2003</b>	A White Paper called 'Our Energy Future: Creating a Low-Carbon Economy'	Supported renewable technologies based on financial and resource security considerations. Ruled out future subsidies for nuclear power, effectively abandoning any possibility of another nuclear programme. Nuclear waste was too problematic, decommissioning was too expensive, and renewables would meet carbon targets.
<b>2005</b>	UK becomes net importer of energy	Concerns rise over energy security

Date	Key Event	Details
2005	Kyoto Protocol enters into force	UK under pressure to put in place a low carbon energy mix
2006	An Energy Review is established after considerable backlash to the 2003 Energy White Paper	The Energy Industry was concerned that the 2003 policy was unachievable and would disadvantage necessary traditional electricity generators. Additionally, the Press were beginning to reconsider the role of nuclear power given escalating climate change concerns and a slow renewables development
2006	The Stern Review and Report	Assessed the economic impacts of climate change. Concluded that the economic effects of global warming outweighed the costs of low carbon nuclear – as long as the carbon price was established
2006	European Union Emissions Trading Scheme vision statement is published.	Hopes to reduce cost of producing low carbon energy
2007	The European Council agrees to a common European strategy for tackling climate change	The emissions trading scheme is agreed to
2007	A White Paper entitled 'Meeting the Energy Challenge' is released and outlines the conclusions of the 2006 Energy Review	The report relayed that anticipation for a great British renewables industry had been over optimistic and that, given supply concerns with oil, gas and coal as well as the prospect of net importation, nuclear power was now integral - based financial appraisal of nuclear on the emissions trading scheme (carbon market)
2008	The Climate Change Act is established	Makes it the duty of the Secretary of State for the DECC to ensure that all Kyoto agreements are met by 2050
2008	A White Paper entitled 'Meeting the Energy Challenge: A White Paper on Nuclear Power' is published	Private industry was to be allowed to build and operate new nuclear power plants given the long term benefits of carbon neutral electricity, and the fairly minimal consequences of radioactive-waste in comparison
2008	Government announce a 'Nuclear Renaissance'	Announcement that the Government would be looking for private forms to build new nuclear
2008	A White Paper entitled 'The Road to 2010: Addressing the Nuclear Question in the 21st Century' is published	The Paper set out the guidelines for site assessments and necessary administrative tasks required by companies proposing nuclear plans.
2009	A White Paper called 'UK Low Carbon Transition Plan' is published	It assured that the early stages of the carbon pricing system was expected to continue into the foreseeable future as the central part of Britain's long term decarbonisation plan - it ensured that the positive financial forecasting of nuclear remained possible
2009	A National Policy Statement on nuclear power is published	Private investors would not have to identify their own suitable sites, but would instead buy or lease the sites already approved for the nuclear purpose. This shortcut the planning process as sites would come pre-environmentally approved. Impacts on the natural environment were justified under Imperative Reasons of Overriding Public Interest which implied that the local implications on nature were of secondary importance to climate change

# Chapter 8: Target-Based Environmentalism and the Nuclear Renaissance

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This findings chapter details the oscillating legitimacy of nuclear power during 1990 and 2000 amidst an intensifying concern for emissions targets and a continuing debate between renewables and nuclear power. Previously shunned by the private sector, the nuclear power industry was in decline as it entered into the 1990s. With the PWR representing the industry's sole development, Nuclear Electric was fully focused on reducing costs in preparation for later attempts at privatisation rather than planning growth. To replace future energy needs previously expected to be met with nuclear power, both gas and renewables benefitted from heightened investment into the 1990s. The former offered a cleaner fossil-fuel than coal and oil and involved minimal structural change (old fossil-fuel plants could often be converted to burn gas). Renewables offered the green energy alternative to nuclear power but required investment for long term gain. With the eventual privatisation of nuclear in 1996 under the company title of British Energy it became increasingly evident that private industry held little desire to build new nuclear plants. The Government promised that no subsidies would be provided to the industry and although market mechanisms remained in place to ensure that British Energy would not collapse without the crutches of Government funding, State R&D began to be siphoned off to renewable and green technologies. Hopes around renewables were so great that in 2003 the UK Labour Government announced a low carbon energy policy that centred on renewable generation and negated any new nuclear builds.

Nevertheless, as emissions targets became increasingly compulsory within international communities such as the EU and UN some high status Ministers, scientists and journalist began to question whether renewables represented a realistic option through which to reduce emissions. By the mid-2000s nuclear power was once again being positively reconsidered by both the Government and a growing volume of newspapers as the most plausible green option given the realities of the renewables industry. Consequently the target-based environmental logic became increasingly dominant in the discursive legitimisation of nuclear power. Interestingly privatisation had caused a rift between the State's social goals (supply security and environmental goals) and economic objectives of private enterprise. With the Government's environmental goals becoming increasingly dependent on the characteristics of low carbon nuclear power a 'carbon price' was

introduced to align the needs of private ownership with the environmental needs of the Government; according to the Government a 'nuclear renaissance' (White 2008) was afoot.

Conversely EMOs argued that only renewables represented the environmentally responsible option given nuclear power's local level impact on ecosystems and biodiversity. By 2010 there continued to be disputes over the environmental credentials of nuclear at the community level, but at the national level there appeared little room for more debate – nuclear power was on the agenda and progress towards its development was increasingly rapid. The Labour Government declared nuclear power as necessary and all local environmental disputes were lost to nuclear's 'Imperative Reasons of Overriding Public Interest' (Department for Energy and Climate Change 2009).

This Chapter will first detail the decline of nuclear power and the rising acceptance of its alternatives. As the degeneration of nuclear power became more and more inevitable, the Chapter will clarify why the Government conducted a policy U-turn in 2006 towards a more favourable nuclear policy. The Chapter will conclude by examining the ways in which the Government justified its nuclear policy with regards to both nuclear's 'greenness' and how it aligned with the economic values of the private sector. There are three key elements of this chapter: how the nuclear versus renewables debate was maintained by the opposing understandings of environmentalism by the State and the environmental movement; how an amalgamation of supply values and the target-based environmental logic provided the foundations for a re-emergence of nuclear popularity; and how the target-based environmental logic was able to coexist with the neo-liberal market logic after the initiation of the carbon price and market.

## **Nuclear Retirement**

Throughout the 1990s the energy industry underwent significant changes. Energy supply liberalisation began in 1990 with the opening up of the market to large electricity buyers (please see Appendix. 2 for a detailed overview of the privatisation process). By 1995 Regional Electricity Companies had been disbanded and complete electricity liberalisation was more or less in place. Privatisation and deregulation of gas markets prompted a 'dash for gas' aided by new and economical gas technologies (Combined Cycle Gas Turbine: CCGT). As private industry expanded the energy production portfolio of the UK, the onus of the nationally owned nuclear industry was to prepare for future privatisation by seducing private investors. For this purpose the Conservative Government under the new leadership of John Major (1990) provided a liabilities fund which would eventually cover the decommissioning costs of the previous programmes' reactors. Its reserves

were protected by the non-fossil-fuel obligation which continued to give nuclear power a protected share of the market by enforcing the fossil-fuel levy which, by 1994, was raising significant funds from licensed suppliers – 97 per cent of which was going towards the new fund.

Although installing funding mechanisms to absorb future costs, the Government did not display any expectation of future nuclear acceleration. Instead, in 1993 the Committee of Public Accounts published a report called 'The Renewable Energy Research, Development and Demonstration Programme' (1993b) which suggested that the future energy mix should look to renewables to generate its clean electricity. The programme referred to in the report's title had been initially established in the wake of the 1970s oil crisis to develop diversity in energy supply. The decision to resolve these supply threats with nuclear power capacity had made the renewables programme dormant. However, it was now applicable in the context of failing nuclear and ensuing international emissions targets. The report suggested that renewables should add 1500 MWs (5% of total electricity generation) to the grid. With each turbine producing 3-400KW the country would need to install around 5000 wind turbines to meet the clean energy targets.

Nonetheless within the context of the regulated electricity market, Nuclear Electric (NE) was able to gradually rejuvenate profits. Its competitors were forced to react to the fluctuations in fuel markets whilst nuclear was ensured sales regardless of uncompetitive prices. Hence whilst companies such as PowerGen were forced to raise their prices in response to energy shortages, NE's prices were able to remain stable and were thus not as uncompetitive as first expected. All this meant that NE began to generate sufficient revenue:

'Since 1989 and the exclusion of nuclear power from privatisation, the industry has performed remarkably well. Nuclear Electric's productivity has increased by 53%, and it's market share by 26% "it's now only a matter of time before Nuclear Electric overtakes PowerGen to take second position in the generator league", NE's chairman, John Collier, boasted recently' (Hawkes 1993)

'Privatisation is the best thing that never happened to Britain's atomic power stations. For it was the transfer of rival coal and oil plants to the private sector that sparked nuclear's performance revolution' (Tieman 1994)

In response to NE's accomplishment the 1995 review White Paper entitled 'The Prospects for Nuclear Power in the UK' announced the Conservative Government's intention to privatise part of the nuclear generation industry. It declared that NE would be re-structured so that the seven AGRs and the PWR could be privatised in 1996 under the company British Energy (BE) without the older

and financially unappealing Magnox stations which were close to decommissioning (refer to Appendix. 2 for details on privatisation). In July 1996 BE was floated and the Government pledged that no more public money would ever subsidise a nuclear project. In a decisive move away from nuclear power the official 1995 energy plans declared a programme of large scale renewable investment. Importantly privatisation not only led to the withdrawal of new nuclear plans, but fundamentally altered the values informing choices between energy options. The following section examines the altering institutional structure of the industry resulting from energy market liberalisation.

## **Privatisation and the Liberal Energy Market**

In the post-privatisation era the energy industry was split between public sector interests which primarily included energy diversity and the meeting of carbon targets; and the market interests of the energy companies who were expected to meet the financial interests of their shareholders. In short, if the Government wished to encourage a particular electricity generation industry it needed to incentivise the growth of that industry in a way that would make it appear viable to a commercial and competitive entity. Given that the Government withdrew support for nuclear power in 1995 there was little optimism regarding the possibility of new builds. The 1995 review made it clear that Government departments intervening in the mechanisms of the market (beyond that of the fossil-fuel levy) could only be detrimental to the interests of the tax payer, highlighting the prominent neo-liberal values of the Government at that time:

‘The Government recognises the significant contribution that the existing nuclear power stations make towards meeting the UKs current commitments regarding the limitation of emissions. The Government concludes however, that there is at present no evidence to support the view that new nuclear build is needed in the near future on emissions abatement grounds’ ...the Government concludes that there is currently no case for intervention in the market...The Government concludes that providing public sector funds now for the construction of new nuclear power stations could not be justified on the grounds of wider economic benefits, and would not, therefore, be in the best interests of either electricity consumers or the taxpayer’ (Department for Trade and Industry 1995 pp.3-4)

The previous situated national-market logic had been surpassed; its generosity in legitimating nuclear power based on ambitious and optimistic future market predictions facilitated by the

flexibility of the State budget was now unacceptable. Private ownership within the energy industry fostered a context in which the constitution of the UK's energy mix rested on considerations of a more short-term and financial nature. This was reinforced by the Government's confidence that independently regulated competitive energy markets were the most cost-effective and efficient way of delivering energy objectives.

The societal institutional logics notably manifest within the energy industry had not themselves altered; the Government was still concerned with the diversity of supply which related to the values regarding the sovereignty and autonomy of the State; the target-based environmental logic was still evident in the Government's intentions to subsidise the renewables industry; and the market logic was of course still vividly applicable, albeit a manifestation which encapsulated neo-liberal market values over those of a national-market (which had taken its conventions from a welfare-state). Given a national lack of concern over energy supplies, economic and market values had become the most salient in discursive legitimations of energy options, as had environmental targets. In 1997 the new Labour administration's manifesto continued an interest in environmentalism and the denouncement of nuclear on financial grounds. The party believed that renewables would provide new green technologies and attract international business:

'...we are committed to an energy policy designed to promote cleaner, more efficient energy use and production, including a new and strong drive to develop renewable energy sources such as solar and wind energy, and combined heat and power. We see no economic case for the building of any new nuclear power stations.' (Labour 1997)

Nevertheless, for the pro-nuclear lobby the most important change during the 1990s was the intensifying commitments to carbon targets which reinforced the legitimacy of low carbon technologies. Although the new Labour Government (1997) seemed uninterested in rekindling the nuclear industry, international pressure from the IAEA and NEA, international carbon targets and an increasingly vocal community of nuclear supporters kept an undercurrent of nuclear advocacy flowing, albeit at the margins of the press. Their advocacy was primarily founded on the discourse of CC and they based their 'greening' of nuclear power on the values of the target-based environmental logic. Essentially CC discourse provided a means to associate the values of an environmental societal logic, as reflected through CC's substantive goals, with low carbon emitting energy techniques. As carbon targets became increasingly binding, pro-nuclear arguments rose in prominence and the nuclear versus renewables debate reached an intensity not previously witnessed. The following section outlines the regulatory reinforcement of carbon goals during the



1990s which supported the emergence of the target-based environmental logic by enforcing a quantitative approach to environmental protection.

## **Intensifying Targets**

Whilst the conclusion of the Government appeared to be that nuclear stations were an illegitimate option given the priorities of the energy sector, a target-based environmental logic was also becoming more salient in energy debates. In 1997 regulatory foundations of the target-based logic solidified as emissions targets became binding and challenging time limits were set for participating nations. With increasingly coercive international pressure the arguments over which technology could best meet the environmental needs of the energy industry intensified. The 1997 Labour Government were under pressure to provide a subsidising or financing framework for either renewables or nuclear given the financial needs of each; the former required R&D investment and the latter required subsidies to operate without loss. Indeed during the 1990s nuclear and renewables were perceived as mutually exclusive because without State intervention the market could not support either, and with it, could not support both. For those in support of renewables such as social movement organisations the meeting of carbon targets were part of a much larger system of substantively rational environmental values which rejected nuclear power on multiple grounds. Nevertheless, for those rejecting the priority systems of the renewable lobbyists and concerned over the trajectory of renewables development, nuclear power could still provide an environmentally friendly solution to the carbon problem. The history and characteristics of the carbon targets will be discussed below before a more in-depth look at the environmental case against nuclear power and Labour's move towards a comprehensive policy based on renewables. The unexpected recovery of nuclear then follows.

‘...there has indeed been a reassessment. Although the original concern about security of supply...is no longer of concern to us, new factors have come into the picture, most important of all the concern about global warming’ (Committee of Public Accounts 1993b)

The first UN Earth Summit in 1992 at Rio de Janeiro convened to address urgent problems of environmental protection and socio-economic development. The primary outcome of the Rio summit was the United Nations Framework convention on Climate Change (UNFCCC) and The Commission on Sustainable Development (CSD) which was to monitor and review the implementation of the Earth Summit agreements. 1997 marked the first five year review by the CSD of Earth Summit progress conducted by the United Nations General Assembly meeting, as well as

the 1997 Kyoto Protocol which was to supplement the UNFCCC adopted at Rio. It was at the Kyoto summit that binding emissions targets were set for 37 industrialised countries and the EC (European Community) for reducing greenhouse gas emissions (GHG). These targets were informed by the data collected over the preceding five years. The Kyoto Protocol was the first agreement to commit member countries to reducing Co2 levels within a specific time limit. Its rules were established in the Marrakesh Accord by COP 7 (7<sup>th</sup> conference of the parties) in 2001, and it officially entered into force in 2005. The protocol, although having a major impact on international (member country) energy policy, only explicitly mentioned 'new and renewable forms of energy' as ways to tackle GHG emissions – nuclear power was not expressly mentioned.

The response from nuclear advocacy organisations associated with the UN and OECD was to propose that nuclear power offered a plausible solution to the carbon conundrum. In 1998 the Nuclear Energy Agency (specialised agency within the OECD) produced a nuclear report in response to the 1997 Kyoto Protocol arguing that nuclear power could be a resolution to the emissions problem:

'...new and renewable forms of energy are mentioned explicitly in the Kyoto Protocol. However, one important option that is essentially carbon-free, nuclear energy, is not specifically mentioned...the nuclear variants discussed in this paper, as well as results from a number of other studies, show that technically and economically feasible nuclear development paths could contribute significantly to alleviating the risks associated with global climate change' (Nuclear Energy Authority 1990 p.4)

According to the NEA nuclear power was practically carbon free, currently available and competitive in a number of countries and sustainable for large-scale deployment since its fuel was naturally occurring and plentiful. This struck a chord with those within the press who believed there was a necessity for a new and clarified energy policy in the UK at the end of the 1990s (Hawkes 1998). The energy infrastructure of the UK was heavily weighted towards coal and CCGT gas electricity production. But as coal mines closed, gas became harder to acquire from local sources and older Magnox stations came to the end of their generating lives whilst the demand for energy failed to waver. Supply worries once dismissed in the early years of the 1990s began reasserting themselves as the media became anxious that the UK was due a new energy plan. By 1997 and the instigation of temporally binding emissions targets the renewables industry was beginning to concern commentators. Around 97 per cent of the non-fossil-fuel levy continued to go to nuclear power to cover its forecasted liabilities and the new Renewables Obligation (announced in the March 1999 budget, and implemented on the 1st of April 2001) to replace the non-fossil-fuel

obligation in 2002 and funded by the climate change levy which was a tax on energy used by businesses). The mix of binding targets and financially stunted renewables development in a climate of future energy supply concern turned the focus of a minority of commentators in The Times and Guardian back onto nuclear power:

‘...nuclear power has long been a main target of environmental campaigners...The green case is poor Nuclear power is the cleanest form of mass energy generation, producing no greenhouse gasses. Costs are falling as reactor design and waste disposal technology improve. And dependency on non-renewable fossil-fuels is reduced’ (Anon 2001)

‘It is highly unlikely, by contrast, the Mr Blair and his successors will manage to meet their next objective of reducing greenhouse gas discharges by 20 per cent of the 1990 rate in 2020, let alone a 60 per cent cut by 2050. Thus quest would become far more credible if nuclear power were placed back into the energy equation’ (Anon 2004)

The reinforcement of carbon targets in the latter part of the 1990s, paired with a deficiency in renewables development due in part to low levels of state investment created the first few murmurs of nuclear legitimacy dependent on the target-based logic. As the pro-nuclear argument grew the renewables lobby unrelentingly delineated nuclear power as anti-environmental given the debates surrounding atomic waste in particular. Radioactive-waste was a central pillar of the traditional environmental criticism of nuclear power and hindered any attempt to convince the environmental organisations that nuclear could be recognised as ‘green’ despite its low carbon emissions.

## **Radioactive-waste: The Pillar of Anti-Nuclear Sentiment**

The new Labour Government commenced a considerable push to clean up the ‘nuclear legacy’ in the late 1990s. Radioactive-waste storage and/or disposal represented a large segment of the previous Government’s 1995 review which re-examined the process of waste removal to understand the costs involved. The review concluded that a site for waste storage was vital. NIREX, the public organisation established back in the early 1980s to search for a storage and disposal site for wastes, had been working against considerable public aggression. By March 1997 only 13 sites had been shortlisted by NIREX for disposal with only Sellafield facing actual exploratory work. A public inquiry for a Rock Characterisation Facility at the site was established by the Environmental Secretary John Gummer in 1995 after planning permission was refused by the council. Compelling

technical cases against the facility by EMOs led John Gummer to cancel the geological test site. By the time Labour had come into power NIREX had failed to identify a single site for disposal since its conception in 1985. A review by the House of Lords Select Committee on Science and Technology was thus initiated to explore issues of waste management. The committee's report was published in 1999 and provided a framework for a new management policy, but it failed to supply a comprehensive management strategy for intermediate level wastes (ILW – levels refer to level of radioactivity) or high level wastes (HLW). Eventually the white paper 'Managing the Nuclear Legacy – A Strategy for Action' (Department for Trade and Industry 2002) was published to provide some clarity to the waste management programme. It set out to ensure 'Environmental Restoration' which, it stated, required careful consideration now older plants were beginning to close and be decommissioned. Good intentions aside, the White Paper failed to detail any concrete waste management plan and merely recognised the need for a plan:

'...the plain fact is that whatever nuclear's future might be, we have to deal with the consequences of the past. Doing nothing is not an option' (Department for Trade and Industry 2002 p.8)

Although there was no programme for long-term disposal of wastes, there was action towards controlling those processes already in place for shorter-term storage. In 1996 the Environmental Agency was created tasked with the monitoring and environmental regulation of nuclear power facilities. The newly created Agency was ultimately intended to become the 'one stop shop' for authorising licenses related to radioactive-waste disposal. One could interpret such actions as an attempt to coerce the industry to finally respond to the environmental movement's waste concerns by making it accountable to actors with more substantive environmental objectives. However, monitoring and careful licensing was not a solution but a damage limitation strategy. During the 1990-1995 review the Conservative Government had promised that no nuclear would be built without a solution to nuclear waste management. The following Labour Government took the same stance and as such there was little prospect for more nuclear power in the coming years. The media echoed radioactive-waste concern by illustrating how nuclear power's environmental credibility continued to centre on its waste:

'...at the heart of the problem is the failure of the industry and successive Governments over 50 years to deal with nuclear waste. No depository exists and high and intermediate level wastes and the most dangerous being held in liquid form in ageing waste tanks, vulnerable to accidents and more recently terrorist attacks' (Brown 2002)

‘For supporters of nuclear power, a new generation of reactors is critical to meeting Britain’s ambitious climate-change targets...Environmental campaigners, however, remain sceptical; arguing that nuclear’s contribution to greenhouse gas reductions is exaggerated and outweighed by the intractable problem of waste’ (Henderson 2008)

By the early 2000s confidence in a lucrative renewables industry along with no clear solution to the nuclear waste problem meant that the Government were favouring renewables. It is important to note however that the inclusion of State support for renewable energy technologies was minimally based on its environmental comparisons with nuclear power. Whereas EMOs in particular continued to argue for renewables in comparison to nuclear power on environmental grounds, the Government were both confined by their previous promise not to build any more nuclear plants and their pessimism regarding the financials of the industry. Interestingly, renewables offered a similar package to nuclear back in the 1940s; security of indigenous energy supply and the possibility of a large and internationally-leading green energy market developing in the UK. Whilst the public and press became increasingly vocal about the environmental implications of energy choices both in respect to carbon and local ecology, the Government were consistent in their market, resource and target-based environmental values.

## **2003 White Paper: Nuclear’s Demise?**

‘Although nuclear power does not cause pollution like gas or coal-fired electricity generation, the Government believes that the best way of combating global warming is to subsidise renewable energy supply’ (Baldwin, Henderson and Mortishead 2001)

The 2003 white paper entitled ‘Our Energy Future: Creating a Low-Carbon Economy’ provided an interesting insight into the alternative values undergirding the battle between nuclear and renewables. The press debated which technology represented the most ‘environmental’ option based on the journalists’ perspectives regarding what constituted environmental behaviour. The Government was more inclined to base their assessment of legitimacy on both liberal-market and state-resource dimensions within the context of environmental targets. Thus although judgements by the Labour Government were made in line with the values of the target based logic, they also had to satisfy the dominating liberal-market logic to invite investment and had to ensure a necessary level of secure supply. Given this constellation of situated logics within the energy industry the Government favoured economically incentivising renewables because if technological development followed the expected trajectory, renewables would be economically favourable and

deployable on a commercial scale, allowing emissions targets to be met fully. Additionally, renewables could be in place on a larger scale much sooner than new nuclear stations. Indeed, the embellishment of renewable energy sources was part of a wider industrial and fiscal belief that the UK could lead globally in a green industry grounded on renewable innovation. It was widely concluded that Britain's days of nuclear leadership had dissolved after decades of low investment and minimal experience in nuclear construction (UK expertise was at an all-time low). Nuclear had not only lost its financial legitimacy, but national pride and sovereignty related to the industry had thawed. Any new reactors would have to be imported from Europe (EPR type) or North American companies (CANDU type). The 2003 white paper encapsulated these considerations, combining an economic imperative for renewables with a depiction of nuclear power as expensive and dated:

'In this white paper we set the ambition of doubling renewable's share of electricity generation in the decade after that...nuclear power is currently an important source of carbon-free electricity. However, its current economics make it an unattractive option for new, carbon-free generating capacity...as we move to a new, low carbon economy, there are major opportunities for our businesses to become world leaders in the technologies we will need for the future' (Department for Trade and Industry 2003 pp.12-13)

The 2003 white paper advocated the development of new technologies in light of exceedingly tough carbon targets (60 per cent reduction in carbon dioxide by 2050) and worries over security of supply given the closure of dated carbon intensive plants and old MAGNOX reactors. Energy reliability was to be sought through diversity in energy suppliers and diversity in turn was to be met by amplifying investment in carbon free technology and energy efficiency measures in public and private domains. To spur the marketplace for renewables, a Renewables Obligation (RO) had been introduced in April 2002. The RO incentivised electricity suppliers to provide a specified and annually increasing proportion of their sales from renewable technologies – in much the same way the non-fossil-fuels obligation contracted suppliers to buy nuclear. Generators were able to claim one Renewable Obligation Certificate (ROC) for every 1MW of eligible renewable electricity generated, which could then be sold to suppliers who would meet their obligation by presenting their ROCs or by paying a buyout fund. This fund then went to all suppliers who presented ROCs. Obligations to buy 'green energy' and to entice businesses into green energy generation illustrated the requirement of the Government and its environmental social goals to align with the economic objectives of the private sector.

The 2003 paper finalised its suggestions by announcing that although nuclear power stations would not be banned, the Government would not contribute financially to any new installations in the

foreseeable future. The press recognised this move as the ‘final nail in the coffin’ (Williamson 2003) given that very few commentators believed nuclear power could remain competitive without state money: ‘...nowhere in the world have new power stations been built under proper market conditions’ (Baldwin, Henderson and Mortishead 2001). The conclusion was linked specifically to the nuclear debacle in 2002 when BE required a State bailout to avoid bankruptcy. The debacle began when a BE owned nuclear plant in Torness had to be shut down in August 2002, allegedly costing BE £250,000 a day and causing a flurry of media speculation which led to BE’s share prices dropping by almost 30% and its output falling around 5% below forecasted (Macalister 2002). The drop in market value and income as well as the planned closure of Dungeness B for refuelling led to a rapid collapse. The Energy Minister Brian Wilson had 18 months before introduced NETA (New Electricity Trade Arrangements) which had made electricity generation more competitive and brought down bulk energy prices, adding to BE’s list of problems. BE approached the Department for Trade and Industry for help to continue operations whilst it restructured:

‘...the Government was faced last night with demands of up to £1bn and possible power blackouts as the country’s biggest electricity generator asked for an immediate financial bailout. The near collapse of British Energy is a huge blow to the nuclear industry, which has been lobbying hard to be allowed to build a new generation of atomic power plants’ (Macalister 2002)

The BE debacle led to speculation over whether the company would go into administration, be re-nationalised or whether the Department for Trade and Industry’s continued support would be found illegal by the European Commission. The Labour Government eventually took a 64% share in BE to avoid its financial collapse; nevertheless the reputational damage had already been done. The pro-renewables lobby began to use nuclear powers troublesome finances to reconfirm the plausibility of renewables. Opportunities to criticise the nuclear lobby by reference to the economic values of the energy sector were seized by EMOs such as Greenpeace and Friends of the Earth who argued through the press that nuclear stations were financially unviable and economically dangerous. Greenpeace even threatened legal action against the Government’s ‘bailout’ claiming that it was illegal without prior approval from the European commission and was unfair in conditions of market competition:

‘Roger Hinman, nuclear campaigner at Friends of the Earth, said: “British Energy’s troubles show yet again that nuclear power is unreliable and uneconomic as well as being a threat to the environment. Ministers must not throw good money after bad with further subsidies to the failed nuclear industry”’ (Macalister 2002)

'Greenpeace and Friends of the Earth have said BE's situation highlights problems with the industry as a whole - that it is unreliable and uneconomic. Greenpeace said on Friday: "Britain would be better without BE's creaking nuclear power stations.'" (Anon 2002)

Advocates of the nuclear industry were in a catch 22 position because to prove that new reactors could be green, clean and cheap would require building them, and to build them they needed to prove that they could be green, clean and cheap. Moreover, because of the stale state of innovation and research in the sector any new reactor designs would need to be imported. Energy market incentives would thus need to be substantial enough to compel international energy operators to enter the UK energy sector. In sum the 2003 white paper signalled an end to the nuclear power 'dream' of the 1950s, with current operators struggling to even maintain the extant fleet. With carbon targets still a central concern of the Government, renewables provided an exciting future based on ideals of economic success driven by innovation and technological change. For the environmental lobby and its EMOs renewables were the quintessentially green option that could provide a more financially rewarding avenue than nuclear. Nonetheless there was a strengthening nuclear lobby which was predominantly spearheaded by Ministers and key scientists who saw the 2003 white paper as a 'cop-out' which failed to offer a realistically attainable energy mix (Charter 2006). With all that seemed wrong with the nuclear industry, its low carbon footprint and the possibility of a carbon price to make it financially viable provided it with a possible future.

## **The Noughtie U-Turn**

'There was a need for a left-wing demonology, and nuclear power was always there in the grimoire of villainy. Until this week. For a curious alteration has taken place. And nukes are now fashionable. Indeed, not just fashionable but thoroughly directional. The last word in chic. Irradiated isotopes have never been so on trend' (Gove 2008)

Three years after the Government announced a push for renewables at the expense of nuclear continuation, pessimism regarding the potential of renewables began to filter into the media. There were three key drivers of the reconsideration of renewables: Supply concerns became immediate issues given stunted renewable growth and the closure of coal and oil plants under EU environmental directives (Large Combustion Plant Directive: LCPD). Rising prices of fossil-fuels made nuclear power appear relatively more attractive than it had been three years ago, as did the prospect of implementing a carbon price; and the alternative 'green' technologies had yet to prove themselves commercial, meaning that carbon targets were looking much more challenging to achieve by the 2020 and 2050 deadlines. These drivers refer directly to the constellation of situated



logics within the energy industry. The first scenario problematised the ability of renewables to meet supply needs of the nation. Supplementing renewables with fossil-fuels would then be problematic given the latter two scenarios – fossil-fuels would make the entire mix much more expensive and would likely threaten the ability of the UK to meet carbon targets. The Government were forced to reconsider nuclear because the reliance on renewables was threatening the very values upon which they sought to build their energy plans. In essence the UK was facing a future of mass energy importation as well as hiked fuel prices considering the imminent shortage of fossil-fuels. Without a large supply of clean energy the UK's future energy situation was looking expensive and likely to fall short of its binding Kyoto agreements. Consequently, a heated argument between the environmental movement, the press and the Government arose regarding what could be considered 'clean energy'.

The 2006 Energy Review (Department for Trade and Industry) reversed the Government's 2003 position by concluding that nuclear, as a source of low carbon energy, would contribute to the diversity of energy supplies and offer an economic option based on likely scenarios for gas and carbon prices. The following section will explore the reasoning behind what the media called Labour's energy 'U-turn' (Jenkins 2006). With the Government altering its position, the nuclear versus renewables debate raged on with an upped tempo. Interestingly the debate continued as an example of two opposing environmental understandings. Those supporting nuclear power tended to argue with reference to the instrumentally rational values of the target-based environmentalism, advising that the monitoring of emissions was far more likely to protect nature than any practices or processes endorsed by the social movement approach. As the debates progressed a 'lesser of two evils' rhetorical strategy emerged whereby nuclear advocates explicitly recognised the problem of nuclear waste, but saw it as a lesser environmental issue than climate change. As both the Labour Government and the Conservative Government of 2010 continued to legitimate nuclear power as the most environmentally friendly option given the energy context, the voices of anti-nuclear environmentalists became almost entirely marginalised. Eventually nuclear power was proposed by much of the media and the Government as the only plausible 'green' option.

By the end of the decade the green credentials of nuclear power also became the vehicles through which it maintained its economic stability. To reconcile the liberal-market values of the private sector with the social state-resource and target-based environmental values of the public sector, the Government established a way to make nuclear power economically attractive by monetising its means of environmentalism; carbon. By the end of the period nuclear was hailed at the policy level as the greenest and most cost effective means of meeting the supply and carbon requirements of the UK energy mix. The following section will detail the rise of nuclear power after the 2003 white

paper dismissed it. It will focus on the role of rhetoric and actors particularly in forming the debate through which the legitimacy of nuclear power became contested and constructed. It will then examine how nuclear came to appeal to the economic and market needs of the energy industry given its 'greenness'.

## **Redefining the Nuclear Argument: Nuclear or Renewables**

'The Prime Minister...wants urgently to revise perhaps his worst-ever white paper on energy policy in 2003. It was a monument to the doctrine of unripe time, concluding that nuclear power was messy, renewables glamorous, and the whole business problematic. It was not a white paper but a fudge paper' (Jenkins 2005)

The 2007 white paper entitled 'Meeting the Energy Challenge' (Department for Trade and Industry 2007a) outlined the conclusions from the 2006 energy review. With an explicit focus on carbon targets, the paper relayed that anticipation for a great British renewables industry had been over optimistic and that given supply concerns with oil, gas and coal as well as the prospect of net importation, nuclear power was now considered as integral. These conclusions were not met with the kind of hostility one might expect after the levels of nuclear revulsion characterising the early 2000s. Debates were beginning to reconsider nuclear power given the continuing concerns over climate change which was receiving much press in *The Times* and *The Guardian* in particular. The quotes below not only highlight the developing support for nuclear power but illustrate the extent to which that support was based on the high value of carbon targets within the press. They are predominantly from before the 2006 paper illustrating that media were part of the lobbying movement to overturn the decisions of 2003:

'Tony Blair seems to be on the brink of making a really good decision. The energy minister, Malcolm Wicks, has spent days denying it, so it must be true. The Prime Minister intends to invest in nuclear power as part of Britain's future energy mix. Praise be.' (Jenkins 2005)

'Mr Blair said the evidence was now overwhelming that climate change was the single biggest long term problem facing the country, and conceded the world was nowhere near finding a mechanism to cut carbon dioxide emissions by the Government's target of 60% by 2050. He told MPs that there was no way nuclear power could be removed from the agenda "if you are serious about the issue of climate change' (Jenkins 2004)

The nuclear policy turnaround led to a wealth of media coverage between 2006 and 2010. Articles critical of the proposed nuclear programme often drew from Greenpeace and FOE publications to

express frustration that new nuclear would monopolise enthusiasm and investment from the State. This demonstrated the extent to which mutual exclusivity between the two industries remained a core assumption of the pro-renewables lobby despite the Government's strategy for a nuclear and renewable energy mix. Importantly the environmental commentators of the newspapers under study did not side with nuclear power at this time. For example, George Monbiot of The Guardian's environmental team published prolifically against nuclear power over 2004-2008 arguing that investment was needed solely for renewables. Conversely, much of the discourse advocating nuclear power argued that renewables could not satiate the energy supply needs of the nation on its own, and that any supplementary low-carbon technologies were nowhere near commercialisation (Carbon Capture Storage in particular). Hence nuclear power provided the only viable way to create enough carbon neutral energy to supply the UK without requiring increased fossil-fuel generation or large scale imports. Indeed, the climate change discourse had partially removed from focus the previous environmental concerns over nuclear power. The following section will examine the pro-nuclear argument and begins with the work of actors to reignite pro-nuclear discourse. It identifies the three key pro-nuclear discourses; keeping it real, resource necessity and lesser of two evils.

## **Forming the Nuclear Defence**

A key character in the redefinition of nuclear power was Sir David King the Labour Government's scientific advisor. Amidst the rumours in 2002 that the Government were to reject nuclear power on the basis of cost and renewable possibilities the critical press began providing editorial space for Sir David King, often displaying him as a 'convert' to the necessity of atomic power. With climate change posing as much an environmental problem as a scientific one, his argument was that only the most technologically advanced energy solutions could realistically mitigate global warming. Essentially Sir David King rekindled the argument that Thatcher was forced to abandon in the privatisation wash out of 1989. Moreover, amid a regulatory background of more stringent emissions directives his supposition aligned with the strengthening target-based environmental concerns of Labour. He proposed that nuclear should receive special attention from the public sector including possible subsidies given its potential to 'curb climate change' (Hawkes and Henderson 2002). Given his prominent social position his argument is often credited with changing the mind of the Prime Minister, Tony Blair:

'Britain must build new nuclear power stations if it is to fight global climate change, the Government's chief scientific advisor said today. David King argued that, at the very least,

decommissioning nuclear power plants would have to be replaced if Britain was to reduce its dependence on fossil-fuels and make progress in reducing carbon dioxide emissions' (Vidal 2002)

'...it is believed chief Government scientist Sir David King has convinced Mr Blair that alternative power sources will not fill the gap created when viable reserves of traditional fuels like gas and coal run out' (Blackman 2005 p.20)

David King's arguments reverberated throughout both press and Government discourse from 2002 onwards. In addition to Thatcher's rather simplistic 'nuclear is green because of its low carbon' suppositions, he further incorporated issues which resonated with the energy industry's state-resource values. For King, nuclear power was the only energy option reliable enough to meet carbon targets given the increasing energy demand of the nation. Additionally, he suggested that radioactive-waste was a small price to pay for long term climate stability which prompted a 'lesser of two evils' discourse which permeated much of the modern defence for nuclear power. In the following sections King's pro-nuclear discourses and their evolved forms are split into three legitimating strategies which interlink and relate to the target-based environmental logic: Firstly, 'keeping it real' highlighted the attainability of nuclear power when compared to underdeveloped renewables given the time frame issues inherent within climate change discourse. Second, the values of a state-resource logic were drawn on to legitimate nuclear power as an alternative secure energy supply. Thirdly, a 'lesser of two evils' discourse is explored which attempted to legitimate nuclear power with regards to both of the above. This last discourse attempted to overcome the traditional environmental problems of atomic power production by contending that failure to meet targets would result in a far more catastrophic environmental effect than that which would be produced by localised and controlled nuclear releases - and since renewables would not be able to meet targets, nuclear power remained the only truly 'green' option.

## **Keeping it Real**

'It's not an environmental thing, even though nuclear power, with its total absence of carbon emissions, ticks all the right climate change boxes. It's not even a security thing, though the location of so much oil and gas in countries run by former KGB men or holocaust deniers does give one pause for thought. It's actually an authenticity thing. Nuclear power has been feted by a team of our nation's leading intellectuals for displaying contemporary Britain's most desired virtue – Keeping it real!' (Gove 2008)

Articles in the press constructed an image of nuclear power as the only realistic option given carbon targets, impending nuclear and fossil-fuel plant closures and disappointing renewable performance at a commercial level. As the debate between nuclear and renewables intensified the nuclear antagonists were divided into two main groups; the environmental social movement organisations and the anti-nuclear generic group of 'environmentalists'. All were framed as impractical and unrealistic in their justifications against nuclear power:

'Greenpeace argues that energy needs can be supplied by a vast expansion of renewable sources. This is unrealistic. Wind farms are producing the kind of furious opposition...The technology is still inefficient...Wave power is in its infancy. And the demand by environmentalists for 15,000 turbines to be built at sea – at the rate of three a day for the next 15 years – to meet carbon targets is utterly impractical' (Gove 2006)

'...scientists may have tapped in to the weather to bring electricity to our homes but they fear nature will not be able to cope with the increasing demand for industrial power' (Burke 2008 p.8)

'Why reacting against reactors is irrational...anyone who thinks we can replace nuclear power stations with renewables is talking b\*lllocks' (Mckie 2004)

## **Invulnerable Nuclear**

Integral to the proposition that nuclear power was 'keeping it real' was the recognition that the UK's low carbon option needed to meet the supply demand of the country to avoid the need for supplementation by 'dirtier energy' sources; implying that nuclear was somehow less dirty than fossil-fuels despite its environmental shortcomings. Additionally, energy supplies were ideally to come from a source which lessened international fuel dependencies and strengthened the energy sovereignty of the nation. With fossil-fuels unlikely to be commercially carbon neutral until CCS was perfected the only other source of low carbon energy which did not require electricity importation was nuclear power. In 2005 these needs appeared particularly salient as the UK crossed the threshold to become a net importer of energy (Department for Trade and Industry 2006). As such, a key component of the pro-nuclear argument was its evolving legitimacy in relation to increasingly relevant state resource values.

'Mr Blair told the Tory leader that Government energy policy was dictated not just by the need to tackle climate change but by reducing risks from future reliance on imported gas as North Sea oil runs out' (Hurst 2006a)

‘For several years experts have been warning of a serious future shortfall in Britain’s energy supplies. They have pointed to the rapid depletion of Britain’s North Sea Gas reserves, the increasingly tough regulations on carbon emissions from Britain’s ageing coal-fired power plants and the planned decommissioning of 14 of 15 existing nuclear generating stations by 2025...On Tuesday night Mr Blair pre-empted his own review and provoked an uproar in the anti-nuclear lobby with a dramatic warning that nuclear stations were back on the agenda “with a vengeance”. He was absolutely right...over a ten-year “dash for gas” its [gas] use rose so rapidly that it now accounts for 40 per cent of electricity generation. But supplies are dwindling. The past winter there were real worries that shortages could lead to power cuts and rationing. As a result, the price has risen rapidly, provoking huge political and consumer unrest...the only viable alternative now is nuclear’ (Hurst 2006b)

Furthermore articles following the 2006 announcement stressed that restricting the level of investment in nuclear power would lead to a dependence on fuel supplies concentrated in less stable regions of the world. Such a scenario would become detrimental if resource nationalism was to rise further and impose a greater degree of state intervention, restriction and discrimination. Thus, reliance on renewables and the back-up fossil-fuel plants it would necessitate caused apprehension. Without a substantial new nuclear programme the Department for Trade and Industry (2007a) estimated that 80% of UK fuels were likely to come from overseas by 2020 and urged the public to consider a new generation of nuclear plants. Unlike past decades wherein the media appeared increasingly distanced and dislocated from the perspectives of the Government, it now appeared that the national papers were willing to accept the energy concerns of the pro-nuclear lobby. For example, George Monbiot of The Guardian published an article in 2008 where he agreed that perhaps nuclear power was the necessary choice for a green energy agenda. He entered into a rather public battle in 2008 with Arthur Scargill who re-emerged as a key figure lobbying for more coal under the premise that nuclear was more expensive and more polluting. Scargill aired his thoughts in a Guardian piece in August 2008:

‘Has George Monbiot sold out on his environmental credentials or is he suffering from amnesia? In his article on these pages last Tuesday he states that he has now reached the point where he no longer cares whether or not the answer to climate change is nuclear - let it happen, he says.... We need an end to all nuclear-powered electricity generation, the most dangerous and uneconomic method of producing electricity... Britain needs an integrated energy policy that will produce 250m tonnes of indigenous deep-mine clean coal per year ’ (Scargill 2008)

Monbiot retaliated by arguing that coal burning would create more radioactive discharges than nuclear and would be more expensive with carbon capture storage (CCS) than nuclear. In particular, coal and its relationship with nuclear had appeared in the Press during 2008 due to a shelved plan by E.ON to build a new coal station at Kingsnorth. The debacle over this particular coal station ignited discussions over the future of fossil-fuel stations in a low carbon economy:

‘But the lobby groups [against Kingsnorth] quite rightly identified that when it comes to climate change, fossil-fuel power stations are a big part of the problem; the idea of building more seemed so crazy’ (Worthington 2009)

This debate between the coal lobby and the nuclear lobby within a single newspaper highlights the array of complex positions taken on nuclear power. Both sides claimed that their recommendations for UK energy policy would lead to the cleanest form of energy generation. Unfortunately for Scargill, his ‘green’ coal plans relied heavily on the installation of CCS systems which were yet to be proven at any commercial scale. Additionally, the recession following the 2008 financial crash repelled the huge investment needed in CCS. This is not to say that fossil-fuel plants stopped being constructed altogether, but that their development was modest. Interestingly, although there was clearly a political debate between energy options, relatively little was said in the press regarding the operational activities of energy producers/suppliers or how the actions of private industry played into the debate. Instead the debate presented a ‘nuclear or nothing’ approach; either the country accepted nuclear power or the country would have to deal with renewables and the negative effects of higher importation rates and CC. Installing better gas storage facilities, for example, were absent from the discussion. Other issues were altogether silenced such as proliferation or cost ambiguities around decommissioning. All the points discussed above aggregated to form a pervasive ‘lesser of two evils’ discourse in support of nuclear power.

## **The Lesser of Two Evils**

‘Environmentalists are used to fighting battles. But with environmentalism going mainstream...environmentalists increasingly find themselves skirmishing with one another as they see-saw between pragmatism and idealism’ (Lynas 2008)

Since a radioactive-waste management programme was nowhere near completion, a discursive strategy emerged whereby those arguing that nuclear power offered ‘green’ energy began to set their brand of target-based environmentalism directly against that of the renewables supporters. Unable to claim that nuclear power was ‘green’ given the criteria of the environmental social movement, the pro-nuclear lobby instead argued that an anti-nuclear position founded on waste

issues ignored the 'bigger picture'. They contended that a push for renewables in spite of nuclear's waste problems would ultimately create more environmental damage than new nuclear stations given the threat of climate change. What emerged was the 'lesser of two evils' discourse which illuminated the tensions between the two environmental meaning systems, rationalities and the continuing 'Green Paradox'. The pro-nuclear lobby reasoned that the pursuit of emissions targets would provide a more environmentally sound energy policy; one which could unquestionably justify the damage caused by radioactive-wastes given the unlikelihood of renewables meeting the demand needs of the nation. Perhaps the beginnings of this argument lay with Sir David King during his 2002 address to the press:

"...we have to balance the environmental questions around nuclear radioactive-waste with the questions around climate change. Mitigating climate change has to be the overriding priority' (Radford 2002)

The discourse became a key feature of the justifying rhetoric within official papers delineating the conditions of a new nuclear programme. A 2007 Department for Trade and Industry paper on the shape of the new nuclear programme was followed by a short public consultation on the nuclear matter, which was in turn followed in 2008 by a BERR White paper called 'Meeting the Energy Challenge: A White Paper on Nuclear Power' which announced the final outline. Private industry was to be allowed to build and operate new nuclear power plants given the long term benefits of carbon neutral electricity, and the fairly minimal consequences of radioactive-waste in comparison:

'The Government believes that the intergenerational issue of radioactive-waste should not be considered in isolation, but alongside the long-term impact of climate change. If no new nuclear power stations are built there would be no additional radioactive-waste. However, there could be negative consequences for the environment' (Department for Business and Regulatory Reform 2008 p.97)

Part of the reasoning lay in the possibility of environmental recovery and technological solutions. Radioactive-waste was clearly an environmental problem, but one that could potentially be fixed through technological innovation over time. On the other hand, once in motion climate change was potentially irreversible:

'...our understanding of radioactive-waste and how to deal with it is arguably more advanced than our knowledge of the impact of man-made climate change and as yet we have no solution for mitigating the risks posed by increased Co2' (Department for Business and Regulatory Reform 2008 p.98)



The data showed that the majority of the media texts expressed support of the Labour Government's proposals and prioritisations. The 'lesser of two evils' discursive legitimisation strategy was prevalent throughout media accounts of nuclear legitimacy:

'I do worry about nuclear waste. But I also care about climate change and energy security, which ministers say will worsen if we do not renew out nuclear capacity. If nuclear is part of the answer, I think we should get on with it' (Cavendish 2008)

'...the daily discharges from a plant like Sellafield probably kill several dozen people a year. A meltdown could slaughter thousands, possible tens of thousands. Climate change has already killed hundreds of thousands, will kill millions, and, if we don't do something pretty dramatic pretty soon, could kill billions' (Monbiot 2004)

The above has illustrated the ways in which the target-based environmental logic continued to justify a prioritisation which put nuclear power and its relationship with carbon emissions above the priorities of local level environmental consequences of atomic stations. State-resource values further reinforced a newly found legitimacy for nuclear power (to the public and the Government) because it offered a secure and less vulnerable solution to energy supply necessities given the constraining and binding carbon deadlines of the nation. The environmental legitimacy of nuclear power should also be understood in relation to carbon target time limits and state-resource values. To meet 2020 and 2050 carbon goals the UK required an immediate reduction in carbon – an obligation which neither renewables nor carbon storage for fossil-fuels could achieve. In sum, renewables had shown disappointing advancement and growth, and thus struggled to remain legitimate as the single 'green' energy option.

Three key conclusions can be drawn from the above: Firstly the target-based environmental logic reflected an instrumentally rational approach to environmentalism which informed pro-nuclear arguments based on the comparative abilities of energy options to meet specific emissions targets. Secondly, this logic became central to decision making in the energy industry due to tight internationally ratified emissions targets and the public anxieties regarding CC. Thirdly, both the Labour Government and the media compared energy options against economic and resource criteria with a continual recognition of carbon targets which led to prevalent discourses backing nuclear power over other options, which in turn characterised the nuclear versus renewables debate. Nevertheless, although the cost of nuclear power had become marginalised in the public debates, if nuclear power was to undergo a 'renaissance' it needed to attract private investment. The following section will examine how the Labour Government and a Conservative-Liberal Coalition Government (2010) incentivised nuclear power given the debates outlined above, and

how as a consequence the original environmental arguments against nuclear reduced in intensity and influence.

## **Profitable Power: Carbon Capitalism Saves Nuclear**

‘His [Blair] new urgency has been prompted by several factors. Global climate change has become an increasingly urgent political issue, but Britain is still falling well short of its promised cut in carbon emissions’ (Hurst 2006b)

With the Government now pledging to renew the nuclear industry a mechanism was needed by which to incentivise the private sector to construct new stations. The challenge for the Government was to manipulate the economic feasibility of nuclear power to allow for the satiation of State social goals as defined by the state-resource and target-based environmental logics. An institutionalised division between the interests of the public and private sectors within energy sector meant that carbon reduction also had to be marketable. This is not to say that the Government was indifferent to cost. The Stern Review (2006) was initiated to assess the economic impacts of climate change, and had concluded that the economic effects of global warming would far outweigh the immediate costs of dealing with the carbon problem – the ‘lesser of two evils’ discursive strategy had gained an economic element.

This provided the Government with a means to argue an economic imperative to a new nuclear fleet; that instead of installing nuclear despite costs it could actually be financially feasible in the long run. The Stern Review was thus key in the legitimisation of nuclear power from a liberal-market and economic perspective with its inference that a carbon price would allow nuclear electricity to be competitive. With the growth of nuclear power looming and newly backed by economic arguments, the environmental lobby and renewables industry began to fight their battle on economic and monetary grounds, illustrating a movement in the nuclear debate towards economics. The eventual solution was to ‘monetise’ environmentalism through carbon pricing. Carbon emissions were to cost those plants that produced them fees that would be reinvested into low carbon technologies, subsequently making nuclear power relatively cheap for those operating its plants.

## Green Money

‘The Stern Review concluded that the benefits of strong, early co-ordinated action against climate change far outweigh the economic costs of doing nothing. It estimated that the cost of not taking action could be equivalent to losing between 5 and 20% of annual global GDP whereas the cost of taking action can be limited to around 1%’ (Department for Trade and Industry 2007a p.25)

By the late ‘00s no national or international scientific body had maintained a dissenting position regarding the existence of some degree of climate change as delineated by the IPCC, illustrating a general global consensus around climate change at this time (Department for Trade and Industry 2007a). Within this context the Stern Review (Stern 2006) was highly influential in strengthening the Government’s case for new nuclear. With the primary stimulus for nuclear power seemingly based on climate change concerns, the economic report reinforced that not only was climate change an environmental issue, but also an economic one. The conclusions of the review proposed that any state spending on nuclear power in the present would drastically reduce the costs of climate change in the future, which in turn permitted the goals of target-based environmentalists to align with the values of an economic and liberal-market logic; carbon minimising would become economic. To ensure that investment would follow the State’s recommended trajectory, the review pointed to the need for a carbon price signal across countries and sectors to push private interest away from fossil-fuels and towards nuclear power and renewables. The carbon price signal would ensure that emission reductions could be delivered in the most cost effective way by obliging those producing carbon to pay into a fund that would support expensive carbon free technologies. Ultimately, the price signal would manipulate the profitable characteristics of energy options so that the large liability and construction costs of nuclear power would become more feasible in comparison to the cheap to construct but carbon intensive fossil-fuel plants. UK priorities for carbon price signalling were tentatively set out in the EU ETS (European Union Emissions Trading Scheme) vision statement in late 2006. The following year the European Council agreed to a common European strategy for energy security and tackling climate change. The agreement committed the EU to a binding target of reducing GHG emissions by 20% by 2020 compared to 1990 levels. It was expected that the European carbon trading scheme would incentivise the market to deliver the Governments wider social and environmental goals:

‘However, energy markets on their own will not deliver the our wider social and environmental objectives...The EU’s Emissions Trading Scheme sets caps on emissions and puts a price on carbon emissions for the first time. This gives firms the added incentive to

make investments consistent with our carbon goals’ (Department for Trade and Industry 2007b p.5)

The Department of Trade and Industry’s ‘Meeting the Energy Challenge: A White Paper on Nuclear Power’ (2007a) developed the UK’s expectations of the EU ETS, and responded to criticisms that the Government had been too ‘nuclear-centric’ by increasing investment in renewables through strengthening the RO, developing greener oil and gas via carbon capture and storage investment (CCS), researching and developing technologies such as biomass, incentivising micro generation and implementing combined heat and power. These technologies were to supplement the large nuclear developments planned in the coming decades given that these other technologies would be far more expensive than the new nuclear fleet if they were developed under pressure in a scenario of no nuclear. The paper also outlined the intentions of the Climate Change Act (2008) which makes it the duty of the Secretary of State for the DECC to ensure that the UK meets all Kyoto agreements by 2050 (80% less emissions than 1990). The Act also created the Committee on Climate Change to advise ministers on how to meet the targets. Indeed, by 2008 meeting the targets within the Kyoto time frame had become a primary focus of the Labour Government, and was to be met by an energy mix which included a new and economical nuclear programme.

To statistically ‘prove’ their economic suppositions, the Government drew on the Markal-Macro model (MMM) (a simulation programme) which assessed the options in context of the carbon reduction and price signalling commitments. The UK Energy Research Centre (UKERC) underwent a study for DTI and DEFRA using the energy systems model to report on the range of UK 60 per cent Co2 abatement scenarios (UKERC 2007). The UKERC produced their report (2007) as a companion publication to the DTI 2007 white paper. The UKERC, using MMM, found that the costs of rejecting nuclear energy were high and that it would be unlikely that the Government would reach its carbon goals in time. When nuclear was omitted from the MMM scenarios a more substantial re-configuration of the energy strategy would be needed and would likely cost the UK £1bn by 2050, and six times that much if CCS failed to develop. Nuclear was framed economically in relation to the other options available to the Government at the time, of which few could claim carbon neutrality, baseload generation and a relatively invulnerable fuel sourcing; all characteristics which when valued financially would benefit the nuclear industry’s economic standing once the EU ETS was in place:

‘Given the carbon price assumptions in the modelling, nuclear power becomes the cheapest generation technology by around 2023...the modelling suggests that wholesale prices would be around 4% higher, on average, than if nuclear was included as an

option...our modelling indicates that excluding nuclear is a more expensive route to achieving our carbon goal' (Department for Trade and Industry 2007a p.193)

'...renewed [private sector] interest reflects assessments that with carbon being priced to reflect its impacts and gas prices likely to be higher than previously expected, the economics of new nuclear power stations are becoming more favourable' (Department for Trade and Industry 2007a p.176)

## **Attracting the Private Sector**

By November 2007 the Prime Minister Gordon Brown publicly announced his intention for an immediate public consultation and hinted at possible manipulation of planning protocols to quicken the pace of new nuclear build preparation. However, the allure and eventual competitiveness of nuclear power depended primarily on the cost of carbon being substantially above zero. Thus the carbon price needed to instil confidence that it would remain as a long term and international mechanism. Businesses interested in nuclear propositions were reported in the papers as nervous of the promised carbon pricing, highlighting the anxiety around nuclear costs and the financial impact upon firms if the EU ETS failed to offer long-term measures to make nuclear relatively competitive. Additionally, there was concern that the carbon price would not be enough considering the liabilities associated with decommissioning given that the current decommissioning of retired MAGNOX plants was presenting ever escalating costs:

'EDF energy, which wants to build four reactors in Britain at a cost of about £20 billion, was accused of holding the Government ransom last night, after an executive told The Times that none would be built unless the Government agreed to underwrite part of the cost...the nuclear programme would proceed only if the Government ensured consumers paid more for electricity from fossil-fuels' (Pagnamenta 2009b)

To calm the anxieties of the private sector the Government published its 'UK Low Carbon Transition Plan' in 2009 which laid out strategies to deliver emissions cuts of 18% of 2008 levels by 2020. The 'plan' involved giving each main UK Government department 5 year carbon budgets which placed binding limits on aggregate carbon dioxide emissions. It assured that the early stages of the carbon pricing system was looking promising and was expected to continue into the foreseeable future as the central part of Britain's long term decarbonisation plan.

The economic legitimacy of nuclear power was based on relative costs to low carbon and high investment innovations including renewables, and to fossil-fuel plants given escalating carbon fees.

Nevertheless, nuclear power's financial aptitude should be noted in light of the speed at which the carbon targets needed to be met. Nuclear power was cost effective as an immediate response to looming 2020 carbon targets and as such its marketability was intrinsically linked to the temporal values of a target-based environmental logic – If the carbon targets did not require prompt fulfilment to 'avoid' climate change, alternatives may have become the cheaper option. Thus economical appeal and environmental targets were key for nuclear legitimacy. Without the targets nuclear power may not have been considered 'green' given that renewables and alternative technologies such as CCS and biomass could have been feasible with the aid of the RO and carbon trading schemes over time. Indeed, the MMM and similar economic evaluations which illustrated that without nuclear energy the UK would need to introduce a substantially more expensive plan were based on the need to meet 2020 limits. In sum, the constellation of situated logics within the energy industry began to centre around the instrumental priorities of a target-based logic, yet, in its legitimating of solutions such as nuclear it rallied actions which hoped to align it with the values and conventions of coexisting industry level logics such as the market. This reinforced the dominance of an economic logic and the importance of nuclear marketability:

'So why nuclear? It's probably the cheapest option...If it isn't, then nothing the Government said yesterday will force anyone to build new stations' (Roper 2008 p.8)

### **'A Brave Nuke World' (Blackman 2006 p.12)**

'...the Government is committed to enabling nuclear new build as soon as possible and envisages the first new nuclear power stations operating from around 2018, but will look to accelerate timescales where possible' (HM Government 2009)

In July 2008 Gordon Brown reinforced the nuclear agenda by announcing that the Government would be looking for energy firms to construct nuclear plants at eight designated sites as part of the 'nuclear renaissance'. Twelve Giga-watts of nuclear power was hoped to begin construction by 2010 and to be connected to the grid by 2018 to meet 2020 carbon targets. The 2008 white paper 'The Road to 2010: Addressing the Nuclear Question in the 21<sup>st</sup> Century' reinforced the now decisive decision to include nuclear power in the coming energy mix, and set out the guidelines for site assessments and necessary administrative tasks required by companies proposing nuclear plans. For both media and Government, the potential of nuclear power now appeared a necessity:

‘Now nuclear is essential. All the time this prevarication has been going on, power stations have been getting older, North Sea gas has been running out, and climate change imperatives have become more pressing’ (Beattie 2009a p.25)

Deadlines on carbon objectives motivated planning alterations to allow energy firms quicker planning protocols and access to nuclear sites. New and more stringent rules around nuclear application processes had been instigated when the nuclear industry was privatised in a bid to stem anxieties over the profit incentive jeopardising safety standards. It was now mandatory for new nuclear projects to undertake a formal Strategic Environmental Assessment (SEA) as part of the Strategic Siting Assessments (SSA) (Department for Business and Regulatory Reform 2008). Applicants would need to carry out full environmental impact assessments of their installation and its impression on the local context as part of these comprehensive assessments. Decommissioning plans would also need to be submitted to BERR, and a new board called the ‘Nuclear Liabilities Assurance Board (NLAB) was set up to advise on the suitability of decommissioning programmes. The radioactive-waste to be created would join the legacy waste in interim storage until being disposed of underground somewhere in the UK yet to be specified, in accordance with recommendations from CoRWM (Committee on Radioactive-waste Management). Communities to host the disposal site were to do so by volunteering themselves. However, plants would have to be constructed before a geological disposal could be built due to the lead times on nuclear plants, going against the Government’s previous promise not to build until the waste problem was sorted. Communities would be consulted if they were under consideration as a site for any new builds, but most would be at existing sites to avoid local protest.

To overcome the deterring nature of the numerous assessments necessary to build a nuclear power station, the Government instigated measures to speed up the process; for example, changes in the Infrastructure Planning Commission (IPC) meant that local consultations would not be eligible to discuss the overall rationality of nuclear power procedures. Community discussions at plant sites were only to debate the local and directly implicated aspects of the build, rather than nuclear power as a practice, thus speeding up consultancy times. By 2009 application processes for sites had been streamlined and a pre-approved list of possible sites was presented which had already been subjected to an Appraisal of Sustainability (AoS) as part of the SSA. A 2009 National Policy Statement by DECC meant that private investors would not have to identify their own suitable sites, but would instead buy or lease the sites already approved for the nuclear purpose. Many of these sites housed retired MAGNOX reactors which were owned by the Government, and as such it was assumed that the communities at each site would be amenable to nuclear power construction. The site announcement was a profound step towards the ‘nuclear renaissance’:

‘Ed Miliband, the Energy and Climate Change secretary, welcomed the announcement of the 11 sites...as another important step towards a new generation of nuclear power stations. “nuclear is part of the low carbon future” he said’ (Pagnamenta 2009c)

## **Greens versus Angry Greens**

The fast-tracking of nuclear power led to environmental backlashes at both the policy and community level. Greenpeace and FOE had been lobbying against the Government on both economic and waste grounds. Conversely, local disputes by planning authorities and residents were idiosyncratic between sites and focused on ecology and habitats at risk. Both viewed the new planning laws as a short-cut which would jeopardize the safety of new builds, as well as marginalising the democratic right of communities to challenge the builds. Within the media data there were a number of articles which reflected public anxiety over the speed by which nuclear developments were taking place, and the environmental impacts of this accelerated pace:

‘Environmental groups reacted with fury yesterday after Ed Miliband tore up the planning rulebook to push through 10 new nuclear power stations...campaigners accused him of ignoring issues such as reactor design safety and toxic waste disposal’ (Beattie 2009b p.19)

‘Environmental groups said the Government was railroading through plans despite the dangers’ (Beattie 2009b p.19)

For those newspaper articles covering the environmental debate, concern was centred on the local environmental consequences of nuclear power stations, especially given the limited scope for community consultation. Interestingly, renewables were meeting similar resistance at the community level for very similar reasons suggesting that at some level these communities were more concerned with the general and amenity based problems of industrial development in rural areas; a concern which echoes to that of the 1950s. Nevertheless, nuclear power’s environmental credentials lay in its long term, intangible and macro level ‘environmentalism’ in the context of binding environmental emissions deadlines. It became increasingly apparent that nuclear power’s local level and tangible impacts were a low priority to the Government who saw them as a necessary price to pay for long term environmental welfare. Local opposition to energy projects illustrated that all energy choices had local impacts on the environment, and that nuclear was just as acceptable as any other low carbon technology:

‘...what is clear is that all energy-generation technologies have an impact on the environment – and environmentalists are going to have to think more deeply about that



their hierarchy of priorities it. For example, nuclear and hydro power were both anathema to environmentalists for decades but are slowly and reluctantly being accepted back into the fold due to their perceived potential for producing low-carbon energy' (Lynas 2008)

The most explicit example of this approach to nuclear power can be found through the use of 'Imperative Reasons of Overriding Public Interest' (IROPI) in the justification of nuclear power at local site levels. IROPI was set out in the EU's Habitats Directive (1992) to aid decisions on whether to allow potentially disruptive projects on sites that may have conservation value. The directive requires that Habitat Regulations Assessments (HRAs) are applied to these sites. The HRA obliges that there be 'no alternative solution' and IROPI to allow projects to be accepted. If IROPI is claimed, compensatory measures must be secured and the Secretary of State is required to agree with the claims. However, IROPI is subject to interpretation and can be based on social, health and economic arguments: '...the Habitats Directive does not specify what is meant by this term, but it implies that health and safety, environmental benefits, and large-scale and long-term social and economic benefits can be IROPI' (Marine Management Organisation 2007 p.7). During 'Assessments of Sustainability' in the prepared list of sites in the NPS, official 'justifications' (their terminology) recognised that a number of sites would be subject to environmentally adverse effects as identified during the HRA. Most of these adverse effects were related to biodiversity and geological issues; the kind of issues prevalent in local disputes over nuclear stations. Nevertheless, all ten sites (out of a possible 12) recommended by the NPS had local environmental issues, yet each site was permissible on the grounds of IROPI:

'...the Government has concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the Nuclear NPS despite the inability to rule out adverse effects on European sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures. This site therefore passes this criterion' (Department for Energy and Climate Change 2009 p.112)

'In demonstrating IROPI the Government acknowledges that the plan has the potential to have an adverse effect on the integrity of Natura 2000 sites, including possible impacts on priority habitats (coastal dune, heathland, dune grassland and lagoons). However, the grounds for IROPI in this case relate to the protection of human health and public safety, and to beneficial consequences of primary importance for the environment. In accordance with Article 6(4) of the Habitats Directive the Government is therefore not seeking an

opinion from the Commission, despite the presence of priority habitat types within sites which may be affected.’ (Department for Energy and Climate Change 2009 p.77)

As seen above, the use of IORPI in these circumstances tended to be rather vague. Nevertheless, IORPI illustrated the avoidance of local level issues and their marginalisation. Communities were not allowed to challenge the policy instigating nuclear power, but were only able to debate the local environmental issues specific to each site so that they could be considered during construction. Target based environmentalism essentially became the Imperative Reason of Overriding Public Interest, with nuclear power in tow.

## **The Continuation of a Private Nuclear Industry**

Once privatisation had been successfully implemented in 1996, nuclear power was set on a course for slow decline. The Labour Government’s social and environmental objectives could be met, assumedly, by a growing and lucrative green technology industry. Market mechanisms were in place to ensure that nuclear power was bought purely in order to maintain the industry. Additionally, funds from the fossil-fuel levy were diverted into renewables investment to entice private industry to invest in wind and solar power in particular. The private sector did not appear interested in the construction of new power stations, and by 2003 the Government announced their intentions to rule out nuclear power on the grounds that it offered an uneconomical option given the possibility of renewables. However, by 2006 it became increasingly evident that renewables were unable to offer the security of supply necessary at a low carbon rate, and would thus require fossil-fuel supplementation to meet carbon deadlines.

Nuclear power’s legitimacy now rested on the inability of an energy mix reliant on renewables to meet carbon goals. By the late 00s nuclear power appeared to have garnered legitimacy from its environmental credentials in light of its ability to help the UK meet such goals. The Government announced its intentions to introduce a new programme of nuclear power in 2006 with considerable media backing which reflected the increasing public anxiety over climate change. Discursive defence of nuclear power during this time highlighted its alignment with the target-based environmental values of both the state and the public. Nevertheless, the Government still had to ensure that nuclear power was economical and thus alluring to the private sector. A carbon price system was eventually confirmed which would align the Governments social and environmental values with the liberal-market values of industry. By 2010 the local environmental issues of nuclear power were understood as minimal in comparison to the environmental benefits

in mitigating climate change by the Government. In essence, the focus on carbon targets within the energy industry had allowed nuclear to bask in its narrow breed of environmentalism; one that broke away from, and was often in tension with, the substantive ethical and moral concerns of the original environmental movement. In doing so it faced criticism from environmental organisations and local pressure groups, whilst appealing to those who viewed nuclear power as the lesser of two evils, environmentally speaking. Indeed, the 'green paradox' of nuclear power continued.

# Chapter 9: Discussion and Conclusion

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The purpose of this research was to contribute to neo-institutional theory by introducing the concept of a societal environmental institutional logic and demonstrating its utility. As stated in Chapter 3, organisational studies as an academic subject has a poor track record in its integration of environmental issues, and there are few examples of institutional theory breaking from this trend (exceptions include Sine and Lee 2009, Holm 1995). This thesis proposes that the development and recognition of an environmental institutional logic provides institutionalism with the tools necessary to engage more deeply with environmental issues. An environmental logic informs how actors ascribe meaning to the natural environment by providing a set of assumptions and values which shape how they understand and conduct their relationship with nature. The 'green paradox' of nuclear power in the UK media presented an empirical opportunity to apply an environmental logic and test its efficacy as an institutional analytical tool. In 2009 when this research was being planned there was an escalating debate in the media which questioned the green credentials of nuclear power; nuclear power appeared both as the only green option to meet carbon targets and as the antithesis to environmentalism given its radioactive processes and the waste produced. To explore and explicate this paradox a case study built from 60 years of historical data relating to the green nuclear debate was constructed from media and Government documents. The case study focused on how various acting Governments legitimated their positions on nuclear power, and how the attitudes and values of actors engaged within environmental debates pertaining to nuclear power were represented within the media. An historical and longitudinal research design was necessary to fully comprehend the nature of the environmental debate and to 'track' the emergence (and shifting nature) of environmental understandings.

The findings show that the 'green nuclear' debate consisted of opposing environmental perspectives on nuclear power which were underpinned by contradictory institutionalised understandings of what constituted environmentally friendly behaviour. The nature of the debate resonates with the trend in neo-institutionalism to examine contestation over the meaning and legitimacy of actions and practices by researching the conflict between multiple institutional logics (Reay and Hinings 2005, 2009, Zilber 2006, Tracey et al 2010). Yet it also provides a rare example of how contradictory arguments pertaining to the legitimacy of a single practice may be informed by a common societal logic. In other words, negotiation of a practice or action's legitimacy is not necessarily always between two (or more) factions drawing from fundamentally different societal logics. Instead a societal logic can emerge in multiple situated forms (which reflect the contextual

historicités and competing rationalities of the actor groups who enact, interpret and discursively reconstruct them) which may provide contradictory understandings of legitimacy. Understanding how these situated logics emerge and why they may contradict each other is the focus of this discussion and provides insights into how inconsistencies within institutional logics manifest around significant policy debates.

The means by which a societal logic becomes 'situated' also contributes to current institutional theorising by clarifying the interconnections between levels of analysis and processes of institutional work. By asking the question 'how do societal logics become manifest at lower levels of analysis', this thesis embellishes the concept of institutional work by identifying intentional processes which connect societal changes with the institutional context of the industry and the political power and motivation of actors. It also builds on literature which has shown that intentional institutional work which is focused on achieving certain political and material goals can trigger and sustain long-lasting institutional change (Tracey et al 2010), such as the emergence of a situated logic within an industry. Both the intentional and unintended consequences of institutional work are therefore significant in modelling the way in which nuclear power came to be understood as a green energy option in the UK.

It should be reiterated here that the Critical Realist perspective of Leca and Naccache (2006) frames this research discussion. Societal institutional logics are recognised as 'real' social structures which possess causal powers. Actors such as journalists, Governmental Departments and Ministers exist at the empirical level of CR's stratified ontology and provide insights, via their own perspectives, into 'actual' events and the nature of the generative mechanisms which may have activated (in a specific space and time) to cause them. From this ontological stance, the 'green paradox of nuclear power' represents a particular conjunction of generative mechanisms pertaining to certain institutional logics which can be explored through perceptions, understandings and justifications identified in Government documents and the Press. From these sources the nature of the green paradox is retroduced and the best explanation, with the conceptual and material resources available, is provided. Important to this discussion is the additional understanding that actors have causal powers themselves (Bhaskar 1998) and thus their institutional work has a significant part to play in the triggering of generative mechanisms. The interaction between the causal powers of actors, influenced at all time by context, and those of the institutional logics may not be intentional or conscious, but has been teased out as means to understand how an environmental logic has come to be embedded within the practices and legitimations of an industry which previously rejected it.

This thesis formulated the following three research questions which aim to address the research gaps presented in Chapters 2 and 3. These research questions were developed from a Critical Realist (Houston 2010) ontological position and therefore act as transcendental research questions with a focus on the relationship between theoretical constructs. These research questions also reflect the hypotheses made in the methods chapter and are restated below:

#### **Research Question 1**

- What is the relationship between institutional levels of analysis?
  - How does the concept of ‘situated logics’ provide insights into the interactions between agents, fields and societal logics?
  - How does the concept of ‘situated logics’ help explain the green paradox of nuclear power?

#### **Research Question 2**

- What role do actors play in the development of ‘situated logics’?
  - How can an institutional work approach be utilised to fully understand the role of agency in the construction and/or reinforcement of situated logics?
  - To what extent can processes of institutional entrepreneurship help elucidate the manifestation, elaboration and institutionalisation of situated logics?
  - How do the actions of actors contribute to the creation of a green paradox?

#### **Research Question 3**

- How does the concept of an environmental institutional logic provide utility within an institutional research agenda?
  - How does the concept of an environmental institutional logic help explain the green paradox of nuclear power?

### **Summary of Key Findings**

The case study of the UK nuclear energy industry and its environmental credentials over the period 1950-2010 illustrated that a number of situated environmental logics informed the nuclear power debate. Over the 60 years of the civil nuclear industry the State, energy industries, political parties, trade unions, the media, social movement organisations and community groups fought over and negotiated the legitimacy of the UK’s nuclear power programme. The lack of agreement pertaining to nuclear power’s ‘green’ legitimacy illustrated four environmental situated logics which informed

the arguments of four distinct groups of actors. These actor groups were analytically differentiable by their predominant rationality types and the form of social relations they engaged in (Biggart and Delbridge 2004). More specifically groups of actors involved in the green nuclear debate employed arguments which largely resonated with either substantive or instrumental rationality (Kalberg 1980) and were engaged in either universalistic or particularistic social relations. The four corresponding situated logics have been termed the amenity-environmental logic, the community-environmental logic, the social-movement environmental logic and the target-based environmental logic. Each represented a manifestation of the societal environmental logic within the idiosyncratic actor groups. The prevalence of arguments informed by each of these situated environmental logics oscillated over time as actors' understandings of the relationship between society and nature shifted.

The emergence of the situated target-based environmental logic is of particular interest in this discussion because it relates to a conception of environmentalism which developed after, and in contradiction to, an already institutionalised social-movement environmental logic. From the late 1960s up until the late 1980s the energy industry had rejected EMO's requests that the environment should be considered in energy decisions and as such this latter situated logic had remained external to the industry. From the late 1980s a target-based conception of what it meant to be 'green' developed within the energy industry and challenged the EMO's approach to environmental protection by redefining nature; instead of a qualitative, complex and morally essential environment, it was reconstituted as a quantifiable, measurable and scientific system. By adhering to the latter construction the consideration of the environment could be considered within the decision making machinery of the energy department – units of the environment such as carbon could be identified and energy options could be compared so that the option with the least quantitative effect could be chosen and claimed 'green'. Regardless, to the environmental social movement nuclear power could never be justified on environmental grounds. Not only do these competing situated environmental logics explain the green paradox of nuclear power as presented in the media, but an understanding of how situated logics form can provide additional insights into how the analytical levels of institutionalism are interconnected. That is, how societal logics come to be manifest within industries through contextualised institutional work. In its discussion of the above this thesis provides a multi-level narrative which builds on previous literature regarding institutional work (Tracey et al 2010, Lawrence et al 2011) and borrows from current theorising around elites (Reed 2012) to explain the manifestation of an environmental societal logic within the energy industry.

In its explanation of how the target-based environmental logic emerged the first section of the discussion focuses on the period 1980 – 2010. At the end of the 1980s an authoritative ‘energy elite’ (Reed 2012) within national Government, supported by a global scientific discourse of CC, sought to legitimate nuclear power for political and economic reasons. In their bid to further the prospects of nuclear power and popularise the technology to an increasingly sceptical public they engaged in processes of institutional work which associated nuclear power with the green agenda of CC. Via processes of theorisation and discursive legitimation Thatcher’s Government pushed for a reconsideration of nuclear power as a ‘green’ technology. The intended consequence of these processes was an energy policy which had nuclear power at its heart. However, when the nuclear industry failed financially in 1989 the intentions to build more nuclear reactors were abandoned. Nevertheless, the institutional work undertaken by the energy elite resulted in a more fundamental institutional change within the energy industry. By claiming that the energy sector should take on certain responsibilities for mitigating CC, key decisions over energy policy were, for the first time, including environmental assessments. Importantly, what constituted ‘environmental’ was determined by quantifying the environmental implications of options and comparing them with national and international targets. Over time the necessity of binding carbon treaties, intensifying CC concerns and political promises became further institutionalised. When nuclear power was back on the agenda in 2006 a process of valorisation was employed because, as had been shown after its financial crisis, nuclear power also needed to be financially viable. This further reflected the measurable element of nature given that ‘units of nature’ such as carbon were becoming financially valued.

Importantly processes of theorisation and legitimation should always be understood as products of context as well as of actor’s causal powers. That is, actors (elites or otherwise) with the knowledge and reflexivity to recognise opportunities for change created theorisations within an industry which had its own institutionalised history, conventions, norms and prevailing rationality. A situated logic may begin to emerge as actors pursue intentional change and reinforce their favoured meaning systems as delineated by their initial theorisations. The nature of the situated logic is therefore not an ‘engineered’ product, but rather an outcome of institutionally embedded and intentional discursive work which may, over time, contribute to more significant (albeit unplanned) institutional change. Moreover, as a new meaning system gathers momentum through discursive reinforcement and regulatory support it can become disassociated from the objective or practice of which it was originally in support and may eventually come to inform alternatives and taken-for-granted decisions within an industry. A conception such as this moves institutional logic analysis away from problematic scientific diffusion metaphors and structural determinism (Zilber 2002) and



towards an understanding of embedded agency in the construction of new situated institutional logics. It also elaborates on Tracey et al's (2010) finding that new institutional forms such as logics may continue to be believed and enacted despite the failure of the initial material change/action to which it owed its existence.

The contributions of this research are threefold: Firstly the recognition of inconsistency within a single societal logic, such as that characterised by contradictory situated logics, is a new development which contributes to the ways in which institutionalists might consider the relationship between societal logics and lower level logics. In relation to Critical Realism this contribution speaks to how real social structures such as societal logics (Leca and Naccache 2006) come to emerge (Elder-Vass 2008), as a result of agency, in the form of situated logics which inform the legitimacy and efficacy of events and institutions within the realm of the actual. Secondly an understanding of embedded institutional work extends previous multi-level literature on institutional work (Tracey et al 2010) by considering in more detail how the process of theorisation, legitimation and, in this case, valorisation are mechanisms through which the institutional structure and conventions of an industry (in which these processes are enacted) come to be reflected in an emergent logic. Thirdly the development and application of an environmental logic provides future researchers with a conceptual tool to understand how actors work within and engage with institutionally defined notions of 'environmentalism' and 'nature'. It is hoped that future research within the domains of environmental responsibility, technology and conservation, for example, might apply an environmental institutional logic in order to more deeply engage with the natural environment rather than treat it as an objectified resource with a fixed and static meaning.

There are two primary areas of discussion within this final chapter. The first delineates what is meant by a situated logic before focusing on the emergence of the target-based environmental logic. Ultimately this first half of the discussion provides a multi-level narrative which explains how the societal environmental logic became situated over time. In so doing it argues that the symbolic and discursive processes of institutional work (Lawrence and Suddaby 2006, Tracey et al 2010, Lawrence et al 2011) interconnect levels of analysis in ways that can help explain how higher order logics come to be embedded in previously unrelated industries. The ability of actors to act and engage in these processes is supported by a conception of power and agency which is elaborated within literature on elites (Zald and Lounsbury 2010, Reed 2012). The aim of the section is to embellish the idea of 'situated logic emergence' by exploring the societal context which provided possibility and opportunity for institutional work. The power to act and the interests (both personal and political) of the actors engaging with such opportunities is considered an integral part of such context and helps explain the ways in which actors' actions both intentionally and unintentionally

defined new understandings of the natural environment. As a consequence of this embedded action the ways in which the industry compared energy options was fundamentally altered.

Thus the emergent nature of the target-based environmental situated logic is seen as symptomatic of the continual dynamic between agency and wider social movements and discourses with which actors re-enact reinforce and embellish certain values or norms given the opportunity, power and political will. The processes actors use to do so are recognised in this case to fall under the categories of theorisation, discursive legitimation and valorisation. These processes act across levels of analysis because they involve actors drawing from societal logics and their constitutive discourses in order to legitimate institutional work. For example, as actors theorised new causal relationships between nuclear and nature in order to legitimate a more favourable nuclear energy policy, they drew from the legitimacy of global political CC discourse and applied it in a way (unintentionally or otherwise) that suited their interests and aligned with the dominant values, conventions and rationality of the industry itself. Thus the processes of institutional work identified in the case study occurred within the particular institutional context of the energy industry which provides an insight into why the new situated logic was so easily integrated into the industry's decision making mechanisms.

The second area of discussion focuses on the 'green paradox' of nuclear power and explains the variation in environmental situated logics via the application of literature pertaining to rationality types (Kalberg 1980) and systems of exchange theories (Biggart and Delbridge 2004). This part of the discussion explores the ways in which the societal environmental logic appeared manifest in multiple forms within various groups of actors; such as geographically local communities, social movement organisations and the energy industry. A taxonomy is provided (Table 12) which maps out the different environmental situated logics apparent throughout the green nuclear debate. It illustrates how the societal environmental logic was understood, interpreted and discursively reconstructed by actors who displayed contrasting rationalities and enacted their debates through either particularistic or universalistic social relations. Actors informed by dissimilar situated environmental logics often disagreed over the environmental credentials of a practice or action because they held opposing understandings of the society and nature relationship. In other words, by understanding the society and nature relationship differently, opposing actor groups not only valued different means towards environmental protection, but fundamentally differed in their expectations and understandings of what could be considered as environmentally friendly. Throughout the debate over green nuclear the most prolific tension existed between the EMOs and the pro-nuclear lobby within Government. The former believed that the rationality of nuclear power was severely under question given that it was environmentally illegitimate on moral

principles and the latter argued that the rationality of nuclear power was based on its ability to provide low carbon energy and therefore represented the most environmentally sound option.

The latter sections of the chapter outline the contributions of this research and the limitations of the project. Avenues for future research are suggested which both overcome these limitations and provide important ways to continue and extend research into the issues raised within this discussion.

## **Situated Logics**

‘Situated logic’ is the term used to refer to the manifestation of societal institutional logics which reflect the historical context and institutionalised interests of actors/actor groups within a given industry. The findings of this research suggest that the dominant values, norms and conventions of the energy industry were reflected in its configuration of embedded ‘situated logics’. Such situated institutionalised values echoed the unique historical and meaningful characteristics of the industry as perceived by industry level actors, thus combining the abstract meaning structures of societal level institutional forms with the physicalities and practicalities of the industry. The situated logics identified by this research are those which informed the debate over nuclear power’s validity as an energy option and were apparent in the legitimisation strategies of both the various Governments over time, as well as the media.

The situating of societal logics is of specific interest because it speaks to the relationship between actors, fields and institutional structures. The concept of a situated logic provides a theoretical tool to recognise how one societal logic may inform multiple and potentially contradictory situated logics. Because societal logics are manifest as a result of actors’ interpretations within context and subject to the specific interests and orientation to action of individual actors in relation to those societal logics, different contexts inhabited by actors pertaining to the same societal logic may nurture opposing situated logics. Moreover, by studying the process of situating it is possible to overcome the problematic issue of ‘scientific diffusion’ metaphors within institutional literature (Zilber 2002). This is because the ‘situated’ approach accepts that whilst industries sit within a pre-defined inter-institutional societal context which provides institutional rules and norms (Friedland and Alford 1991) for actors to draw on when determining legitimate meanings, an industry’s distinct institutional and historical values, conventions and rationalities affect the ways in such rules and norms manifest. This is because the a-priori institutional structures of industries influence what actors perceive as legitimate and possible when generating and enacting new meaning systems. An

emergent situated logic will therefore not provide a direct reflection of an 'ideal type' societal logic (Thornton 2004), but will become manifest as a refracted outcome of values, norms and conventions within its host industry.

## **Explaining an Emergent Target-Based Environmental Logic.**

In the following section a narrative is developed which illustrates how pro-nuclear elites (referred to as the 'energy elite') within the Conservative Government of the 1980s set in motion certain processes which constructed a target-based approach to environmentalism in a bid to popularise nuclear power and overcome its ubiquitous environmental critique. By publicly and politically marketing nuclear power as 'green' they embedded within the energy industry a particular set of environmental values and conventions which informed how energy choices were to be compared and justified into the 1990s and 2000s. More specifically the energy elite underwent three institutional work processes: theorisation, discursive legitimation and valorisation. These processes worked across levels of analysis in ways that linked social movements, global CC discourse, the energy industry's institutional context and the interests and political positions of pro-nuclear actors. In other words, the situated manifestation of societal logics is understood to be the (intended and unintended) outcome of institutional work which interconnects multiple levels of analysis so that both societal and industry level institutional and political context becomes reflected in the nature of 'lower-level' situated institutional logics. Understanding the basics of this process will shed light on how societal logics may come to be inconsistent at lower levels of analysis – given that their 'creation' is dependent on time, space and agency.

The following sections neither place all explanatory pressure on agent-centric theories of institutional work, nor forward a structurally deterministic explanation of change. Rather, they embed the former in the latter and suggest that the interactions between the two result in situated logics at the industry level. Institutional research on societal trends and changes has shown how social movements (Rao, Monin and Durand 2005) and new discourses (Maguire et al 2004) provide actors with opportunities to work on and even change institutionalised meanings intentionally or otherwise. In many cases such changes 'jolt' the institutional structure of an industry by providing new meaning systems with which individuals may, if reflective, motivated and opportunistic enough, use to alter how themselves or others perceive the legitimacy of practices. In the case study two particular societal level structural changes occurred which had the potential to affect the way in which nuclear power could be understood and legitimated – these were the environmental social movement of the late 1960s and the global development of a political discourse around CC

in the late 1980s. Both pressurised the State to consider the environment when deliberating over energy policy, although each provided different cues as to how green behaviour might be enacted. This section begins with an exploration into their implications in order to understand why and how an international CC discourse came to be theorised in relation to nuclear power to create an idea of 'green nuclear'. It should be noted that these societal changes should not be considered as isolated from the political interests of actors or from the institutional nature of the energy industry. In other words, the way in which the environmental movement and CC discourse affected nuclear power was an outcome of their interaction with embedded actors and was therefore not structurally determined. Nevertheless, to understand how certain actors contributed to the emergence of a situated target-based environmental logic, the context for their actions at the macro societal level of analysis must be understood (Tracey et al 2010).

## **Social Movements and Global Political Discourse**

Social movements have been well documented as important vessels in the creation and recombination of institutional logics (Rao, Monin and Durand 2005, Lounsbury et al 2002). Sine and Lee (2009) have examined the role of social movements in propagating cognitive frameworks. They argue that social movements disrupt institutional arrangements by disseminating new cultural and cognitive frames for sensemaking through which they define and distribute elements of societal logics to fields previously unrelated. These movements are often highly value laden and strive to mobilise the highest volume of actors possible through education and awareness. By doing so, social movements can create mass antagonism towards a practice or technology on ethical and moral grounds within a short space of time. In the 1970s new-environmentalism was a highly politicised social movement which problematised various aspects of the nuclear industry. Whilst diffusing its own value laden morals, its educative element enticed public debates over the environmental legitimacy of nuclear power. Contentious issues surrounding nuclear waste and plutonium proliferation during the Cold War were brought to the attention of the public for the first time, and very quickly the nuclear power industry became a clear antagonist to Environmental Movement Organisations (EMOs).

Interestingly EMOs employed a process similar to Leca et al's (2008) specification whereby nuclear power's environmental failure was framed in a way that included a diagnosis and causation which aimed to interpret 'the problem' in ways which linked it to the EMOs broader cultural environmentalist schema. In other words, the problem with nuclear power was unrelated to the usual energy-comparison schemas of the energy industry and was instead specified from a

previously unconnected environmental lens. Consequently the industry was ill-equipped to rebuff the environmental criticism of nuclear power and given that there was no solution to many of the issues the industry instead rejected the notion that such issues should be a consideration. Regardless of whether the EMOs were 'unrealistic' in their requests for nuclear abandonment, the social movement had provided society with a moralistic lens through which to understand its relationship with nature. It is evident in the media coverage of nuclear power's environmental impact at the time that this particular approach to nature became ubiquitous, illustrated by the fact that there were only a handful of references between 1960 and 1988 to nuclear power being in any way environmentally friendly. Indeed, it was publicly accepted that under no circumstances could atomic energy be green.

It was not until the late 1980s that the world started to take seriously a more quantitative and scientific environmental agenda. The ratification of CC and the formation of the Intergovernmental Panel on CC in 1988 should be viewed as a significant environmental jolt (Sine and Lee 2003) which eventually affected institutionalised understandings regarding the role of energy industries in environmental protection. The political legitimacy of international institutions now concerned with escalating CC provided the nuclear lobby with the opportunity to reconfigure institutional arrangements. An important aspect of this particular jolt was the way in which the Government (and therefore the national energy industry) were embedded within it. Indeed CC represented both an environmental issue as well as a macro societal discourse within the global political economy. As Wittneben, Okereke, Banerjee and Levy (2012) note '...CC is not just an 'environmental problem' requiring technical and managerial solutions; it is a political issue' (p1431) which is influenced by, but resides 'above', the political bailiwick of individual national Governments. However, although CC is defined by supra-national organisations such as the UN and its inter-Governmental panels (IPCC) it is consistently renegotiated and remains ambiguous in its interpretation across levels. For example, Wittneben et al (2012) note that Governments routinely clash over their responsibilities in addressing CC at the international policy level; companies struggle to balance investor interests with regulatory pressures for reduced emissions at the organisational level; and at the level of the individual, consumers remain unsure of the trade-offs between consumerism and their carbon-footprints.

The issues discussed above have a number of repercussions. Firstly inter-Governmental bodies such as the IPCC have the political power to define and govern CC in relation to the nations under their jurisdiction, particularly given that since 1997 a number of these nations have signed a binding treaty to meet certain IPCC standards. As Wittneben et al remark 'Climate change is a global issue and, while national Governments have a key role to play in climate policy, the global governance of

climate change occurs in a broader international political economy. These international institutional structures shape the prospects and limits of political agency and action.’ (2012 p.1937). Although they may shape the nature of political agency, the implications of CC at the level of State remain contested. That is, national Governments are somewhat independent when it comes to their perceived responsibilities for carbon mitigation and the role of certain industries in that mitigation. CC is thus accepted and structurally reinforced by international organisations, yet is further delimited by the political interests and institutionalised conventions of actors within national Government and its related industries. As such CC discourse both presses for conformity and retains an element of ambiguity in terms of how it should ‘play out’ in industry sectors. Additionally it is both substantively focused on the moral obligation of humankind to protect the planet and itself and evidently target orientated given its focus on global carbon and GHG emissions levels. By playing on the ambiguity regarding operationalising CC mitigation and its links with more moralistic environmental discourse, the pro-nuclear lobby hoped to associate CC’s scientific and measured approach to environmental protection with nuclear power’s low carbon output and subsequently call nuclear ‘green’.

Ultimately the Government and its energy industry were aware of the public support for the EMOs cause and were also embedded within, and expected to act in concordance with, the broader political landscape of which CC became a part. Both the social movement and the CC discourse provided potentially complementary yet fundamentally alternate conceptions of what constituted nature and ‘green’ action – representing distinct manifestations of an environmental societal logic. The international environmental social movement diffused a moralistic and qualitative environmental logic (social-movement environmental logic) into the UK which put pressure on the Government by not only proposing a new environmental meaning system to the electorate, but by actively propagating how nuclear power contradicted it. The internationally ratified and UN backed CC discourse provided an opportunity for nuclear supporters to finally counter environmental critique of nuclear power, and in the process, reinforce a quantitative and target orientated approach to environmental action. Thereafter international CC organisations and subsequent treaties enforced their own breed of environmental concern and provided politically legitimated discursive and symbolic resources for actors to argue that low carbon technologies were green.

The following section is specifically interested in the ‘actors’ who promoted nuclear power as an environmental solution to CC in 1988. The section begins its analysis in 1979 when a newly elected Conservative Government first illustrated its enthusiasm for initiating a third nuclear power programme. It was during the early years of this Government that an ‘energy elite’ was established who, in 1988, first delineated a ‘target-based environmental logic’ within the energy industry. The

configuration, purpose and power of this elite is integral to understanding how a new meaning system was able to become so successfully embedded into the industry.

## **Power, Elites and Embedded Action**

The discussion of elites in this section responds to recent literature by Zald and Lounsbury (2010) and Reed (2012) who propose a research agenda considerate of national and international elites and 'command situations' in the study of important policy issues. In the following section the development of a state centred authoritative elite and a supra-national expert elite is outlined; both of which formed around, and were advocates of, a pro-nuclear agenda. The former came about as a result of political will power, interest and the authoritative autonomy of high-ranking politicians. The latter reflected developing cultural expectations in regards to CC and a growing international scientific community which developed with the ideological backing of major supra-national organisations such as the United Nations. In line with Reed (2012) the following discussion has a distinct focus on State centred structures of domination but maintains recognition of normative and cultural context in reinforcing the legitimacy of the elites and their theorisations. The aim of the section is to understand the propensity of actors with certain forms of power to act, and in doing so how they contributed to the emergent manifestation of a situated logic.

The pro-nuclear elite, referred to throughout this discussion as the 'energy elite', were linked by a common cause and high-ranking bureaucratic positions within the Government's energy department and related organisations such as the CEGB. The actors constituting the energy elite had a form of power which relates most directly to Reed's (2012) understanding of authoritative elites. According to Reed (2012) the members of an authoritative elite are embedded in structures of domination which give them the potential bureaucratic and authoritative power to engage in strategies through which their interests can be pursued. The hierarchically stratified power structures and mechanisms within the State gave the 'energy elite' privileged access to resources with which they were able to progress their agenda for nuclear power development. These resources relate to their propensity to initiate public inquiries, liaise with the BNFL to build a strong defence for nuclear power, engage in policy decisions and develop national energy strategy. In other words, the energy elite were '...agents who [had] the "structural place" and "organizational power" to shape the governing structures and regimes through which the everyday lives of citizens are ordered and managed' (Clegg et al 2006 p.343). The following section explores the creation and influence of Thatcher's 'energy elite' who were key in the development of 'green nuclear' discourses in the late 1980s. Their political relationship with alternative energy industries such as coal and their rejection of renewable technologies (and their supportive EMOs) meant that they



saw the development of nuclear power as integral to UK energy supplies as well as the future of the construction consortia.

The State had consistently favoured nuclear power between 1945 and 1980 given the energy supply security it provided and its future economic and market promise. Initially the CEBG and UKAEA had reinforced distancing and normalising discursive strategies which appeared successful in framing nuclear power as peaceful and 'just like all the others' in terms of its ordinary processes and outputs. When the antagonistic environmental social movement problematised the distancing and normalising strategies in the 1970s the State used its authoritative power (Reed 2012) to discredit environmentalism and its influence on energy policy. It claimed that their emotive concerns were idealist and unattainable since they provided no alternatives to nuclear power which could satisfy the institutionalised requirements of energy options (resource security and market potential). Nevertheless, by the late 1970s the nuclear industry was in disarray. A lack of new orders by the CEBG due to indecision over the next reactor design meant the construction consortia were struggling to survive. Indecision regarding nuclear power eventually ceased in 1979 when Thatcher's Conservatives won the election and began to execute their political aspirations of quashing the power of the trade unions and revitalising the nuclear industry.

Under the explicit auspices of energy security and future economic promise, and more implicitly to provide stable electricity whilst the coal industry was downsized, the Conservatives pledged to reanimate the UK's nuclear industry by constructing a PWR reactor at Sizewell. To this end and under the direction of Thatcher a rising cadre of pro-nuclear individuals came to occupy key power positions or 'command situations' (Reed 2012) within the energy industry. As such the 'energy elite' was both symptomatic of the broader state of affairs within the energy sector that was considered problematic given the institutionalised cultural and normative expectations of the industry, and the political interests of high-ranked politicians embedded in the more enduring socio-material domination structures of the industry. More specifically in 1979 Thatcher began filling influential pre-defined 'command situations' within the bureaucratic structure of Government by appointing David Howell as her first Secretary for Energy. Howell was immediately tasked with building the country's first PWR reactor and was therefore responsible for initiating the Sizewell Inquiry and constructing the Government's PWR defence alongside BNFL. Nigel Lawson took over Howells post in 1983 given his advocacy of Thatcher's privatisation policy, and was followed by Peter Walker (1983-1987) who successfully won out against the Miners in the strikes of the mid-1980s and approved the application for Sizewell B in 1987 following the inquiry. Peter Walker had previously shown support for nuclear power in 1973 during which time he was imperative in the establishment of the NNC as Secretary for Trade and Industry. A perhaps more influential appointment was that

of Lord Marshall of Goring in 1983 to the post of CEGB Chairman from a previous post as the chairman of the UKAEA. Additionally in 1987 a diehard Thatcher supporter Cecil Parkinson was made energy secretary and was keen to both enforce competition on electricity and preserve nuclear power – two goals which were ultimately to be in conflict.

Backed by her deliberate arrangement of influential and bureaucratically powerful actors within the key command situations of the industry, Thatcher was in a position to enact a high degree of autonomy over the crafting of a pro-nuclear energy policy in the UK. By the time CC discourse had become ratified by the UN this pro-nuclear energy elite had already succeeded at the PWR Sizewell Inquiry. Nevertheless, what was clear from the case study was that public opinion relayed by the newspapers at the time did not reflect the Government's nuclear enthusiasm, particularly in terms of environmental impact and safety. Discursive legitimisation based on the national market and state resource situated logics was just not able to counter the public's perception of environmental threat caused by nuclear reactors given the recent Three Mile Island and Chernobyl crises. It is therefore unsurprising that the energy elite jumped at the opportunity to market a green discourse around nuclear power, and they were in the perfect position to do so. After the UN accepted CC as an issue and established the IPCC the CEGB took out advertising space in both *The Times* and *The Guardian* proposing to the readers that nuclear power was environmental. At the same time Thatcher delivered environmental speeches which included the promotion of nuclear policy as an environmental response. The energy elite's counterfactual thinking (Tracey et al 2010) – that nuclear power was green – was diffused in a way that reflected their authoritative power: at international conferences, in policy documents and within Government backed marketing campaigns.

## **Theorisation in Context**

Theorisation (Tolbert and Zucker 1999, Suddaby and Greenwood 2005) and the resultant legitimisation strategies engaged in by the energy elite were constructed within the institutional context of the energy industry. This thesis argues that all institutional work processes identified in the case study (theorisation, legitimisation and valorisation) connect multiple levels of analysis, such as societal movements, industry meaning systems and actor interests, so that their outcomes reflect both the intentional objectives of actors and the prevalent rationality embedded within the industry. In particular the discursive legitimisation and theorisation of the energy elite, and its repetition by sympathetic Press, created a discourse of 'green nuclear' intentionally designed to support a favourable nuclear policy and an institutionalised understanding that the energy industry should consider target-based environmental issues when deciding over energy options. This latter

outcome should not be considered a planned and pre-meditated institutional change, but an emergent and potentially unintentional consequence of institutional work. First this section will consider the process of theorisation and its role in the emergence of the target-based environmental logic. Second it will discuss how theorisation occurs within, and may be affected by, the institutional context of an industry.

Suddaby and Greenwood (2005) define theorisation as the means by which institutional vocabularies are employed to justify new ideas by linking them to broader cultural schemas. The body of literature focusing on theorisation tends to show how it achieves shifts between logics. However, by linking together broad meaning systems and political objectives, the energy elite were able to locate a previously 'external' logic within the energy industry and draw on it to legitimate a desired practice. CC discourse provided the necessary discursive resources for nuclear power to be linked with an environmental agenda so that energy legitimacy began to cohere around the assumption that energy options with the lowest carbon output should be considered the greenest. Drawing from Suddaby and Greenwood (2005) one may identify this type of theorisation as primarily value-based. By initially associating nuclear power with carbon mitigation and proposing it as a solution to CC, actors hoped to connect nuclear power with environmental ideologies. Certainly carbon targets were discursively aligned with normative, ethical and moral environmental cultural templates (Rao, Monin and Durand 2005) encapsulated by the environmental social movement. By relating nuclear power with said targets it was hoped that it too would become aligned with these ideologies. This is similar to the findings of Maguire et al (2004) who show that theorisation is the processes through which institutional entrepreneurs political mobilise normative support by relating new or favoured practices with the key values of different actors in order to create a broad base of support.

It should also be noted that international expert elites involved in the CC movement helped reinforce the theorisations of the energy elite. Zald and Lounsbury (2010) noted in their review of the institutional elite literature that there is a need to focus on a new breed of international experts '...who coalesce into more informal collective communities of expert discourse and can shape command post outcomes in more subversive ways' (p.972). Certainly the global scientific community of NGOs and policy boards, which coalesced around CC, could be considered as important international expert elites. The issue of CC was fostered by several overlapping international scientific networks under the guidance of the World Meteorological Organization (WMO) and the International Council of Scientific Union (ICSU) (see Andresen and Agrawala 2002). This scientific community warned of climatic dangers and provided substantial research which academically reinforced the problems associated with emissions release. Essentially, the

international field of CC experts constructed itself over time and developed new normative expectations, regulatory capabilities and modes of reinforcement which, in the case of the UN's IPCC, they were able to mandate at a nation-state level.

Interestingly the national authoritative 'energy elite' and the international expert elite reinforced the legitimacy of each-others' discourses. Target-based environmental theorisations reinforced the urgency of CC concerns and CC discourse acted as a supporting infrastructure (Reed 2012) against which the industry could develop an energy policy which furthered their own pro-nuclear interest. Green nuclear theorisations were fed back to the international and scientific community for reinforcement. For example Thatcher's addresses at the UN General Assembly on the Global Environment and the 2<sup>nd</sup> World Climate Conference in 1990 proposed nuclear energy as a means to mitigate dangerous carbon release. Given the lack of nuclear support in the UK the international community contained far more potential allies for the nuclear cause. Additionally politicians and scientists may have been considered the most likely audience to sympathise with target-based environmental theorisations given their predisposition to instrumentality, operability and measurement. Interestingly environmentalists were not considered a receptive audience and were not expected to comply with the proposition that nuclear power posed an environmental solution to CC. Thatcher herself exclaimed that the use of nuclear to cut carbon emissions would not be well received by EMOs. This suggests that value-based theorisations are open to resistance and audience selection is crucial to their successful diffusion.

The way in which the green nuclear theorisation became diffused reflected intentional efforts by the energy elite to legitimate an energy policy with a stronger focus on nuclear power back in the UK. This work discursively delimited how the energy industry should approach environmental issues and hence set in motion the manifestation of a target-based environmental logic. In order for this form of environmental concern to make sense to actors within the industry the target-based logic needed to align with the institutionalised conventions and embedded systems informing energy decisions. In other words, green nuclear theorisations relied on a related and emerging institutionalised understanding which delineated how 'green' could be understood – this understanding reflected both the objective orientated nature of CC discourse and the quantitative and instrumental personality of the energy industry.

## **Industry as Mediator**

When EMOs broke down the normalisation and distancing discursive strategies of the nuclear lobby and encouraged public debates around radioactive waste and proliferation, their concerns were

countered and resisted by the energy industry who claimed that the environmentalists were unrealistic in their demands and that the nuclear industry was 'keeping it real'. At no point during the first four decades of the civil nuclear programme was nuclear claimed 'green' – rather the idea that the environment should be a consideration by the energy industry was shunned. For the industry the legitimacy of nuclear lay in its capacity as a UK designed baseload generator of electricity and its promise of future economic prospects. This reflected a highly instrumental approach to judging the rationality of energy choices. This thesis argues that the institutional structure of the energy industry and its prevalent rationality affected the form of the emergent target-based logic. As Thornton, Ocasio and Lounsbury (2012) note '...societal-level institutional logics are not... transposed directly to institutional fields in whole cloth. At the cognitive level, societal logics provide available and accessible categories and schemas for sensemaking and action...at the social level, these categories and schemas are translated and adopted in the institutional field at various levels of abstraction...' (p152). The instrumental rationality of the industry was predominantly reflected in the way in which the industry utilised quantitative proxies for energy option comparisons. Such an approach became a central characteristic of its emergent approach to environmental care.

In particular, energy option adherence to values and conventions informed by the state-resource and national-market situated logics could be assessed quantitatively. In this way industry actors displayed a highly instrumental relationship with energy options reflected in the ways in which the financial costs or percentage of UK based fuels used could be compared between options (although one should not discount the importance of political interest in the construction of such figures and in the definition of the end goals). As Biggart and Delbridge (2004) note, 'An action is instrumentally rational when someone attempts to consider all possible means to an end and weighs the alternative means in a decision-making calculus, often in a quantitative analysis...' (p34). In a similar vein, the emergent environmental 'green nuclear' theorisations displayed characteristics which permitted its integration into the proxy-based decision-making machinery. The proposition that environmentalism was in some way quantifiable via the measurement of carbon units, reinforced by CC discourse, represented a theorisation based on instrumental rationality. It was therefore comprehensible and easier to accept than a more substantive environmental logic for the industry because it aligned with a customary cognitive and comparative approach. Thus, by portraying nuclear power as green, the energy elite were inadvertently proposing an instrumental approach to environmental friendliness which matched the institutional and rational nature of the energy industry's dominant sources of legitimacy.

This can be understood as the result of three related factors: Firstly these actors were themselves institutionally embedded within the field and therefore were likely to construct their theorisations and discursive legitimations in ways which reflected their taken-for-granted understandings of how energy comparisons should be made. Secondly the continual reinforcement of target-based environmentalism over time in regulation and policy worked to both fortify the instrumentality and enforce environmental consideration. Thirdly the approach is greatly reflective of the scientific nature of the global CC discourse. Given that the Government were keen to adhere to the carbon limits defined by the international community their theorisations, which initially delimitedated the target-based environmental logic, drew heavily on the quantitative character of CC discourse. Taken as a whole, the institutional structure of the energy industry informed the development of environmental meanings which ensured the comprehensibility and operability of the emerging target-based logic. As the target-based environmental logic became increasingly institutionalised within the industry its exclusive association with nuclear power weakened. Indeed, when nuclear power was shown to be financially problematic in the latter part of 1989 the Government was keen to centre a new energy policy on alternative green options such as renewables.

## **Emergence and Institutional Change**

Institutional work of the energy elite, in their pursuit of legitimating nuclear power, kick-started the emergence of the situated target-based logic which continued to institutionalise despite the financial collapse of nuclear power in 1989. The following discussion seeks to explain the emergent institutionalisation of the target-based environmental logic over time and consists of two parts: The first focuses on the implementation of regulatory support to reinforce target-based environmentalism, further embedding it in the institutional infrastructure of the energy industry. The second part examines how theorisation and regulatory reinforcement related to the emergence of the situated logic which continued to be elaborated within the energy sector regardless of its dwindling use in the legitimisation of nuclear power. The discussion demonstrates that actors may intentionally enact causal powers in the form of institutional work towards political ends, aided by their power to pursue action, but that these actions may have wider repercussions for the institutional landscape of the industry over time which may support future actions unrelated to the initial political project. This latter finding extends previous literature on the unintended consequences of institutional work (Tracey et al 2010) by providing a discussion of how the intentions of those specifically in power may become reinforced and subverted over time.

The 'low carbon equals green energy' theorisation was reinforced by regulatory embellishments which forced the energy industry to meet environmental targets. The planned privatisation of the

energy industries in the late 1980s meant that the CEEB was facing dismantlement in 1990. Losing the CEEB and its leadership would weaken the political power of the pro-nuclear energy elite thereby threatening the future of nuclear. Choices between energy options would be dependent on private interests and nuclear power was expensive and uncompetitive. In an attempt to reinforce the utility of nuclear power in light of CC, UK carbon targets were initially crafted in early 1989 at an international Downing Street Conference. Similarly when the Department of Energy was dissolved in 1992 and energy responsibilities moved to the DTI, international legally binding targets were already in discussion in the Rio de Janeiro World Summit. By 1997 the Kyoto protocol treaty had set objectives which reinforced the instrumental and temporal character of the carbon targets. However, the Kyoto Protocol made no mention of nuclear power, illustrating that by the mid-1990s (after the failed nuclear privatisation) the emerging target-based situated logic was taking shape without the theorisations which connected it to nuclear power. The binding nature of emissions agreements embedded national Governments deeper within the global field of CC and as a result energy industries in particular were becoming increasingly implicated in the struggle to mitigate global warming.

What can be inferred from above is that the intentional actions of the energy elite to support nuclear power by strengthening carbon regulations before its privatisation (to ensure its competitiveness) reinforced target-based environmentalism and ensured its re-enactment within the entire energy industry. The continued reference to the target-based logic in the legitimisation of alternative energy options after the nuclear moratorium illustrated its on-going emergence. 'Green nuclear' theorisation and resultant legitimisation strategies provided discourse which, when reinforced over time, contributed to the continuing institutionalisation of the target-based environmental logic. Such an understanding is in alignment with literature detailing emergence and its elaboration through co-determination: '...elaboration is co-determined by the conditional influence exerted by antecedent structures together with the autonomous causal powers of current agents' (Elder-Vass 2007a quoting Archer 1995 p.26). These antecedent structures comprise of CC discourse and the institutional context of the energy industry. Such emergence is also relational in that the emergent properties of institutional logics '...are not contained in the elements themselves, but could not exist apart from them' (Archer 1982 p.475). In other words the emergent properties of an institutional logic have the potential to create structures which are greater than the sum of their parts, dependent on the ways in which they are configured. Situated logics are therefore representative of a distinctive organisation of a societal logic's causal and emergent properties which developed over time given the interaction between agents and the institutional influences

of the field. This emergent approach provides an explanation as to how a situated logic can progress without being pre-meditated or actively engineered.

The discussion of the on-going emergence of the target-based logic after the financial delegitimation of nuclear power extends Tracey et al's (2010) understanding that the creation of new institutional logics to legitimate new organisational forms can create institutional change even if the material organisational form eventually fails. In this case-study the target-based environmental logic which was initially triggered by the diffusion of new discourses related to the theorisation of 'green nuclear' continued to institutionalise (emerge) in the energy industry even after nuclear power's legitimacy dwindled. Thus when trying to understand the origins of specific situated logics the answer may not lie in exclusively exploring the purposeful institutional work of actors to initiate change, but also the consistently reinforced meaning systems which that change required to make sense, and which may unintentionally become institutionalised thereafter.

So far this discussion has focused on the process of theorisation and its role in interconnecting levels of analysis during institutional change. However processes of discursive legitimation have so far only been touched upon (such as 'keeping it real'). The following section explores the re-emergence of the 'green nuclear' debate in the mid to late 2000s and highlights the role of a specific discursive legitimation strategy labelled here as 'accommodation'. The process of valorisation is also discussed as nuclear power needed to appear financially stable if it was to be taken seriously by the now privatised energy companies. Both legitimation and valorisation institutional work processes drew from the situated target-based environmental logic to legitimate nuclear power in distinct ways, often reinforcing target-based environmentalism by reiterating its meaning system and, in the case of valorisation, intertwining its symbolic and material dimensions with that of wider economic systems.

## **Legitimation and Valorisation in the Late 2000s**

The use of language in the form of legitimation strategies is central to the institutionalisation of theorisations (Greenwood and Suddaby 2005). The case study illustrated the role of humanisation and narrativisation (Vaara et al 2004) discursive strategies throughout anti-nuclear rhetoric which sought to de-legitimize nuclear power on the grounds of safety and environmental pollution and break down the normalisation and distancing strategies of the Government and UKAEA. The Government responded by rejecting the anti-nuclear rhetoric as utopian and idealist, instead opting to re-affirm nuclear power's legitimacy by drawing on the national-market and state-resource situated logics to reinforce its instrumental rationality as a necessary energy option. This type of



legitimation aligns with Vaara et al's (2004) concepts of authorisation and rationalisation so that legitimation is formed both by reference to authority garnered from tradition, custom or law, and based on the cognitive validity of certain social actions as embedded within the energy industry. The contestation between these legitimation strategies utilised by the pro and anti-nuclear lobbies played out throughout the initial decades of the case study primarily because of an implicit acceptance by both parties that nuclear power could never be considered 'green'. Instead the debate was one of environmental problematisations by one side, and objections to their relevance to energy decisions by the other. However, by the mid-2000s the situated target-based environmental logic had become institutionally entrenched within the industry and was central to discursive strategies which supported nuclear power's green 'renaissance'. This paved the way for an important new nuclear legitimation strategy, which was applied by the pro-nuclear lobby as a means to 'accommodate' the environmental concerns of the EMOs into their legitimation of nuclear. This accommodation is referred to as the 'lesser of two evils' strategy and became prevalent in media coverage of the nuclear debate from 2003 onwards.

### **The Lesser of Two Evils**

The 'lesser of two evils' proposition claimed that, in light of the inability of renewables to mitigate CC, nuclear power provided the most environmental energy solution regardless of its waste and proliferation issues. This proposition is important to consider for three reasons. Firstly it clearly demonstrated the institutionalisation of the instrumental and quantitative target-based environmental logic within the industry. Nuclear power was only considered 'green' because it could meet carbon targets necessary for the mitigation of global warming, an attribute which propelled it into the 2006 energy mix (Department for Trade and Industry 2006). By claiming that nuclear power was a lesser 'evil' than CC, nuclear advocates were implying that all other options including renewables were less environmentally viable because they increased the risk of the greater 'evil' – CC. All options could be compared quantitatively based on their determined emissions and were evaluated as green against very specific numerically defined 'ends'. Other environmental concerns such as radioactive waste were marginalised by this discussion given that they had no way of being incorporated into the system of decision making within the energy industry, and that the particular 'ends' did not specify any additional environmental considerations. Thus it is clear that this strategy drew from, and reinforced a highly institutionalised target-based environmental logic, and was central in legitimating nuclear power in the mid to late 2000s.

Secondly it is a clear illustration of a discursive strategy (legitimation process) which interconnects the wider CC global discourse with the interests of pro-nuclear elites and the institutionalised

nature of the industry. Interestingly it was a pro-nuclear scientific elite comprised of Sir David King and a number of well-regarded environmental nuclear 'converts' (for example, Guardian environmental columnist George Monbiot and Gaia theory writer John Lovelock) which initially proposed that CC was a much worse fate than that of nuclear pollution. The Labour Government agreed, given the impending carbon targets, with the backing of both global institutions such as the UNs International Atomic Energy Agency (IAEA) who proposed nuclear as a carbon mitigation tool, and a mixture of scientists and environmentalists within the UK who were willing to discursively relate the mitigation of CC with nuclear power. This provided the discursive strategy with political impetus and contributed to its development as a widely accepted justification for nuclear power.

Thirdly the 'lesser of two evils' strategy was illustrative of a type of 'accommodating' strategy whereby the environmental problems of nuclear power illuminated by the EMOs were accepted yet overcome with the referral to 'higher' environmental discourse. In essence, global CC discourse had become somewhat of a tie-breaker for debates attempting to define environmental practice. As such the environmental problems of nuclear power could be accommodated into its legitimisation (yes nuclear is evil) without destroying it because they were immediately marginalised by the 'bigger issue' (but not AS evil as global warming). The identification of this discursive strategy contributes to the body of literature on legitimisation which has not previously considered the strategy of 'accommodation'; the integration and subsequent marginalisation of antagonistic arguments through referral to broader/higher-level systems of meaning. However, although nuclear power was flagged as a necessary green energy option, it still needed to appear commercially and economically viable in order to receive the substantial investment it required. This is where the process of valorisation came into play.

## **Valorisation**

Valorisation refers to the process by which the Government (Labour and then the Conservative-Liberal coalition) attempted to assign monetary value to natural substances (i.e. carbon) which were then used to measure environmental 'friendliness'. More specifically the valuation of carbon in the late 2000s aided both the financial legitimacy of nuclear power and simultaneously reinforced the target-based environmental logic. For the reanimation of the nuclear industry this process was vital because nuclear electricity would not be competitive in the energy markets otherwise. Following nuclear power's financial collapse in the late 1980s and privatisation in 1996 (and British Energy's financial crisis in 2002) the Labour Government promised that nuclear power would receive no subsidies from Government (Department for Trade and Industry 2003a) and would only be constructed if deemed competitive by private industry. Indeed privatisation had merely

reinforced the importance of economic competitiveness in shaping public policy (Wittneben et al 2012). By 2006 it was evident that all low carbon technologies were expensive and produced electricity which was difficult to sell within competitive energy markets. To better the chances of tempting private investment in low carbon technologies the Government planned to introduce an EU based carbon market. If firms released more than a centrally designated amount of emissions they would suffer a financial penalty and vice versa, with the amount lost or gained dependent on the value of certificates which represented carbon and could be traded.

Through commodification and control over the means of exchange of atmospheric elements the Government's low-carbon energy policy established an economy of climate capitalism (Childs 2003, Wittenben et al 2012) which signified a meeting of two seemingly separate worlds; environmentalism and the capitalist market. Climate capitalism provides an example of situated logic coexistence; the initiation of the carbon market was illustrative of the dominance of both neo-liberal market beliefs and the unquestioned requirement to meet carbon targets. Both were able to coexist because the former could be applied to the latter, permitting integration rather than conflict. Via economic modelling, the Government were able to 'prove' that nuclear power could mitigate the environmental damage of CC, within the time limits defined by the Kyoto Protocol, at a lower cost than alternative low-carbon technologies. Consequently, the valorisation of carbon intertwined the symbolic dimensions of the target-based environmental logic with the market mechanisms of an entrenched and dominant economic ideology and was therefore an important process in reinforcing the legitimacy of nuclear. Additionally the integration of carbon targets in economic modelling for future energy policy ensured the target-based environmental logic's relevance and repetition within the energy industry.

## **Concluding Situating**

The previous narrative clarifies how a societal environmental logic became situated as a target-based environmental logic within the energy industry. Theoretical value comes from the treatment of institutional levels of analysis which are interconnected through the processes of institutional work identified. A 'real' societal institutional logic, as evident in the diffused discourse and schemas of the environmental social movement, was initially rejected by the energy industry until 1988 when the CC movement provided an opportunity for the pro-nuclear Conservatives to link nuclear with a 'green' agenda pre-defined by the environmental movement as necessary and moral. Processes of embedded institutional work which aimed at achieving such a link reflected the agency of an elite embedded in the 'actual' institutional and historical context of their industry. This embedded institutional work leads to both intentional and unintentional consequences. The energy

elite were knowledgeable and powerful actors who were provided power by their location within a state bureaucracy and were able to use their political influence to publicly legitimate an energy policy more favourable to nuclear power. Over time their theorisation of causal relationships and development of discursive legitimations came to constitute a supportive situated target-based environmental logic. This speaks to both its emergent nature and the fact that it came to be embedded in a form which could be drawn on to legitimate a variety of low carbon technologies.

The societal environmental logic became situated within the energy industry in a target-based form as a result of the intentional institutional work of the energy elite, backed by a growing international expert elite, to popularise nuclear power. The theorisations and legitimisation discourses which they produced were created and enacted from within an industry predisposed to an instrumental form of rationality. In other words, the cognitive schemas historically employed to weigh and evaluate the rationality and comparative appropriateness of energy options valued the role of measurement, quantification and economic modelling. Target-based environmentalism could be operationalised because it legitimated a carbon emissions proxy from which all energy options could be compared, and without which environmental comparisons would be ambiguous, contentious and unstable. Additionally the impact of the social movement in the 1970s and the pre-existing situated logics of the energy industry during the 1950s and 1960s were crucial in understanding the context from which the opportunity for institutional change arose.

By the 1990s, and certainly into the 2000s, environmental considerations were integral to the Department of Energy's decisions between energy options. Notably the target-based environmental logic reflected a specific understanding of the relationship between society and nature whereby nature was considered quantifiable and environmentalism could be achieved through meeting certain emissions limits. The following discussion will examine how this particular approach to the natural environment sat in tension with the alternative perspectives evident throughout the green nuclear debate. Alternative situated environmental logics informed different groups of actors who contested the environmental credentials of nuclear power as espoused by the pro-nuclear lobby. Ultimately this thesis argues that multiple situated logics may exist in tension even when they pertain to the same societal logic. In this case study their contradiction was because each insinuated and informed a different relationship between humanity and nature. Consequently, nuclear power was considered legitimate under a situated logic which understood humankind's protection of nature as one of monitoring and measuring to ensure minimal human damage; but it was also perceived as illegitimate under a situated logic which viewed man's protection of nature as one of ethical and moral conservation. These tensions maintained nuclear's 'green paradox' because nuclear power was simultaneously construed as environmentally friendly

by actors informed by the former situated logic and intolerably un-ecological by actors informed by the latter.

## **The Green Paradox of Nuclear Power: Situated Logic Contradiction**

So far the discussion has concentrated on the emergence of the situated target-based environmental logic which informed arguments asserting 'green nuclear' from the late 1980s onwards. However, the debate over nuclear power's legitimacy engaged many actor groups who did not agree with the quantifiable approach towards the natural environment. Target-based environmentalism informed a highly instrumental relationship between society and nature, yet alternative manifestations of the societal environmental logic provided contradictory belief systems. Actor groups outside of the energy industry understood, interpreted and discursively reconstructed the societal environmental logic in ways which reflected their own interests and institutional background. In other words, arguments which challenged the energy industry's own green nuclear discourse were informed by alternative institutionalised understandings of the relationship between nature and society and therefore conveyed a different view on nuclear power's environmental credentials. By recognising contradictory situated environmental logics it is possible to cast light on the 'green paradox' of nuclear power. Competing logics bring '...rivalry to the fore' (Reay and Hinings 2009 p.629, 2005, Thornton 2004) and certainly rivalry was endemic within the nuclear power debate, suggesting that various logics informed conflicting positions.

This area of discussion speaks to institutional literature on complexity and institutional rationality. Literature pertaining to institutional complexity (Greenwood et al 2011) has highlighted how local level institutional logics, such as those residing within a geographically distinct community, affect actors' perceptions of legitimacy relating to actions and practices associated with encroaching logics. Complexity is therefore symptomatic of the interactions between multiple institutional logics and the implication of these interactions on the legitimacy of an action or practice. This discussion builds from such ideas by arguing that groups of actors draw from their own distinct situated logics, and many such groups can potentially converge on a single debate over the legitimacy of an action or practice. The plurality of standpoints provides the potential for conflict. Furthermore, types of institutional rationality are applied throughout the discussion as distinguishing elements of actor groups to help explain the nature of the conflicts over meaning which occur between actors informed by the different situated logics. Glynn and Lounsbury (2005) argued that certain logics are more akin to certain types of rationality. In their study they suggested that an aesthetic logic within the orchestral field was predicated on a Weberian form of substantive rationality, whereas a market

logic was more akin to the formal rationality of a capitalist society (p.1037). Biggart and Delbridge (2004) liken formal rationality to instrumental rationality which is more neatly associated with the predication for 'measuring and monitoring' found in the energy industry. It is understood here that situated environmental logics are underpinned by either substantively or instrumentally rational arguments which reflect the nature of the related actor groups. For example, the situated target-based environmental logic reflected the instrumental rationality of the industry in which the agents who contributed to its emergence resided. Nevertheless, it should be noted that the societal environmental logic, of which each situated logic represents a manifestation, instils an overarching substantive and value-laden quest for environmental protection; yet there are many means towards environmental ends.

## **Differentiating Logics**

A taxonomy is presented below (Table 12) which distinguishes between different and often contradictory situated institutionalised understandings of environmental behaviour. That is the taxonomy identifies distinct situated environmental logics which informed the various approaches to the green nuclear debate. To clearly delineate why these situated environmental logics differed from one another (in ways that affected the green perception of nuclear) this discussion draws on the dimensions employed by Biggart and Delbridge (2004) to identify various systems of exchange. These authors propose that the 'market' is but one form of exchange and that there exist '...qualitatively distinct types of socially organised exchange that support substantively different orientations to economic action' (p29). Their analysis found that the rational orientations of actors and the social relations between them combined to produce distinct systems of exchange. This is applicable to the arguments formed below because it provides variables through which actor groups can be meaningfully differentiated and from which their distinct cognitive schemas and institutional meaning systems can be identified. Certainly both rational orientation and forms of social relation were relatable to the characteristics of actor groups engaged in the green nuclear debate, and their combination unearthed varying orientations towards environmental action. In other words, the variables are understood as having affected the emergent properties of the various situated environmental logics because they influenced how specific actor groups developed perceptions of green nuclear

Actor groups who display different rationality types will perceive and operationalise the norms and conventions of societal logics differently. Their opposing judgements over ascriptions of rationality have the potential to lead to conflict as an action considered instrumentally rational may not appease acceptable substantive ends, and vice versa. Rationality type is likely to be an historical

characteristic of an industry and therefore affects the process through which a societal logic becomes situated. Secondly, the structure of social relations between actor groups engaged in the green nuclear debate is considered as either universalistic or particularistic (Parsons 1968). Types of social relation identified are strongly linked to whether the debate was focused at the national policy level or within localities and communities. Universalistic relations are evident when, in principle, all actors are treated the same and equally and are identifiable at higher levels of aggregation; i.e. at the national policy level of debate. For example, the debate between EMOs and the Energy Department was characterised by impersonality and universalistic relations between the two parties engaged in a fairly generic dispute. Indeed, at this level all anti-nuclear campaigners tended to be referred to in Government documents and media articles as 'environmentalists' rather than specific EMOs or campaigning groups. A particularistic orientation exists in settings where the actors' relations to each other are taken into consideration and the nature of the interaction is more personal and relatable to the actors involved. This type of relation is often more evident at lower levels of aggregation such as when residents of specific geographical localities resist the Government's proposals via local planning meetings.

The social relations of interest were those between anti-nuclear actor groups and the pro-nuclear lobby within Government. The nature of the social relations unearthed the environmental issues which were most salient to the actor groups. This provided a helpful distinction because the focus of environmental concern indicated the ways in which specific groups of actors understood what constituted environmentally friendly behaviour. For actors concerned with the effects of local nuclear installations and with particularistic relations with the Government, environmental concern was often related to site specific ecosystems and pollution. Their understanding of the relationship between society and nature reflected this focus by valuing local conservation and the protection of localised habitats. National and universalistic debates tended to be more focused on abstract and long-term issues whereas particularistic debates were inclined to consider the immediate, observable and short term environmental impacts recognised by specific individuals or small groups of individuals. In sum, the nature of the actor groups and the character of the situated logics were found to be closely intertwined given that societal logics manifest in certain ways because they are reflections of the actors who construct, reinforce and reconstitute them. Table 9 provides an overview of the four different situated logics identified as informing the arguments of those engaged in the green nuclear debate.

## Instrumentally Rational Environmentalism

The situated environmental logics underpinned by instrumentally rational arguments are identified as amenity and target-based logics. The situated amenity logic predominantly informed the environmental nuclear debates during the 1950s and 1960s when environmental awareness was low and debates focused on short term issues surrounding the visual effect of nuclear installations. Groups concerned with amenity issues illustrated instrumental rationality in their quick definition of specific problems and their acceptance of instrumental solutions. The instrumentality appears symptomatic of a lack of concern with the moral and ethical need to protect nature and the practical valuation of nature as an entity to be maintained for human convenience.

**Table 43 A Taxonomy of Situated Environmental Logics and their Respective Actor Groups**

<b>Social Relations &gt; Rationality type</b>	<b>Particularistic</b>	<b>Universalistic</b>
<b>Instrumental Rationality (IR)</b>	<i>Amenity</i>  landscaping and monitoring at the reactor site level  Environmentalism as local amenity	<i>Target-based</i>  Setting and meeting of environmental targets at policy level  Environmentalism as global targets and objectives
	Actor groups: Individuals or community groups with interest in local amenity.	Actor groups: Government energy departments (DECC), energy generators.
<b>Substantive Rationality (SR)</b>	<i>Community</i>  Specific and isolated resistance to environmentally concerned plans at site level  Environmentalism as local protection. Focus on particular ecosystems or habitats based on geographical location.	<i>Social Movement</i>  Foundational source of environmental values at global/national level – political agenda  Environmentalism as global change and ecological priorities
	Actor groups: Local Planning Authorities, Local Councils, community groups	Actor groups: EMOs

*Source: Informed by the work of Biggart and Delbridge (2004)*



The Department for Power very rarely considered environmental amenity issues in the judgement of energy option legitimacy unless an installation was flagged as a threat to protected flora and fauna (the Isle of White MAGNOX station was cancelled on such grounds). Instead, local communities living near nuclear installations would sometimes complain of the negative impacts upon the amenities of the countryside and the Government would provide solutions which worked with the amenity based diagnosis. For example the Department for Power landscaped around the early offending reactors because the locals did not like the appearance of the installations. Interestingly in the 1970s, during which the public moved away from amenity concerns towards more substantive apprehensions, the Department of Energy continued to propose amenity based responses to the public's problematisations. For example, the Government introduced measures to lessen the impact of nuclear stations on their immediate surrounding area after the Flowers Report in 1976, but in doing so they failed to provide any substantive response to the worries of the environmental movement. These measures illustrated a clear misunderstanding by the Department of Energy of the emerging public insight into the moral ecological complications of nuclear power.

Moreover the situated amenity logic appeared to be an antecedent to the target-based logic. The industry's reaction to the Flowers Report culminated in the establishment of advisory boards and monitoring schemes which worked to implement quantified and 'acceptable' pollutant levels. Targets were necessary to judge environmental adequacy, although importantly energy options were not opted for by the Department of Energy based on the need to meet these targets. Rather, much like other measures underpinned by the amenity logic in the past, the monitoring was purely to appease the critics once the decision had been made. Alternatively, the situated target-based logic underpinned judgements between energy choices, rather than merely forcing options already chosen to conform to set environmental standards. Additionally, target-based arguments were principally proposed by actors debating the configuration of national energy policy whereas amenity concerns were played out between specific communities and Government representatives in regards to certain installation sites.

Informed by an understanding that emissions targets equalled environmental action, the energy industry pursued a green energy policy throughout the '90s and '00s by comparing energy options based on their ability to meet emissions objectives. The international setting of binding targets at the Kyoto Protocol in 1997 solidified this instrumental approach and enforced a temporal element by requiring immediate environmental action for long-term conservation. As the binding targets made at Kyoto drew nearer, particularistic social relations between the Government and

communities became rarer. Instead, the Department of Energy was increasingly faceless and universalistic. This was illustrated by IROPI in the late 2000s. When the National Policy Statement in 2009 outlined potential nuclear sites which had passed the Governments siting assessments the Government hoped to speed up the planning processes by ruling that local planning meetings would not discuss siting choices, just local implications. Whilst communities were silenced from questioning overall nuclear policy each site was officially justified under the term IROPI which claimed that the ecological damage identified by the assessments was overruled by Imperative Reasons of Overriding Public Interest. In other words, meeting carbon targets was more important in terms of environmental protection than local ecological damage.

### **Substantively Rational Environmentalism**

Situated environmental logics underpinned by a substantively rational argument were the social movement and community logics. Nuclear power faced its most prominent battle for legitimacy against a very public environmental movement which engaged society in debates around radioactive-waste and proliferation. As shown in the literature, social movements bring with them new logics (Rao, Monin and Durand 2005) that tend to have broad moral and social goals which are reinforced by the substantive rationalisations of their constitutive actors such as EMOs. The global environmental movement of the late 1960s and 1970s had brought international EMOs into the UK which focused on national policy issues. These EMOs problematised nuclear from their own ecological ethics, presenting disputes which could not be solved through solutions previously appropriate in overcoming amenity anxieties in the 1950s and 1960s. In many ways, the EMOs engaged in universalistic social relations with the pro-nuclear lobby because of their generic anti-nuclear stance. On the other hand, there was some cross-over between the broad agenda of the social movement and the particularistic communities. EMOs would mobilise, support and back local nuclear campaigners, thereby involving themselves in particularistic debates. Both these local and nationally based anti-nuclear environmental groups rejected nuclear builds given their substantive valuation of nature and the environment. For them, nuclear power could never be acceptable because of the environmental risk it posed and the natural harm it had the potential to cause.

The differing objectives of EMOs and community actor groups created a clear distinction between the community environmental logic and the social-movement logic. This is because the alternate goals of each group influenced the kind of social relations they participated in. For community actor groups, the objective was to protect a very specific area of land. Although sometimes evident in the media, their short-term mobilisation meant that their presence in the Press was often short lived or referred to under the broad and unelaborated term 'environmentalism'. Much like those with

amenity concerns, they partook in specific planning inquiries in relation to sites in their 'back yard' (although it is possible that some were also members of EMOs). On the other hand, EMOs were well funded and mobilised around policy issues with long-term objectives which were aimed at national Government. Their informed critique of Government attracted substantial media attention and accounted for why EMOs were well represented in newspapers. Interestingly, their universalistic political agenda also put them in conflict with community groups over installations such as wind farms because they had environmental implications at a site level. Nevertheless, in the nuclear debate EMOs and community groups tended to support each other as their goals often aligned. Both were visible in environmental protests and Public inquiries (THORP and Sizewell) with the former providing detailed policy critique and the latter illustrating public frustrations and local ecological concerns. Often EMOs would financially support communities. For example at the Windscale THORP inquiry (which required oppositional parties to self-fund) community groups opposed nuclear power with the support of FOE who could afford to oppose BNFL at the inquiry. In the following section the chapter will discuss the implications and contributions of both the taxonomy outlined above and the multi-level narrative of logic situating with which this chapter began.

## **Contributions to Knowledge**

Biggart and Delbridge's (2004) system of exchange typology provides a framework for interpreting the impact of 'competing logics of action' (p45) which underpin multiple and distinctive understandings of the role and composition of a market. The same variables used by Biggart and Delbridge (2004) have been applied in a similar vein in order to demarcate between four qualitatively distinct approaches to environmentalism and 'rational' green action (Table 9). Each has been distinguished by an underpinning situated environmental logic which informs and reflects the nature of different actor groups engaged in the green nuclear debate. The situated logics identified illustrate the multitude of ways in which the values of a single environmental societal logic can be reinterpreted, enacted and situated within specific actor groups who are differentiated based on their approaches to rationality and the form of social relations in which they partake. The discussion extends Biggart and Delbridge (2004) in two key ways. Firstly, their framework is applied outside of the 'market systems' approach and provided utility in distinguishing between varying manifestations of societal institutional logics. As explained previously, actors contribute to the emergence of a situated logic within their 'groups' by theorising and legitimating its central themes from a position of embeddedness. As such Biggart and Delbridge's dimensions (rationality type and

forms of social relations) are meaningful in delineating actor groups predisposed to developing differing situated logics precisely because they are prevalent yet distinct institutionalised features of each group's context – which then become unconsciously inculcated during theorisation and legitimisation processes. It is therefore likely that a similar application to the one achieved here could result in the discovery of various situated logics within multiple industries and pertaining to other societal logics.

Secondly, Biggart and Delbridge (2004) do not discuss the ways in which systems of exchange may come into tension yet this thesis illustrates how each situated logic has the potential to be in contradiction with another when mobilised around a common debate. This is primarily because an action considered rational by actor groups with a predominant sense of instrumental rationality may clash with more substantively rational actors if the action is considered in contradiction with an entrenched form of substantive value. The green paradox of nuclear power is explained by showing that actor groups engaged most heavily in the green nuclear debate (the energy industry and the EMOs) are unlikely to reconcile over nuclear power because their arguments are underpinned by different approaches to rationality and thereby informed by different situated logics. These extensions of Biggart and Delbridge's (2004) work have permitted a theoretical contribution which has broader appeal within institutional theory. Specifically, the idea that multiple situated logics may exist and compete within a single debate (and implicate a single industry) contributes to considerations of institutional complexity and logic interaction. Greenwood et al (2011) showed how institutional complexity can mean that a specific societal logic may become resisted at a more geographically local level because of community based institutional histories which align with oppositional societal logics. These findings both support this theoretical movement towards understanding the logics of specific communities, and extend it by illustrating how one societal logic may manifest in multiple ways and come into tension with itself based on the institutional histories of specific actor groups. By doing so, institutional complexity is increased because one has to understand both the institutional origins of the situated form (the real institutional logic and its generative mechanisms) as well as the embedded agency which contributed to its development, and the continual interaction between the two which reinforce and reconstitute it over time.

Additionally, the multi-level institutional work narrative provided at the beginning of this chapter theoretically contributes to existing literature in the field in two ways. Firstly, it speaks to the role of institutional work processes in interconnecting levels of analysis. Although scholars have accepted that institutional work occurs at various levels of analysis (Tracey et al 2010, Lawrence et al 2011) those who fully combine a multi-level analysis within research on institutional work have

focused on the capacity of the actor to transcend the totalising influence of institutions. As a result much institutional work literature has provided overly 'bottom-up' analyses whereby the institutional context is under theorised (Hwang and Colyvas 2011). This discussion has looked to avoid an over-focus on agency by showing how actors, although responsible for institutional work, enact intentional behaviours within the bailiwick of their own institutional contexts. Actors reflect and act on opportunities presented to them from shifting societal discourse or social movements if they have the knowledge and political capacity to do so. Their 'acting on' an opportunity, in the form of institutional work processes, is predominantly a discursive task (legitimation and theorising in particular) which is enacted within, and is moulded by, their institutional context. In other words, given that situated logics are reflections of actors' theorisations and their concurrent discursive strategies, any emergent situated logic will not only be a reflection of an actor's interests and intentions, but will likely reflect the historically institutionalised nature of that actor's context. Additionally the new logics' institutional alignment with such a context may be necessary for its long term survival, as without such alignment it may not be readily operationalised. For example, if the target-based environmental logic did not legitimate emissions proxy's the energy industry would have struggled to integrate it into their own systems for decision making.

The multi-level narrative also contributes to existing literature by taking seriously the 'origins' of more 'local' level logics. Previous research within neo-institutionalism has often failed to clearly delineate how lower level institutional logics (within fields, industries or organisations) are defined and constructed. That is, the logics identified within institutional literatures are rarely linked back to the societal logics identified by Friedland and Alford (1991) or Thornton et al (2012). Recognising that societal logics may become situated allows researchers to consider how actor groups embedded within multiple institutional structures effect the manifestation of societal logics. Structural determinacy and scientific diffusion metaphors (Zilber 2002) are overcome by the recognition that agentic institutional work affects the nature of situated manifestations, yet voluntarism is avoided by considering agency as bounded by their immediate institutional context. Primarily it is the institutional work processes (legitimation, theorisation and valorisation) which discursively interconnect actors, institutional context and societal change, and thus actors take central stage in the initiation of change. Moreover, this research builds on literature which has shown how institutional work may not ultimately lead to desired material outcomes, yet may initiate long-lasting and successful institutional change (Mutch 2007 and Tracey et al 2010). It elaborates this literature by more specifically detailing the role of emergence and its relationship with forms of power and social action. In this vein the thesis has shown how institutional entrepreneurs are unlikely to consciously create institutional change or design a new institutional

logic. Instead their actions may be motivated by their own interests and power to act which can lead to processes of theorisation, legitimation and valorisation becoming successfully diffused and embedded in both practice and language. Additionally, that which is diffused may become institutionalised apart from the original material practice to which they were originally linked.

Furthermore, power is rarely discussed within neo-institutionalism yet it is important in understanding how embedded institutional work comes to be mobilised. Politically motivated institutional work processes were successful in initiating change primarily because those enacting them were in positions of elitist power (Zald and Lounsbury 2010, Reed 2012). More specifically they were part of a deliberately engineered (and embedded) 'energy elite' within Government tasked with reviving the nuclear power industry, and were increasingly backed by a growing international expert elite related to CC. The energy elite, in their original pursuit for favourable nuclear energy policy, used their authoritative power and bureaucratically defined responsibilities to establish regulatory bodies and legally binding policies which enacted green agendas fixated on meeting emissions objectives. In so doing, they ensured the continuation of target-based environmentalism after the financial collapse of the nuclear industry in 1989. In sum, the energy elite were the actors responsible for the continual emergence of the situated target-based environmental logic. By combining an understanding of elites with that of institutional work this research contributes to current institutional literature by acknowledging the role of power (national and international) and its contribution to new institutional logic formation. Certainly power within institutional analysis is heavily under theorized and is often implicitly regarded from a resource-dependency perspective alongside theories of social position (Battilana 2006) and embeddedness (Greenwood and Suddaby 2006). However, by drawing on elite literature and its conception of 'command situations' (Reed 2012) it is possible to integrate institutional work research with a recognition of actor's locations within vertical and hierarchical structures of domination in order to better account for their propensity to act.

The role of Critical Realism and its relationship with the multi-level approach adopted within this discussion should also be noted as a contribution to current institutional theorising. This research represents one of a handful of studies which have overlaid institutionalism's levels of analysis (individual, organisation and society) with CR's stratified ontology and agency/structure duality (Leca and Naccache 2006, Wry 2009, Delbridge and Edwards 2013). As discussed, agency is considered an embedded empirical level phenomenon, yet can be held apart from the structures which embed it so that the relational dynamic between the two can be better understood. In this analysis, actors are not dis-embedded from the social world during the act of initiating institutional change but are instead considered ontologically distinct from it and with their own causal powers.

This is in line with both Leca and Naccache (2006) and Wry (2009) who have argued that institutional entrepreneurs may 'use' the causal powers of logics to reinforce or challenge institutions. In other words, the ontological separation of agency from structure provides room to conceptualise how actors may, through institutional work (intentional or not), come to uniquely configure the generative mechanisms of social structures such as institutional logics in ways which may define new institutionalised rules, norms and conventions (also see Mutch 2007).

Moreover, this discussion extends their argument by suggesting that actors may utilise the causal powers of societal logics (without the knowledge of doing so) in ways that configure them to align with the pre-existing configurations of the causal powers of other logics with which they must co-exist. For example, the process of valorisation shows how the situated manifestations of a market logic and an environmental logic were able to coexist because the environmental proxy of 'carbon' could be monetised and traded (carbon capitalism). This process leads to a configuration of causal powers or generative mechanisms in the realm of the actual which is both distinctly related to a specific societal logic, but which can align with an historical and institutional context at a lower level of analysis in which other logics are situated. Such a suggestion reaffirms the continual impact of the realm of the actual (institutions) on the ways in which actors relate to and utilise 'real' social structures. It also illustrates that societal logics can coexist at a situated level in certain conditions if they share similar characteristics which allow actions deemed as legitimate by each to be met. In terms of the example, the carbon price provided nuclear power with the means to be financially viable whilst also reaching carbon targets. Of course, further research might want to look more in depth at the mechanics of this coexistence and to understand in more detail the relationship between the logics and the role of agency in their alignment.

Finally, the use of media documents and the methodological focus on discursive strategies has brought to light a number of legitimating strategies previously not identified within the literature. Normalisation, authorisation, moralisation and narrativisation were all identified in concurrence with the findings of Vaara and colleagues (2006). The identification of discursive strategies was integral in understanding how nuclear power was legitimated, and provided a basis from which to reproduce the institutional logics being drawn on, contested and negotiated. The use of a variety of newspapers was particularly useful for such an endeavour because they portrayed a diverse mix of politically charged perspectives and provided a rich view of background context. Not only is such a methodology relatively innovative within institutionalism, but previously unrecognised discursive legitimisation strategies were also noted. For example, distancing strategies are used to disassociate two practices which may lose legitimacy if conceptually connected. Distancing strategies were vital to the nuclear industry in the early decades of the nuclear programme in order to disconnect

nuclear power from nuclear armament. In particular the UN's IAEA used a distancing strategy as its tag line 'Atoms for Peace'. Additionally a discursive strategy labelled 'accommodation' was identified during the latter decade of the case. The use of accommodation was most prevalent in the 'lesser of two evils' discourse whereby pro-nuclear actors attempted to marginalise oppositional discourse by accommodating it into their own discursive strategies, within which they then downplayed its relevance through referral to more threatening discourses such as CC. Although theoretical generalisability of the strategies identified may be low due to their specific relevance to the issues of the case study, they nevertheless extend the body of literature on discursive strategies.

## **Utility of an Environmental Logic**

The four types of situated environmental logic provided within this discussion illustrate the different ways groups of actors engaged in the green nuclear debate understood the relationship between society and nature. The research highlights that the natural environment is not merely part of an organisation's technical environment (Scott 1991). Actors' understandings of what constitutes environmental action are determined by institutionalised meanings residing within the institutional environment. At the societal level an environmental institutional logic informs actors of the need to protect and conserve nature and ecosystems, yet it manifests within groups of actors depending on their own interests, historical contexts and predominant rationality types. This societal environmental logic therefore becomes enacted in various ways and informs differentiable understandings of the relationship between society and nature, which further inform how individuals perceive the environmental credentials of certain practices. This is an important contribution because it moves institutional theorising away from its tendency to objectify and externalise the natural environment in its analysis (Maguire and Hardy 2009, Hoffman 1999). By considering an environmental institutional logic it is possible to understand how institutionalised understandings of what nature 'is' affects behaviour towards environmental policy, carbon mitigation and environmental law, among many other issues.

The findings of this research have illustrated the utility of this conceptualisation. Institutionalised approaches to the natural environment clearly affected the perceived legitimacy of the nuclear programme to various audiences. The future of the nuclear power industry depended on the emergence of the situated target-based environmental logic to align it with environmentally orientated societal expectations. Indeed, the green paradox of nuclear power was not a mere side debate to larger issues of resource supply or the market, but was central in the discussion over long



term energy policy. Without the development and adoption of an environmental societal logic throughout this research the negotiations over nuclear power's legitimacy could not have been clarified. This thesis therefore suggests that the addition of an environmental institutional logic to the logics already accepted as constitutive of the intra-institutional system (Thornton and Ocasio 2008, Friedland and Alford 1991) is necessary at a time when environmental consideration is attracting increasing scholarly attention within the organisational studies discipline (Goodall 2009). It seems surprising that so far this has not been pursued by key theorists within the discipline (Thornton et al 2012).

## **Limitations**

Practical limitations to the size and scope of the case study meant that certain areas of interest could not be discussed. Broadening the case study may have provided further insights into the institutional structure of the energy industry. For example, a closer look at the debates around renewable technologies may have shed more light on the Government's approach to nuclear power in the 1990s and 2000s. Given limitations of case study size there is a possibility that the evidence was not 'saturated' (Houston 2010) and that other connections and social activities could have explained elements of the analysis differently. Moreover the theoretical contributions proffered by this research project would benefit from verification in other fields of study. Certainly this study provides a starting point to understand how an environmental logic affected the legitimacy of the other energy industries such as coal and oil.

Additionally the construction of the case study relied heavily on media documents which may be perceived as ambiguous in their intent. Much effort was taken to maintain connections between media articles and their historical context, yet there are many ways in which a single text can be read and interpreted. Also it is difficult to identify whether an article is from the perspective of the newspaper or journalist, or whether it represents the feelings of the public. Riaz et al (2011) regard journalism as institutional work, yet to understand the institutional work underpinning 500 articles and the implications upon analysis would be highly time-consuming. Nonetheless, all articles were analysed and interpreted with sensitivity to the historical context of the articles as well as the political interests of the newspapers. Indeed, it was the political and journalistic differences between newspapers which led to a separate case-study being built for each. By constantly re-reading and referring back to newspaper based case studies certain arguments and discursive strategies could be directly linked to the political endeavours of certain papers. Therefore, all

feasible effort has been taken to make clear the associations between certain arguments and particular newspapers when deemed necessary.

A third limitation relates to the lack of additional data types. Interview data collected from both industry historians and from industry representatives may have supplemented the evidence gathered from texts and provided a fresh perspective on the case study. However, the budget and time scale of this research project meant that the addition of a second method of data collection would have been difficult, especially given the lengthy and necessary process of transcription. Additionally interview transcripts would require methodological reconsideration and integration which would have added cumbersome complexity to the research. Fortunately there was plentiful document data on all aspects of the case study and both Government and media texts covered the 60 years with consistency. Nevertheless, if there was more time and a higher word limit then interview data would likely have been sought. Certainly interviews would be important in the development of the research findings and likely to be of most help once certain contributions are put under further scrutiny.

## **Future Research**

The development and application of an environmental logic provides future researchers with a conceptual tool to understand how actors work within, and engage with, institutionally defined notions of 'environmentalism' and 'nature'. It is hoped that future research within the domains of environmental responsibility, sustainability and conservation, for example, might apply an environmental institutional logic in order to more deeply engage with the social dimensions of the natural environment, rather than treat it as an objectified resource with a fixed and static meaning.

Additionally this research has suggested the propensity for particular industries to be characterised by prevalent forms of rationality which affect their approach to certain issues. Although focus has been on the energy industry, future research may find value in exploring the impact of rationality types comparatively across multiple industries. In particular it would be interesting to compare energy industries and their varying (or not) approaches towards environmental protection. This is based on the assumption that different energy industries would be characterised by alternate rationality types. For example, it was noted in the findings that the Government supported renewables in the 1990s precisely for the same instrumentally rational reasons they supported nuclear power in the 1950s – for future economic prosperity (a world leading green technology sector) and resource security. By the late 2000s the possibility of renewables to meet these

objectives and impending carbon targets was severely questioned and the Government's planned reliance on renewable technology was scaled back. Future research might explore how the renewables industry perceived itself in terms of its environmental mission and whether it embraced the target-based environmentalism of the wider energy industry, or found itself in tension with the resultant expectations of efficiency and cost, and the apparent disregard of other more substantive forms of environmentalism. Supplementary research in this area would more fully develop an understanding of the environmental tensions between the renewables industry (and its EMO supporters) and alternative energy industries, ultimately providing insight into how such tensions could be minimised.

The above is related to the future possibilities of applying the concept of 'situated logics' to explore the institutionalised rules and conventions informing contradictions over the meaning of practices within individual industries. Research utilising and extending this concept might find its utility in recognising and explaining the contesting approaches to a practice of interest which appear informed by a single societal logic. Indeed this may provide a means for institutional research to go beyond the 'one societal logic versus another' model and towards a recognition of societal logic inconsistencies. It also begs the question of the extent to which institutional logics are decomposable. In other words, future research may look to understand whether, and through what processes, actors decompose institutional logics (for example, by de-aggregating their generative mechanisms) when attempting institutional change projects. This requires a more advanced development and definition of an 'institutional logic' and the ways in which agency interacts with its 'parts'. A more stringent application of an ontological framework such as Critical Realism may aid such a research agenda because it proposes a theory which relates to the components of social structures such as their causal properties and generative mechanisms.

Theoretically there is further scope to examine the interactions between powerful elites, institutional work and institutional histories. Nascent and upcoming literature on 'institutional biographies' (Lawrence et al 2011) and 'institutional portfolios' (Suddaby and Viale 2011) suggests that the personal backgrounds and institutional histories of individuals can provide valuable insights into their propensity to act. Certainly a more detailed look at the backgrounds of those constituting the energy elite might provide greater detail regarding their power to form and diffuse influential theorisations. Another avenue for prospective research involves an engagement with the links between rhetorical appeals, discursive strategies and types of rationality related to the institutional logics to which they refer. Moreover the energy industry is not well-researched within institutional literature (Sine and David 2003, Sine and Lee 2009) which tends to focus on the contradictions and negotiations which occur between actors informed by professional and market based logics

(Townley 2002, Thornton 2004, Greenwood and Hinings 2005). Indeed, the recognition of an environmental societal logic provides an avenue for institutionalists to research the institutional dynamics of other empirical contexts which are not characterised by professional versus managerial conflicts – such as the on-going conflict over the UKs energy policy.

Ultimately the findings proposed by this thesis provide the theoretical foundations for future research to explore the novel interactions between situated institutional logics in numerous different settings. Additionally the combination of levels of analysis, institutional work, power elites and discursive legitimation within the thesis provides a basis with which to begin the detailed examination of how all these institutional ‘tools’ of analysis can combine to comprehensively explain an institutional phenomena such as nuclear power’s ‘green paradox’. Finally, there is much work still to be done in the development of an environmental logic, yet its utility in addressing a major research gap within institutional literature – the lack of environmental consideration – is unquestionably evident and deserves academic embellishment in the future.

# Acronym Key

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Acronym	Meaning
<b>AEA</b>	Atomic Energy Authority
<b>AERA</b>	Atomic Energy Research Authority
<b>AERE</b>	Atomic Energy Research Establishment
<b>ACAE</b>	Advisory Committee on Atomic Energy
<b>AGR</b>	Advanced Gas-Cooled Reactor
<b>AoS</b>	Appraisal of Sustainability
<b>APC</b>	Atomic Power Constructors
<b>AWRE</b>	Atomic Weapons Research Establishment
<b>BE</b>	British Energy
<b>BEPO</b>	Britain Experimental Pile Zero
<b>BERR</b>	Department for Business, Enterprise and Regulatory Reform
<b>BNDC</b>	British Nuclear Design and Construction Ltd
<b>BNFL</b>	British Nuclear Fuels Limited
<b>CANDU</b>	Canada Deuterium Uranium
<b>CC</b>	Climate Change
<b>CCGT</b>	Combined Cylinder Gas Turbine
<b>CCS</b>	Carbon Capture Storage
<b>CEGB</b>	Central Electricity Generating Board
<b>CND</b>	Campaign for Nuclear Disarmament
<b>COP</b>	Conference of the Parties
<b>CoRWM</b>	Committee on Radioactive Waste Management
<b>CSD</b>	Commission on Sustainable Development
<b>DECC</b>	Department of Energy and Climate Change
<b>DEFRA</b>	Department for Environment, Food and Rural Affairs
<b>DM</b>	Daily Mirror
<b>DTI</b>	Department of Trade and Industry
<b>EA</b>	Environment Agency
<b>EEC</b>	European Economic Community
<b>EMO</b>	Environmental Movement Organisations
<b>EU ETS</b>	European Emissions Trading Scheme
<b>EURATOM</b>	The European Atomic Energy Community

<b>Acronym</b>	<b>Meaning</b>
<b>FOE</b>	Friends of the Earth
<b>FBR</b>	Fast Breeder Reactor
<b>GEC</b>	General Electric Company
<b>GHG</b>	Greenhouse Gasses
<b>HLW</b>	High Level Waste
<b>HSE</b>	Health and Safety Executive
<b>HTR</b>	High Temperature Reactor
<b>IAEA</b>	International Atomic Energy Authority
<b>IFCE</b>	International Fuel Cycle Evaluation
<b>ILW</b>	Intermediate Level Waste
<b>INC</b>	Intergovernmental Negotiating Committee for a Framework Convention on Climate Change
<b>IPCC</b>	Inter-governmental Panel on Climate Change
<b>IROPI</b>	Imperative Reasons of Overriding Public Interest
<b>LCPD</b>	Large Combustion Plant Directive
<b>NATO</b>	North Atlantic Treaty Organisation
<b>NCB</b>	National Coal Board
<b>NDA</b>	Nuclear Decommissioning Authority
<b>NDF</b>	Nuclear Decommissioning Funds
<b>NE</b>	Nuclear Electric
<b>NEA</b>	Nuclear Energy Agency
<b>NEC</b>	Nuclear Energy Company
<b>NETA</b>	New Electricity Trade Arrangements
<b>NFFO</b>	Non-Fossil-Fuel Obligation
<b>NII</b>	Nuclear Installations Inspectorate
<b>NLAB</b>	Nuclear Liabilities Assurance Board
<b>NNC</b>	National Nuclear Corporation
<b>NPPC</b>	Nuclear Power Plant Company
<b>NPS</b>	National Policy Statement
<b>NPT</b>	Nuclear Proliferation Treaty
<b>NRPB</b>	National Radiological Protection Board
<b>NUM</b>	National Union of Mineworkers
<b>NUTS</b>	Nuclear Utilisation Targeting Strategy
<b>MAD</b>	Mutual Assured Destruction

<b>Acronym</b>	<b>Meaning</b>
<b>MMM</b>	Markal-Macro Model
<b>MOX</b>	Mixed Oxide (fuel)
<b>MWs</b>	Mega-Watts
<b>OCNS</b>	Office for Civil Nuclear Security
<b>OECD</b>	Organisation for Economic Co-Operation and Development
<b>ONR</b>	The Office for Nuclear Regulation
<b>OPEC</b>	Organization of the Petroleum Exporting Countries
<b>PWRs</b>	Pressurised Water Reactors
<b>RO</b>	Renewables Obligation
<b>ROC</b>	Renewables Obligation Certificates
<b>SALT</b>	Strategic Arms Limitations Treaty
<b>SALT II</b>	Strategic Arms Limitations Treaty II
<b>SEA</b>	Strategic Environmental Assessment
<b>SGHWR</b>	Steam Generated Heavy Water Reactor
<b>SMOs</b>	Social Movement Organisations
<b>SSA</b>	Strategic Siting Assessments
<b>SSEB</b>	South of Scotland Electricity Board
<b>THORP</b>	Thermal Oxide Reprocessing Plant
<b>TNPG</b>	The Nuclear Power Group
<b>TMI</b>	Three Mile Island
<b>TUC</b>	Trade Union Congress
<b>UK</b>	United Kingdom
<b>UKAEA</b>	United Kingdom Atomic Energy Authority
<b>UKERC</b>	UK Energy Research Centre
<b>UKSO</b>	UK Safeguards Office
<b>UN</b>	United Nations
<b>UNEP</b>	United Nations Environmental Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>USSR</b>	Union of Soviet Socialist Republics
<b>WMO</b>	World Meteorological Organization

# Appendices

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## **Appendix 1: Reactor Types in the 1970s**

The inefficiency and escalating costs of the British AGR reactor type forced the industry to reconsider its preferences for the third programme. Without knowing which reactor to build and with no orders for AGRs from international nuclear nations, construction consortia were struggling to remain buoyant within a market of multiple players and low order volumes. The Science and Technology Select Committee recommended that a single consortium be created to focus firmly on the new British Steam Generating Heavy Water Reactor (SGHWR). Following the committee's advice, the Conservative Government in the early 1970s began a process of restructuring. A single design and building company called the National Nuclear Company (NNC) was established from an amalgamation of construction consortia (the Government and UKAEA took shares in the NNC, whilst the General Electric Company (GEC) ran it). Breaking from the committee's recommendations, the CEGB continued to favour the import of American Light Water Reactors or the newer American Pressurised Water Reactor (PWR) which had proven efficient and economical in the US. In an echo of the previous tensions between reactor designs, the UKAEA and Ministry of Power favoured the British developed SGHWR design. They considered the PWR problematic because it would require modifications to meet the UK safety standards and would disturb the perceived 'British-ness' of the nuclear programme. Finally, in 1974 a new Labour Government agreed with the Select Committee recommendations and the go ahead was given for the SGHWR to constitute the third nuclear power programme for the UK. In July 1974 Eric Varley, the new Secretary of State for Energy (1974-1975) stated that there was to be a programme of around 4000MWs of capacity to be met with SGHWRs to boost the British industry.

By 1977 the SGHWR programme was put on hold, with the CEGB and NNC recommending the AGRs and PWRs instead. A year later the Labour Government abandoned the SGHWR altogether and suggested that the CEGB and SSEB were instead to build more AGRs and one American imported PWR design, Sizewell C, dependent on the outcome of an inquiry. Additionally there was considerable excitement around a Fast Breeder Reactor (FBR) prototype which was running in the UKAEA's Dounreay research facility (set up in 1955). The FBR had the potential to offer the UK a means to create large amount of electricity with substantially higher fuel efficiency whilst simultaneously creating fuel for AGR reactors (FBRs and their earlier counterpart, High Temperature Reactors (HTR) are uranium fuelled and have the potential to breed more fissile



material than they use and create plutonium as a waste product). The third nuclear power programme was considered by many to be the prelude for a full-scale commercial FBR programme.

Similar arguments to those which characterised the late 1950s and early 1960s were playing out in the 1970s. Both the Labour and Conservative power Ministers were striving to buffer a fragile British nuclear industry by backing the UKAEA designed SGHWRs, and then AGRs when plans for the former fell through. With few threats to security of supply the choice between reactors boiled down to the CEGB's cost focus versus the Governments will to retain State dominance over energy resources. Further legitimacy of a nuclear programme lay in the market and resource possibilities of a future FBR programme which were exciting the press: It would be exportable, efficient and would minimise importation fuels. However, as the 1970s progressed the industry became increasingly pressured to respond to escalating concern that nuclear power had unique environmental implications. Judgements based solely on energy supply or market considerations were becoming problematised.

## **Appendix 2: Industry Privatisation**

Whilst the non-fossil-fuel obligation continued to ensure the sale of nuclear electricity to suppliers for the time being, the nuclear industry began to reform under the management of Nuclear Electric (1990-1995), Chaired by John Collier a former chair of the UKAEA, and the watchful eye of the new Office of Energy Regulation (OFFER) and the director general of electricity supply. In 1989-1990 the CEGB was split into three generating companies (Powergen, Nuclear Electric and National Power) and a separate transmission company (the National Grid). Nuclear Electric took control of all English and Welsh nuclear stations (Scottish Electric was responsible for the Scottish reactors) and was the only generating company to remain in State hands (and Scottish Nuclear which owned Scottish reactors). Nuclear Electric (NE) had its own board of directors which were tasked with reviving the fortunes of the nuclear industry in time for its 1995 review. With OFFER in place, a system of central planning was finally replaced by a dialogue between State policy and market forces as delimited by contracts. To maintain competition in the privatised energy industry OFFER prohibited mergers and takeovers among the electricity companies. Additionally, Government special shares in National power, PowerGen and NGC ensured fair competition in the introductory years of the 'electricity pool' (the heart of the energy market).

In response to NE's successes the 1995 review white paper entitled 'The Prospects for Nuclear Power in the UK' announced the Conservative Government's intention to privatise part of the

nuclear generation industry. It was decided that the nine Magnox stations owned by Nuclear Electric and Scottish Nuclear would be held by a State owned standalone company and would be integrated with BNFL. A holding company called British Energy (BE) was established in 1995 to contain those elements of both Nuclear Electric and Scottish Nuclear to be privatised (only the seven functioning AGRs and the PWR). In 1996 the process of privatising BE was initiated by the Department for Trade and Industry; all AGRs, the PWR and their liabilities in full were transferred over to the company. BE was floated and the Government pledged that no more public money would ever subsidise a nuclear project. To aid the transfer and to ensure aptitude in the new corporation the Government retained 'special shares' in BE and its subsidiaries. Moreover, the Nuclear Decommissioning Fund (NDF) was established to help BE pay the future costs of decommissioning by saving over time, monitored by five-yearly reviews of BE's decommissioning strategies by the Health and Safety Executives' (HSE).

## Appendix 3: Initial Coding Framework

First order event codes	Second order codes	
EI - Energy markets (general) EI - Renewables industry (general)		
EI-EC - Privatisation (negative) EI-EC - Privatisation (positive)		
EI-ENV - Benefits of green energy EI-ENV - Environment and energy (general) EI-ENV-CC - Climate change and energy (general) EI-ENV-CC - Energy Policy - carbon reduction		
EI-N - Alternative options (oppose) EI-N - Alternative options (support) EI-N - Energy diversity/supply EI-N - Industrial benefit/economic needs		
N - Nuclear integration in energy industry N - Nuclear opposition (general) N - Nuclear support (general)		
N - Ownership - boards/committees N - Ownership - regulators N - Ownership - reorganisation of industry		
N - Radioactive waste - disposal    N - Radioactive waste - storage    N - Radioactive waste (general)	Community repercussions Construction - disruptive Long term Environmental Damage   Community repercussions Construction - disruptive Long term Environmental Damage	(moralisation) (rationalisation)  (moralisation)   (moralisation) (rationalisation)  (moralisation)
N-EC - Economic viability (negative)	Cost escalation Unaffordable Market uncertainty Economic uncertainty Technological uncertainty	(rationalisation) (rationalisation) (rationalisation) (rationalisation) (rationalisation)

N-EC - Economic viability (positive)	Cost cutting	(rationalisation)
	Cost effective	(rationalisation)
	Current cost savings	(rationalisation)
	Future cost savings	(rationalisation)
N-EC - Industry in decline		
N-EC - Privatisation (negative)		
N-EC - Privatisation (positive)		
N-EMO - Emotional Appeal (negative)	Fear of nuclear	(moralisation)
	Future Generations	(moralisation)
N-EMO - Emotional Appeal (positive)	Justified	(moralisation)
	New challenges of tomorrow	(moralisation)
N-ENV - Environment and nuclear (general)		
N-ENV - Environment and nuclear (concern)	Mastery over nature	(narrativisation)
	Nature over-ruled - economic reasons	(rationalisation)
	Nature over-ruled - environmental reasons	(rationalisation)
N-ENV - Environmental constraints		
N-ENV - Nuclear an environmental option	Nuclear as best green option	(rationalisation)
N-ENV - Nuclear not part of environmental agenda		
N-ENV-CC - Climate change - nuclear (negative)		
N-ENV-CC - Climate change - nuclear (positive)	Nuclear as lesser of two evils	(rationalisation)
	No alternative to nuclear	(rationalisation)
N-ENV-CC - Climate change - renewables		
N-ENV-CC - Climate change and nuclear (general)		
N-POL - Political agenda		
N-POL - International implications		
N-POL - International regulations		
N-POL - National - election		
N-POL - National - party conflict		
N-SOC - Societal Implications	Health (concern)	(moralisation)
	Health (not a concern)	(moralisation)
	Impact on communities (concern)	(narrativisation)
	Impact on communities (not a concern)	(narrativisation)

	Safety (concern)	(moralisation)
	Safety (not a concern)	(moralisation)
N-TECH - Technological advancement	Faith in science/technological progress	(rationalisation)
	Nuclear problems can be overcome	(rationalisation)
	Nuclear advancing technology	(rationalisation)
N-TECH - Problem with low carbon alternatives	Economic issues	(rationalisation)
	Carbon target issues	(rationalisation)
	International market issues	(rationalisation)
N-TECH - Nuclear technology - higher risk		
N-T-FU - New Nuclear (2000s)	Technologically advances	(rationalisation)
	Technological predictions	(rationalisation)
	Nuclear Fusion	(rationalisation)
N-T-PA - Historical accounts (general)		
N-T-PA - Past problems	Unsafe	(rationalisation)
	Uneconomical	(rationalisation)
	Unnecessary	(rationalisation)
N-WEP - Disarmament/non-proliferation	Civil rights concerns	(narrativisation)
	Plutonium economy	(narrativisation)
	Terrorism	(moralisation)
	National security	(rationalisation)
N-WEP - Protest		
N-WEP - Power unlike weapons	Distancing	(distancing)
	Peaceful nuclear	(narrativisation)
N-WEP - Power same as weapons	Conflation	(distancing)

Key	
N - Nuclear	EI – Energy Industry
EC - Economic	ENV – Environment
CC – Climate Change	EMO – Emotional Appeal
POL - Political	SOC – Societal
TECH - Technological	FU – Future
WEP - Weaponry	

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