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Networks, power and knowledge in the planning system: A case study of energy from waste

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ABSTRACT

Understanding the nature of power relations has been integral to debates in planning theory and planning practice since the 1960s. Current theoretical approaches to planning and power have evolved to a state of pluralism which impacts upon how planning is conceived of and practiced. We seek to examine power relations and knowledge via a multidisciplinary case study of an energy-from-waste (EfW) development based in South Wales. Centred on a highly contested technology, incineration, this case study incorporates in-depth, longitudinal interview data with social network analysis to build up a picture of competing framings of environmental health risk. In local environmental debates, planners are expected to be able to help resolve competition between conflicting interests and yet, in reality, such conflicts often appear intractable and have long been dubbed wicked problems. This is especially the case for waste management. In our in-depth case study, significant pre-existing power relations existed between the local planning authority (LPA), which was also the lead co-developer in the EfW project, and the local community. In terms of methods, we have been keen to unearth data that allows us to explore the nature of institutional and networked power as it plays out within a community over time. It is our contention that too often the dynamics of power have been underplayed because it is studied as a snapshot rather than over time. Here we have utilised a variety of methods – from key person interviews to social network analysis – to examine the application for development, the operation of the EfW and the closure of the plant – over a ten year time frame. By drawing upon a rich database we can better understand the ways in which, in the case of particularly contentious developments, power relations greatly hampered efforts at public participation. Our nuanced methodological approach reveals empirical evidence for tensions in theoretical approaches to power relations in the planning arena and we can identify how debates can move forward based on a more geographically informed perspective. © 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

In this paper, we focus on power relations, networks and public participation in planning practice. We note how attempts over four decades to boost participation have come from a number of perspectives in planning theory – advocacy, radical/transactive, collaborative and Deleuzian – each based on a critique of prior theory and practice (Davidoff, 1965; Forester, 1989; Friedmann, 1973; Harvey, 1973; Hillier, 2008). Advocates of these perspectives regard power relations as being mediated through state-led national planning systems, and asymmetric differences in power as

responsible, in large part, for negative outcomes in social and environmental terms. Such critiques spurred on and overlap with the environmental justice literature. These critiques and the empirical evidence for them are made via recourse to normative approaches ‘needed’ to overcome the democratic deficits said to be inherent in the planning system (Bullard, 1990; Walker, 2012). Practical change to planning can be achieved by boosting community and individual participation in the planning process. Although this debate started in the 1960s, it still matters today in terms of how planning is conceived of and practiced. Planning theorists and practitioners continue to explore the ontological question of how actors’ perceptions of the world alter under conditions of uncertainty (cf. Christensen, 1985). This theoretical picture suggests planning practice is permeated by power relations.

Getting approaches to public participation right also matters to a profession whose political legitimacy, based on its technical,

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managerial and political expertise, is continually recast (cf. Rein, 1969). From the public's point of view, hoped-for gains in democratising national planning systems have not diffused at anything like the rate that early proponents of change initially anticipated (Irvin & Stansbury, 2004). Radical change has not occurred in part because planners deal with 'wicked problems' (Rittel & Webber, 1973). These social policy problems are evidenced in intractable land-use contestations between rival stakeholders. Policy solutions that are dependent upon technical expertise cannot necessarily be found in a 'rational' way by state managers or bureaucrats.

The paper makes a significant contribution to current debates on environmental planning and power. At its heart is a longitudinal case study approach which enables analysis of how debates on development continue after a decision has been made. Power relations are constantly made and remade as actors and networks interact or events move to the fore (such as the granting of a licence to operate). This suggests that actor and networks based on asymmetric power relations remain embedded in communities (cf. Hacking & Flynn, 2014). We offer a theoretical approach to the study of power relations, planning and public participation which suggests that planners need to operate with a variety of theoretical perspectives and approaches given competing claims to knowledge, expertise and power. This avoids being caught in the sil mentality that sometimes exists in planning theory (Rydin, 2007). We use a number of methods to show how power plays out in practice at the community level. For instance, we unpick the competing social constructions of knowledge of different stakeholders in the development using 'sociologic' diagrams (Latour, 1987). These sociologies vividly illustrate how actors relate to one another in networks. This is in terms of the knowledge and resources that actors marshal when seeking to win an argument over whether a proposed energy-from-waste (EfW) plant should be built and how it should be operated. In our case study, participatory efforts failed dramatically because of the high levels of public distrust in governance institutions. The power that was projected into this particular community, via an unwanted development, meant that resistance was inevitable. The community responded in three ways: first, some 'citizen scientists' (cf. Irwin & Wynne, 1996) tried to tackle the development on its own terms; second, some community members pursued direct action; and third, others stood by. In amongst these competing perspectives of disparate interest groups, planners needed to be reflexive about their own role in terms of power relations and how they themselves are a key structure projecting power into the community.

This paper is organised into a further five sections. In Section 2, we outline progressive shifts in paradigmatic thinking on public participation in planning in a thematic review of a directed selection of the literature. We cover three linked areas: evidence and analysis of social critiques, case study examples of social and environmental injustice, and normative suggestions for boosting public participation. Our conclusion from this thematic review is that existing theoretical approaches, which inform current planning practice, remain conflicted and require professional planners to retain a keen critical detachment about the ways they frame their activities (Pløger, 2001, 2004). This review informs our approach to the following sections.

In Section 3, we explain our case study methodology and analytical framework. We make use of sociologies to draw out the perceptions of key actors from Crymlyn Burrows in south-west Wales and the power resources that they draw upon. These map individual actors' knowledge construction and reveal the array of knowledge, procedures and norms that a particular network draws on in its efforts to overcome a rival network. The contestation was about the framing of risk from a contentious technology – the

incineration of mixed waste – since the perception of risk shaped how actors and networks behaved. For example, by imposing a low risk framing on the local community, the developer and regulator worked within narratives that promoted the benefits of EfW and drew upon well-established regulatory processes to legitimise their case. Finally, in this section, we use social network analysis (SNA) with twelve years' of meeting data from the community Liaison Committee of this energy-from-waste (EfW) development. The SNA further illustrates how events and actors interacted. It strengthens our analysis of how power is made and remade at the local level.

In Section 4, we describe the background history of the case study. Crymlyn Burrows is in the borough of Neath-Port Talbot in south-west Wales, in an area which has suffered a long history of environmental degradation. This history is directly linked to a sense of deep mistrust of public bodies by community members and this shaped the community response to incineration technology. The facility, the Materials Recovery and Energy Centre (MREC), was announced in 1998. Debate, albeit much more muted, continues in the present well after the facility was licensed in 2002. A distinctly asymmetric set of power relations between three networks – the regulator, the developers, and community and NGO dissenters – undermined opportunities for more constructive stakeholder dialogue in the planning process. In our interviews, these lost opportunities were reflected upon. NGO and community members pursued a rejectionist strategy based on the precautionary principle. They challenged the scientific basis for the developers' claims for the safety of the incineration process as citizen scientists (Brown, 1992; Elam & Bertilsson, 2003; Elliott, Harrop, & Williams, 2009; Irwin & Wynne, 1996). Others in the community, however, opted for direct action against the project. Ultimately, Section 4 sets the scene for the reporting on our case study findings which are presented in Section 5.

The material in Section 5 reveals the actors' constructed knowledge (shown via the sociologies). Interviews were part of a systematic data collection process that took place in 2009 and then again in late 2012. Since then we have remained in touch with key individual actors on a more ad hoc basis. The 2009 material focuses largely on events between 1998 and 2002 when the EfWs operating licence was granted. It offers a vivid illustration of the detailed technical sophistication of the opponents to the EfW plant. It also shows how quickly the debate on the merits and weaknesses of the EfW plant moved within and between the polarised networks. Data is then presented from a second round of interviews with the same group in 2012. This material concentrates more on activity at the site since 2002. There was a serious fire in 2003 which temporarily shut the plant and forced co-developer HLC out of the project. The MREC has been shut down twice more – in 2010 and 2012 – for breaches of its operating licence over dioxin emissions. Between 2002 and 2012, the sociologies reveal how constructions of knowledge and network allegiances have been resilient over time. What shifts most significantly from the licensing phase, up to 2002, to the operational phase is the emergence of a Liaison Committee. The activities of this potential 'hybrid forum' (cf. Callon, Lascoumes, & Barthe, 2009), where expertise could be put aside and open dialogue take place, are illustrated through the application of SNA. In the end, power played out very differently in practice in the relationships between Liaison Committee members. For several years, the committee was the focus of ongoing debate over the provision of and access to reliable emissions data, but by 2011 many of the original core community dissenters began dropping away. The core community dissenters argue that the committee is not a true hybrid forum after more than a decade with no resolution on key contested issues. In 2012, dissenters concluded that, for them, the level of engagement on offer only

represented a degree of tokenism (cf. Arnstein, 1969). In keeping with the specific history of the local community, opportunities for trust and public participation had once again been lost.

Finally, Section 6 draws together the analysis for this case study. It reviews the implications of our findings for planning theorists and practitioners. Having charted the fates of these three networks over time, we note the strong potential for countervailing political responses particularly in places where environmental injustice is believed to have occurred (Pulido, 1994, 1996). These responses were translated into challenges based on citizen science and/or attempts at more revolutionary, ‘rhizomic’ responses that entirely reject the confines of the planning system (Deleuze & Guattari, 1987), which also took place at Crymlyn Burrows. This detailed case study suggests a method for planners to reflect on the competing logics of stakeholders in a development (cf. Rydin, 2007). It is an approach that is more in-depth and potentially more fruitful than ‘locally unwanted land uses’ (LULUs) and ‘not in my back yard’ (NIMBY) (cf. Bickerstaff, 2012; Devine-Wright, 2011; Simmons & Walker, 2005). The frictions between perspectives – e.g. between a realist, governmentality-led approach to planning (cf. Mckee, 2009) and countervailing, ‘revolutionary’ demands to disrupt that process – will continue to be in evidence. This is especially the case in spaces of ‘trust-deficit’. If local government attempts to introduce technologies perceived to be environmentally degrading, as can be the case of waste management, they will not be welcomed. In these circumstances, and often over long periods of time well after a planning decision has been taken or waste licence has been awarded, planning practitioners must continue weighing up whether efforts at boosting public participation in the planning system are realistic, achievable and necessary. We argue that an improved conceptual framework is needed for understanding whether or not this is the case (Rittel, 1972; Rittel & Webber, 1973).

2. Power, planning and participation

This section involves a thematic examination of a directed selection of literature across several planning discourses: Marxist, advocacy, radical/transactive, collaborative, Foucauldian and Deleuzian. This in terms of: (i) how proponents conceive of power relations, (ii) which case study examples they cite relating to social and environmental injustice, and (iii) what normative changes are advocated in terms of public participation. We then examine the planning literature for what such insights mean in terms of reflexive planning practice. The literature recognises the value of local-level analysis as a window on power relations (Flyvbjerg, 2006) as well as the enduring appeal of debates on planning and power. Insights from the literature then inform our conceptual framework and the selection of the EfW plant as a case study. The literature is generally weak, however, in analyses of power. Significantly, local planning studies fail to grasp the value of a “more contingent, spatially relational account of how power works in practice” (Griffin, 2012, 209). We rectify this in our case study (see Section 5) where relationships, interactions and events are brought to the fore.

2.1. Perspectives on planning and power

We regard national planning systems as an arena of political negotiation in which land-use decisions are made. The planning system represents “important institutional terrain for the contestation of the meaning and relations of the ‘natural environment’” (Whatmore & Boucher, 1993, 168). The planning system also provides broad boundaries to planning activity. As such, the planning system regulates and guides planning practice. Friedmann and Hudson (1974, 2) refer to practice as an activity

“centrally concerned with *the linkage between knowledge and organized action*” (italics in original). It is what Forester (1999, 177) more broadly defines as the “organization of hope”. Planning practice thus identifies the locus, or loci, of political power. According to Forester (1999), this knowledge helps identify resource availability. Planning policy exists alongside the planning system. It represents the codification of the intentions of the planning system in terms of rules, regulations and guidance (cf. Owens, 1994). Planning theory has always been more problematic to define (cf. Friedmann, 1998). However, Allmendinger (2009, 2) suggests that:

“[T]here are theories of planning (why it exists and what it does) and theories *in* planning (how to go about it) ... theory in the social sciences is not immune from the influence of power and its wider social context, that is, there is a *political* and *temporal* element to theories.” (italics in original)

In our case study, a dissenter network assembled to defend their community. The network provided a means to challenge the assumptions and practices of EfW plant developers and the regulator. It drew on its own resources, raised its legitimacy within the community, its ability to nurture an alternative scientific expertise, and developed an alternative narrative challenging safety at the plant. Throughout the application and licensing process, and the subsequent operation of the plant, some outcomes were more heavily favoured than others (e.g. the approval of the developer application). Nevertheless, the dissenter network always challenged these assumptions. The playing out of interactions between the more and the less powerful in this case study demonstrates the ways that people and places are connected and how power is mediated in practice (cf. Allen, 2004). These issues, as we shall see below, have been discussed in the planning literature at length but are still not satisfactorily resolved.

2.2. Planning theory and practice

In this section, we introduce our review of a directed selection of the planning literature (see Table 1). We characterise how a pluralistic range of approaches emerged in the 1960s in response to the perceived deficits of synoptic planning. Given that this process continues today, this review will be returned to throughout our analysis.

‘Blueprint planning’, and later ‘synoptic planning’ with its intellectual underpinning in structural-functionalism, have their roots associated with the Modernist project. Proponents attempt to reach fixed objectives with certainty (Faludi, 1971). Involving relatively untrammelled state power, there is no need for the public’s input (this only occurs via the ballot box or dissent). Two key notions survived the early 1960s’ demise of blueprint planning: (i) planning is essentially apolitical, and, (ii) there is a single, unified public interest. As Alexander (2002) indicates, contemporary notions of the public interest are contested between different philosophical perspectives, e.g. utilitarianism, communitarianism and libertarianism, for example. Here, we recognise that contested approaches to the public interest have informed a range of critiques of synoptic planning as well as other planning discourses.

Synoptic planning appeared in the early 1960s. It remains the dominant approach of practitioners in North America and Western Europe. With its sequential and systematic approach, only limited public participation is permitted. Synoptic planning was immediately critiqued for its lack of appreciation of power relations. Theory and practice were said to be deeply mismatched as evidenced by empirical studies from the US and the UK. Hoped-for social outcomes on the ground were typically missed, it was claimed, in part because of low levels of public participation

Table 1
Thematic literature review for perspectives on planning and power relations.

Perspective	Marxist	Advocacy	Radical/transactive	Collaborative	Foucauldian	Deleuzian
Critique of planning	Class-based analysis	Groups' uneven bargaining power	Groups' uneven bargaining power	Groups' uneven bargaining power	Social constructivist approach	Decentred approach
Selected authors	Pahl (1970), Harvey (1973), Harvey (2000), Simmie (1974), Fainstein and Fainstein (1972), Fainstein and Fainstein (1974), Fainstein and Fainstein (1979), Castells and Sheridan (1977), Ambrose (1986) Marriott (1969), Elkin (1974), Massey and Catalano (1978), Ambrose (1986), Harvey (2000), Fainstein (2010) (n/a – a Marxist approach does not advocate public participation)	Davidoff (1965), Davidoff (1971), Peattie (1968), Kaplan (1969), Piven (1970), Mazziotti (1974) Peattie (1968), Kaplan (1969) Armstein (1969)	Alinsky (1969), Kravitz (1970), Grabow and Heskin (1973), Friedmann (1973), Friedmann (1987), Friedmann (1998), Friedmann (2008) Ambrose and Colenutt (1973), Ambrose (1974) Beard (2003)	Healey (1992), Healey (1997), Healey (1998a), Innes (1995), Forester (1989), Forester (1999) Harvey (1973), Healey (1973), Healey et al. (1978) Petts (1995), Goldstein and Butler (2010)	Foucalt (1991), Hillier (1993), Yiftachel (1994), Yiftachel (1998), Flyvbjerg (1996), Flyvbjerg (1998), Richardson (1996), Flyvbjerg and Richardson (1998), Flyvbjerg, Richardson, Allmendinger, and Tewdwr-Jones (2002) Flyvbjerg (1998), Flyvbjerg (1998) (n/a – a Foucauldian approach does not advocate public participation)	Hillier (2005), Hillier (2007), Hillier (2008), Gunder (2010), Purcell (2013) Dovey (2005), Wood (2009), Hillier (2007) Dovey et al. (2009), Nyseth et al. (2010)
Selected case studies revealing social/environmental injustice						
Selected case studies showing normative approaches to participation						

(cf. Ambrose & Colenutt, 1973; Elkin, 1974; Hall & Peacock, 1973; Meyerson & Banfield, 1955).

A variety of new planning discourses began to emerge. The practising planner, it was argued, no longer had an apolitical role. There was no unified public interest. Advocates of these new approaches provided case studies illustrating the negative outcomes of asymmetric power relations (e.g. Altshuler, 1965; Harvey, 1973; Davidoff, 1965). Since the 1980s, similar examples have been framed in terms of environmental justice (Pulido, 1994). These proponents of participation similarly offer normative suggestions for improving planning practice. Boosting public participation, they suggest, will inevitably help with intractable wicked problems over land use conflicts (Arnstein, 1969; cf. McDonald, 1989; Rittel, 1972). This selection of literature is examined thematically below.

2.3. Power relations in planning

A number of post-Modern and post-structural planning discourses emerged in the 1960s. These were used initially to critique synoptic planning's approach to theory and practice, but later they critiqued each other. For each perspective described below, Table 1 has three rows that are linked in terms of their argument, the evidence that they bring to bear and analytical implications:

- (i) literature containing the critique of planning and power relations,
- (ii) case studies revealing social/environmental injustice as evidence of (i), and
- (iii) normative approaches to public participation as a 'solution' to (i) and (ii).

Of the perspectives running from left to right in Table 1, Marxists were the first to critique structural-functionalism (e.g. Dahrendorf, 1959; Mills, 1956; Rex, 1961/2010). Marxism's revolutionary prescriptions share much with the more recent perspective of Deleuzian planning (Purcell, 2013). All perspectives shown in Table 1 place emphasis on power relations. All except collaborative planning avoid the presumption that actors in any planning system automatically desire social co-operation. Of necessity, no review can be comprehensive when there are such longstanding and wide-ranging debates in planning theory. Our concern has been to focus on those contributions where there is a more overt recognition of power relations.

2.3.1. Marxist approaches to planning and power

As the literature cited in the top row of Table 1 indicates, Marxist planning has an overt recognition of power relations based on a class-based critique. Co-opted individuals and institutions enact the centralised policy choices of others (cf. Kravitz, 1970; Simmie, 1974). These same actors are unreflective about their roles within local, regional and national power structures (Simmie, 1974). The planning system is an arena subject to overt political power. Pahl (1970, 191), for example, points out that:

"The built environment is the result of conflicts, in the past and present, between those with different degrees of power in society – landowners, planners, developers, estate agents, local authorities ... [and] ... The social structure is the key to the spatial structure."

The state has a critical yet deceptive role:

"[P]lanning potentially seeks to help sustain capital and even persuade people that it is acting on their behalf (through public

participation, etc.) while in reality it is really a façade for powerful interests.” (Allmendinger, 2009, 85).

Case studies of power relations – shown in the second row of Table 1 – reveal socially iniquitous outcomes for individuals and communities (Fainstein & Fainstein, 1972, 1974; Harvey, 1973).

By the early 1980s and into the 1990s, this literature overlapped with that of the nascent environmental justice movement. Case studies came from the United States, for example (e.g. Bryant & Mohai, 1992; Bullard, 1983, 1990, 1994; Geiser & Waneck, 1983). Empirical work linking power and race, although not always definitive (see Cutter, 1995), nevertheless provoking some planning practitioners to tackle power, racism and poverty in ways not being undertaken in the UK (e.g. Agyeman, Bullard, & Evans, 2003; Agyeman & Evans, 2004; Walker, 1998; Walker & Bickerstaff, 2000; Walker, Fairburn, & Bickerstaff, 2001).

In the UK, Marxist studies reveal significant disparities of wealth throughout the UK driven in large part by unequal patterns of land ownership (e.g. Massey & Catalano, 1978). Similarly, David Harvey explores the social processes at work in the urban regeneration of East Baltimore at the city and neighbourhood level (Harvey, 1973, 2000). He notes:

“[L]ow-income groups experienced great difficulty in actually getting into a negotiating position ... groups can effectively be excluded from the negotiating and bargaining game by institutional barriers or by manoeuvres of other groups. Only a strong and cohesive group will be able to overcome such barriers and get around the problem of what is called ‘non-decision-making.’” (Harvey, 2010, 78)

In this way, Harvey highlights one way that power relations are exercised at the micro-level. He suggests that those individuals and institutions with the power to include or exclude others from a network or forum will impact upon the ways that social justice plays out (Harvey, 2010). This is another important insight into the social processes underpinning our longitudinal case study which reveals efforts by more powerful actors to both include and exclude certain individuals and interest groups from the development process.

The Marxist critique of synoptic planning, however, does not promote public participation:

“[N]o scope for public participation ... no role was provided for the public ... the approach had little to offer the practising planner ... while the Marxists advocated grass-roots action, they offered no suggestions for coping with the dominance of the ‘haves’ rather than the ‘have nots’ in planning” (Lane, 2005, 294)

Two other approaches – advocacy planning and radical/transactive planning – also tackle the need to overtly recognise power relations. These are explored below.

2.3.2. Advocacy planning and power

Advocacy planning recognises the uneven bargaining power of different groups and their varied access to power structures. Lane (2005, 293) summarises its central tenets:

- (i) there is a profound inequality of bargaining power between groups,
- (ii) there is unequal access to the political structure, and
- (iii) there are large numbers of people who are unorganised and therefore unrepresented by interest groups.

The idea of a unitary public interest is rejected. Instead, as many marginal voices as possible are included. From this, advocacy planners are regarded as facilitators who encourage marginal

actors to participate in the planning process or advocate on their behalf. Taking their cue from the manifesto of Davidoff (1965), advocacy planners looked to the slums of Boston and the redevelopment of the cities around San Francisco, where effective political representation for residents of ethnically diverse and impoverished communities was rare (Peattie, 1968; Kaplan, 1969). In terms of advocacy planning’s normative vision, public participation became a central objective, not a technique to be added later. For example, as Table 1 indicates, Arnstein (1969) notes positive outcomes from increased participation for individuals involved in US Department of Housing and Urban Development (HUD) schemes. Such outcomes suggested power could be shared by improvements in process and participation. However, the relative power of protagonists still remains asymmetrically distributed in space.

2.3.3. Radical/transactive planning and power

Radical/transactive planning is based on an overt recognition of inequalities of access to power (Friedmann, 1973, 1987, 2008; Grabow & Heskin, 1973; Kravitz, 1970). Community involvement in a decentralised planning system is sought because of inequalities within and between communities and other interest groups (Friedmann, 1973, 1987). Face-to-face, interpersonal dialogue is pursued. Outcomes are evaluated in terms of mutual learning and linking knowledge to action (cf. Grabow & Heskin, 1973). Plans should have an “effect on people on their dignity and sense of effectiveness, their values and behavior, their capacity for growth through cooperation, their spirit of generosity” (Hudson, Galloway, & Kaufman, 1979, 389, italics in original). Social outcomes are considered more important than economic benefits.

Table 1 shows that early radical researchers in the UK drew on case studies including the UK commercial office building market (Ambrose & Colenutt, 1973), new developments in the village of Ringmer in East Sussex (Ambrose, 1974) and in Southwark in South London (Ambrose & Colenutt, 1973). Ambrose (1974, 220) found social and environmental injustice stemming directly from developers’ market actions:

“[S]omething is terribly wrong when developers ... can profit from millions of square feet of empty office space in London when countless men, women and children are homeless. So long as abuses such as these are possible, the quiet revolution is not yet complete.”

The radical vision is for “participation and empowerment ... [to] become goals to be attained rather than methods to be used” (Lane, 2005, 293). Radical dissenting strategies amongst communities (e.g. Beard, 2003) have achieved positive goals. Such strategy formation has direct relevance to our case study in terms of individuals attempting to overcome dominant neo-liberal governance arrangements.

2.3.4. Collaborative planning

Collaborative planning is a re-affirmation from the political left of a Modernist, structural-functionalist approach to planning theory (Forester, 1989, 1999; Healey, 1992, 1997, 1998c; Innes, 1995). Collaborative planning’s normative approach to conflict resolution emerged in the 1980s in recognition of the struggle with wicked problems. Drawing on Habermas (1968a, 1968b, 1981), power relations are recognised (e.g. Healey, 1973; Healey, Underwood, Mcloughlin, & Diamond, 1978), but generally de-emphasized.

Collaborative planning involves individuals moving: “towards inter-subjective mutual understanding” (Healey, 1992, 147–150) which will facilitate participation, interaction, reflection and social justice. From this, Healey (1998a, 1535) suggests that there will be the development of governance cultures in which:

“collaborative collective action is possible [and] will be more likely to resist forces leading to economic exploitation of people in places, to limit environmental degradation, and to maximise the possibilities of human flourishing in sustainable environmental relations than cultures which are dominated by individualist competitive strategies.”

Disputed by realist theorists as utopian, collaborative planning was nevertheless adopted by policymakers in the UK and US in the late 1990s (DTLR, 2001; Goldstein & Butler, 2010; Margerum, 2002; ODPM, 2002, 2004; Petts, 1995).

2.3.5. Foucauldian planning

Foucauldian planning came in response to the perceived shortcomings of collaborative planning’s Habermasian underpinnings. As described in Section 2.1, Foucauldian planning involves an assessment of state power via the governmentality approach (Dean, 1999; Foucault, Burchell, Gordon, & Miller, 1991; Miller & Rose, 1990; Rose & Miller, 1992). With governmentality, power relations are all-pervasive and expressed relationally between actors (Flyvbjerg & Richardson, 1998; Flyvbjerg, 1996, 1998; Hillier, 1993; Yiftachel, 1994, 1998).

In terms of defining power, and understanding how power relations are exercised, Foucault’s definition, based in part on Bentham and Marx, has proved popular:

“[T]here exists no *single* power, but several powers ... [including] forms of domination, forms of subjection, which function locally ... All these are local, regional forms of power, which have their own way of functioning, their own procedure and technique. All these forms of power are heterogeneous. We cannot therefore speak of power, if we want to do an analysis of power, but we must speak of powers and try to localize them in their historical and geographical specificity” (Foucault, 1976, cited in Crampton and Elden, 2007, 156).

For Foucault, this definition of *what* power is was further elaborated in his concerns for *how* power is made manifest. First and foremost, it is relational and performative. Only when it is exercised does power exist (Marshall, 1995). As Foucault (1982, 219) notes:

“The exercise of power is not simply a relationship between partners, individuals or collectives; it is a way in which certain action modifies others ... Power exists only when it is put into action”.

Secondly, Foucault was supremely conscious of how power is exercised oppressively instead of achieving liberal freedoms (Foucault, 1975, 1980). As Bevir (1999, 69) points out:

“Our modern society ... [does not defend] ... individual liberty in the way we might think it does. On the contrary ... liberal freedom [is] ... impossible ... [M]odern reason excludes ... the way modern power dominates the individual.”

Then, as Foucault (1976, 95) indicates: “Where there is power, there is resistance.”

Thirdly, Foucault explored how power is exercised via the state – through ‘governmentality’ – or what he termed the ‘conduct of conduct’ (Defert & Ewald, 1994, 237). From these tenets, a discursive form of governmentality was developed (Dean, 1999). At its heart, this discursive approach seeks to describe and explain the demands and social dynamics of governing a modern state, how power relations are exercised relationally, the resulting potential for oppression and countervailing geographies of resistance (Mckee, 2009). Governmentality also analyses how power creates knowledge, and specifically how the production of geographical knowledge can be used to control actors and

institutions in particular territorial spaces (Ó Tuathail, 1996; Rose-Redwood, 2006). The projection of ‘power at a distance’, essential for state control of territory, is achieved relationally through a variety of ‘technologies’ (Barry, 1996) which, to distinguish them from energy-from-waste technologies, we refer to as ‘procedures’. One set of procedures is via the planning system which can involve basic accounting systems and statistics, spatial plans, communications media, and development plans, for example. Along with human agency, these procedures help stitch and maintain governance networks. Relational links align ‘governed’ actors who are embedded in geographically remote areas (Mackinnon, 2000; Murdoch, 2004). Faced with wicked policy problems with divisive outcomes (cf. Alty & Darke, 1987; Davoudi & Atkinson, 1999; Healey, 1995, 1997), displays of governmental power in the planning arena result in adaptation (Mackinnon, 2000) or resistance (Raco, 2003).

Governmentality also provides a framework for understanding the indirect ways in which power structures individuals’ behaviour in other ways (Allen, 2004). Stakeholders behave responsibly because they understand what acceptable behaviour is and what they imagine to be the reality of their own circumstances (Griffin, 2012). Allen (2004, 23) suggests that for “embedded institutional practices”, governmentality is a plausible explanation for constrained agency. For instance, regulatory ‘intrusion’ into *local* spaces shapes the distinct responses that communities are permitted to pursue. However, the regulator in our case study failed to recognise the deep-rooted historical specificities of this community.

In succinct criticism of the governmentality approach, Griffin (2012) makes two pertinent points. First, governmentality gives insufficient attention to resource inequalities. As we shall see, regulatory and developer networks for the EfW were able to draw upon much greater resources than dissenters in exercising power. Second, it underplays individual agency. Governmentality suggests actors have to react to dominant discourses, such as those for the regulation of polluting industries (cf. Mckee, 2009). In our case study location, though, the dissenter network, although often working within regulatory procedures and norms, were able to develop an alternative discourse. This gave priority to their interpretation of the precautionary principle and how pollution might be measured independently.

Table 1 shows that the key Foucauldian case study is the in-depth examination of the redevelopment of central Aalborg in Denmark in the 1970s (Flyvbjerg, 1998). The civic contestation here involved:

“[P]ower relations ... [that] were of a pre-modern kind that could not be defended publicly vis-à-vis standards of modern democracy ... I found too little democracy.” (Flyvbjerg, 2002, 8–9)

This is relevant to our case study because local authorities with vested interests in development plans will inevitably consider excluding certain voices from planning debates. In this way, “[P]lanning and public participation are always permeated not only by power, but also by tactics, strategies, and the microphysics of power.” (Pløger, 2001, 228).

2.3.6. Deleuzian planning

More recently, ‘Deleuzian planning’, or ‘Deleuzoguattarian’ planning, another Marxist approach, has been explored (Gunder, 2010; Hillier, 2005, 2007, 2008; Purcell, 2013). Concerned with transition and ‘becoming’ rather than ‘being’, Deleuze and Guattari worry about “how capitalism and the state function as apparatuses of capture” (Purcell, 2013, 30). They suggest unfettered capitalism creates instability and upheaval while the state tries to manage economic production. The state must impose its will on institutions and individuals, via a “whole apparatus of regulation” to

govern economic relations (Deleuze & Guattari, 1987; Deleuze, Guattari, & Massumi, 1977, 252).

Normative approaches to public participation are challenged via Deleuze and Guattari's "revolutionary connections" (Deleuze & Guattari, 1987, 473). They advocate freeing individuals from state-controlled "striated space" (Deleuze & Guattari, 1987, 474–500) via dissent which may occur in cross-cutting, bottom-up fora termed "rhizomes" where space is non-metric and accentred (Deleuze & Guattari, 1987, 17). Rhizomes are a "non-hierarchical, non-signifying system without a General and without an organising memory or central automaton, defined solely by a circulation of states" (Deleuze & Guattari, 1987, 21). Rhizomes self-organise in a challenge to the state's top-down projection of power and, according to (Coyné, 2008, 558), they are "parasitic on established structures [growing] from within to subvert the edifice." Rhizomes are "entities in which each member has the potential to communicate horizontally with any other" (Purcell, 2013, 27). Nevertheless, it is worth noting that all forms of dissent cannot be said to be automatically equated with rhizomic activity.

Table 1 reveals examples of Deleuzian planning in the literature including Melbourne (Dovey, 2005; Dovey, Woodcock, & Wood, 2009), Kosovo (Hillier, 2007), and Tromsø in Norway (Nyseth, Pløger, & Holm, 2010). As Purcell (2013, 22, 31) notes of Deleuze and Guattari:

"[They] ... offer us ... an unapologetically normative political agenda ... [and it is] an unmistakable rejection of any form of state-led planning ... from rational, expert-driven planning to more participatory and communicative forms."

We return to such insights in our case study as it suggests that highly disaffected individuals and communities, who place no trust in the mechanisms of the state, will self-organise and may not engage at all with organised efforts at boosting public participation in the planning process (cf. Walker, 2012).

2.3.7. Conclusions and implications of the literature review

Overall, this review of the literature suggests to us that there are a number of important insights into the social processes underpinning power and participation in national planning systems. The Marxist critique of synoptic planning is strong, but does not promote public participation. Advocacy planning, radical/transactive planning, collaborative planning and Deleuzian planning similarly recognise the uneven power relations of different groups. These approaches suggest improvements in process and participation based on their normative critique of synoptic planning. However, while the Foucauldian approach does not offer a normative critique of power asymmetries, it has been used in in-depth case studies to reveal such iniquities over time and in space (Flyvbjerg, 1998). Meanwhile, Deleuzian planning does offer an analysis of such dissent in state-controlled striated spaces (and/or more radical rhizomes) and these two approaches are relevant for the interpretation of our case study in Section 5.

We recognise that discursive governmentality has its limitations including failing to sufficiently recognise the scope for action of individual actors (cf. Griffin, 2012; Mckee, 2009). Nevertheless we believe that the Foucauldian perspective offers the most potential for the analysis of the way power plays out at the local level which is the focus of our case study. To overcome this weakness in scope, we pursue 'realist governmentality' in our analysis (Stenson, 2005, 2008). This modified approach to discursive governmentality avoids the pitfall of assuming that governmental ambitions are always successful in realizing their desired outcomes (Mckee, 2009). Instead, a realist governmentality is based upon politics and social relations which stress local variation and context. In this way, realist governmentality retains the key analytical insights of discursive governmentality but also

offers "an analysis of the exercise of power in situ that is sensitive to both time and place" (Mckee, 2009, 482). This approach reveals the "messiness and complexity involved in the struggles around subjectivity, and [offers] a more nuanced and finely grained analysis of governing in situ" (Mckee, 2009, 479). In her case study research on public participation in housing management in the UK, McKee has found that when opportunities for participation are offered by political authorities, they nevertheless remain in control of both the policy agendas and significant financial resource:

"[C]ommunity participation [occurs] in strictly defined parameters. This is more akin to a process of incorporation than empowerment, and results in strategic-level decisions being retained within the state apparatus ... This opens up the possibility of contestation and contradiction between, and within, governmental rationalities as interpreted by different actors" (Mckee, 2009, 474–6).

Having described the concept of power that we pursue in this study, the next section details how this approach is going to be used.

3. Methodology

Using a mixed method approach, we draw out the dynamic nature of power relations in our case study, i.e. how they are contested, constructed and reconstructed. Our design draws on qualitative interviews with key stakeholders and analysis of quantitative data from primary and secondary sources to identify which social processes underpinned key interactions. A longitudinal analytical framework is used to capture: (a) the nature of individuals' opposing constructions of knowledge over time of the Materials Recovery and Energy Centre (MREC) in Crymlyn Burrows, and (b) how power relations between three networks play out in space and time. By studying the MREC's development proposal, its approval and operation over nearly 15 years, we characterise the nature of this contestation over a long time frame not normally seen with studies focusing solely on events leading to the award of an operating licence. The location of the site of the MREC development is shown in Fig. 1.

Qualitative longitudinal research from interviews is analysed diachronically, through time, and synchronically by cross-cutting at one point in time (Corden & Millar, 2007; Elliott, Holland, & Thomson, 2008; Shirani & Henwood, 2011). We examined interviewee data from both perspectives. We attended to different types of social structures/systems in analysis and interpretation – i.e. longitudinal intersectionality – by dividing our interviewees into three networks each with distinct roles in this contestation over the EFW plant. We analysed how their responses overlapped or remained mutually exclusive in terms of their constructions of knowledge.

3.1. Data collection – Materials Recovery and Energy Centre (MREC)

In terms of secondary data sources, a media search was conducted in the LexisNexis database. All articles relating to the MREC development from 1998 to 2012 in regional and national newspapers were collated. From this, a timeline of events was created referencing all actors including community members, community leaders/representatives, planners, developer/operators, consultants, statutory consultees, the regulator and local politicians.

Then, potential contributors were identified in terms of their likely perceptions of the health risks of incineration – from low-risk to high-risk – as well as the likely reflexivity they might exhibit with those in other networks. These potential contributors were then approached by letter, telephone and e-mail. Initially

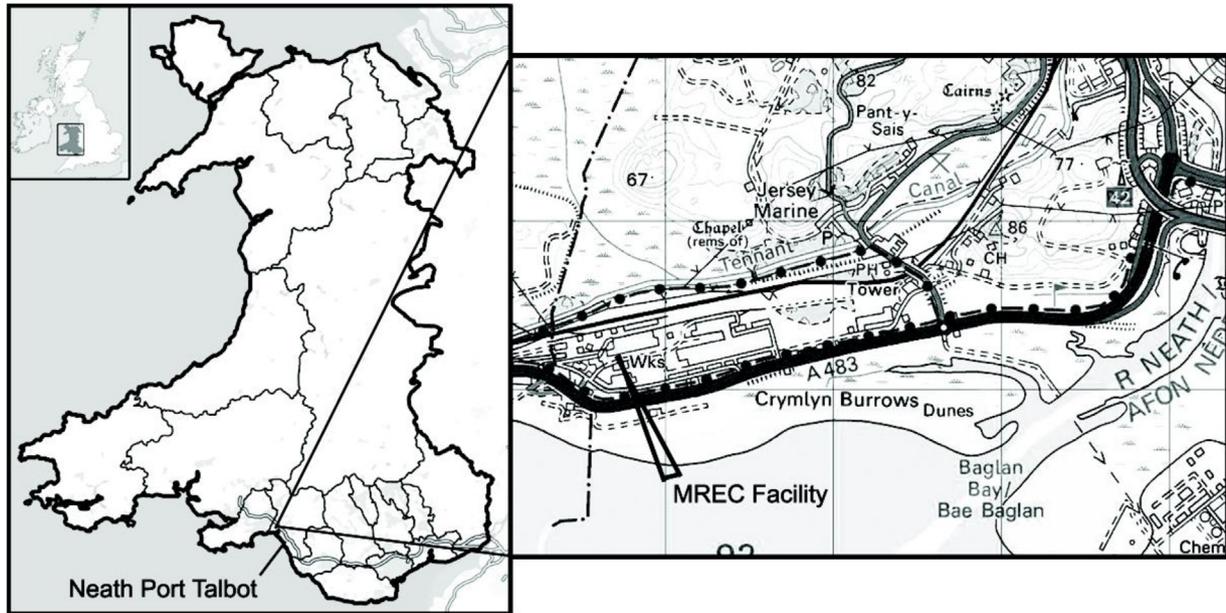


Fig. 1. Map of Materials Recovery and Energy Centre (MREC) facility, Crymlyn Burrows, Neath Port Talbot, South Wales.

individuals were classified as to whether they were supportive of the proposed development (e.g. developer), neutral (e.g. regulator) or antagonistic (e.g. community). Once key contributors from these three groupings had been approached they were also asked to suggest the names of further people who should be interviewed for their knowledge of the development.

In 2009, eight in-depth qualitative interviews were recorded at contributors' homes, their places of work or at neutral public venues. Typically these interviews lasted 2 hours. Phone interviews with the same contributors for 30–40 minutes were undertaken in 2012, except for E1 who refused. However, written answers to our questions for E1 were given by their employer, Environment Agency Wales (EAW). All recordings were transcribed and coded in an iterative way using an analytical inductive approach (cf. Thomas, 2006). Anonymised codenames and network names for these stakeholders in the MREC development are given in Fig. 2. The governmentality dimension at the top of Fig. 2 suggests a tripartite split between: (i) 'governing groups' on the left

who reside in more politically networked areas; (ii) 'instrumental groups' in the middle who assist governing groups in achieving their aims, and (iii) 'governed groups' on the right who are relationally less networked, and so more 'distant' from governing groups than instrumental groups.

Fig. 2 shows that these groups, categorised primarily in terms of governance (Bulkeley, Watson, Hudson, & Weaver, 2005), were then also characterised according to their anticipated environmental risk perceptions. These run from 'very low risk' on the left, i.e. that of the typically more technocratic types, to 'very high risk' on the right, i.e. that of those with high environmental concerns due to their physical proximity to the MREC development. Fig. 2 shows that the breakdown of contributions in terms of networks was as follows:

- (i) the regulatory network (E1),
- (ii) the developer network (C1 and D1), and
- (iii) the dissenter network (A1, A2, B1, B3, and B4).

Governmentality Dimension				
politically 'central'	regional agents	regional agents	politically 'distant'	political 'distant'
Environmental Risk Perception Dimension				
very low risk group	low risk group	medium risk group	high risk group	very high risk group
national & devolved government politicians / regulatory agencies / civil servants	developers / operators, planners, consultants, planning committee members	local politicians, statutory consultees	community leaders, church figures	community members, NGO members, members of the media
REGULATORY NETWORK E1 – Environment Agency Wales (EAW)	DEVELOPER NETWORK C1 – Lead Co-developer / Planner (Neath Port Talbot County Borough Council) D1 – Co-developer / Operator (HLC Neath-Port Talbot Ltd)			DISSENTER NETWORK A1 & A2 – Pressure Group 1 (PG1) B1 & B2 – Environmental non-governmental organisation 1 (NGO1) B4 – Environmental non-governmental organisation 2 (NGO2)

Fig. 2. Networks and actors in terms of a typology of governmentality and environmental risk perception.

When first approached, members of the regulatory network, EAW indicated that their views were largely uniform. Only one contributor would be made available due to the fact that the case study had been so controversial for EAW. The regulatory network also had no significant concerns about the proposed development and so, with its technocratic approach, could be considered to be operating within similar framings of risk to the developer network. Conversely, the opinions expressed in press articles by the dissenters are relatively heterogeneous. There was, however, a strategic split between those pursuing direct action and those tackling the MREC development on its scientific and technological merits alone Fig. 2 shows that, no contributors appeared in press cuttings who represented views from in between the very polarised perspectives of those in the three leading networks. Our contributor search was therefore mediated by our press article search. Nevertheless, while the media had a role in amplifying (and de-amplifying) such political divisions (cf. Kasperson et al., 1988), there is little doubt from the media coverage, NGO documents and our interviews that the issues described in the case study below were indeed fought over fiercely on all sides.

Ultimately, our theoretical framework and the data collected are linked via analysis undertaken for each network which focuses on the evidence for governmentality. This initially involved producing sociologics described in the next section.

3.2. Sociologics

Latour (1987, 205–213) calls maps of knowledge constructions ‘sociologics’ and indicates that there is no privileged way of viewing them:

“None of these people think either logically or illogically, but always sociologically ... they look for stronger and more resistant allies ... Thus mapping ... [reveals] what they value most ... Irrationality is always an accusation made by someone building a network over someone else who stands in the way ... [W]ords like ‘rational’ or ‘irrational’ ... are meaningless ... [sociologics] simply consider the angle, direction, movement and scale of the observer’s displacement.”

Sociologics, constructed for members of each network, help us to answer questions about the inevitability of conflict (cf. Damer & Hague, 1971). As shown generically in Fig. 3, these diagrams highlight similarities and differences between the constructions of

knowledge of individuals. In interview, contributors made a number of stated beliefs. They offered a range of ‘evidence’ in support of those beliefs. Highlighting these ‘logical’ connections in a chain of beliefs constructed from different positions of power, however seemingly ‘illogical’ to an outsider, paints a richer and more textured picture of the contrasting risk perceptions and other framings. Sociologics therefore help to visually reveal how knowledge constructions are made manifest (Latour, 1987). They show how network members access different resources and why power is likely to play out differently between networks in various ways. This approach, particularly given our repeat interviews over time, provides a more nuanced and dynamic analysis of power, knowledge and local environmental decision-making. The social network analysis, outlined in the next section, reveals the potential for the flow of power rather than automatically showing the exercise of power in a network (Rydin, 2013).

3.3. Power relations and social network analysis

One approach to social network analysis is affiliation networks in which two-mode analysis involves logging actors’ names against their attendance at meetings, for example. In affiliation networks, the centrality of all actors is a key indicator of relative networked power (Knoke & Yang, 2008; Wasserman & Faust, 1994). Centrality reveals those actors and events which have the densest affiliations with other actors and events (Faust, 1997). Affiliation network analysis thus visualises how actors and events are interrelated. An affiliation network has two types of nodes: a set of actors and a set of events (plus a set of relations between each nodal type). Research on two-mode networks can discover the relational structures among actors, through their joint involvement in events, and reveal the relational structure of events attracting common participants. By contrast, one-mode networks link actors to actors or events to events. We use Ucinet 6 to undertake two-mode graph construction and to make calculations of centrality. The latter includes measures of closeness (Freeman) and proximal betweenness. In terms revealing the potential importance of actors within the overall network, we also use a one-mode eigenvector analysis.

We gathered lists of attendees at Liaison Committee meetings between 2001 and 2013. This data was acquired from community members after no response was received from a request to NPTCBC. These Liaison Committee meetings are important. They provide an insight into how key network actors perceived power

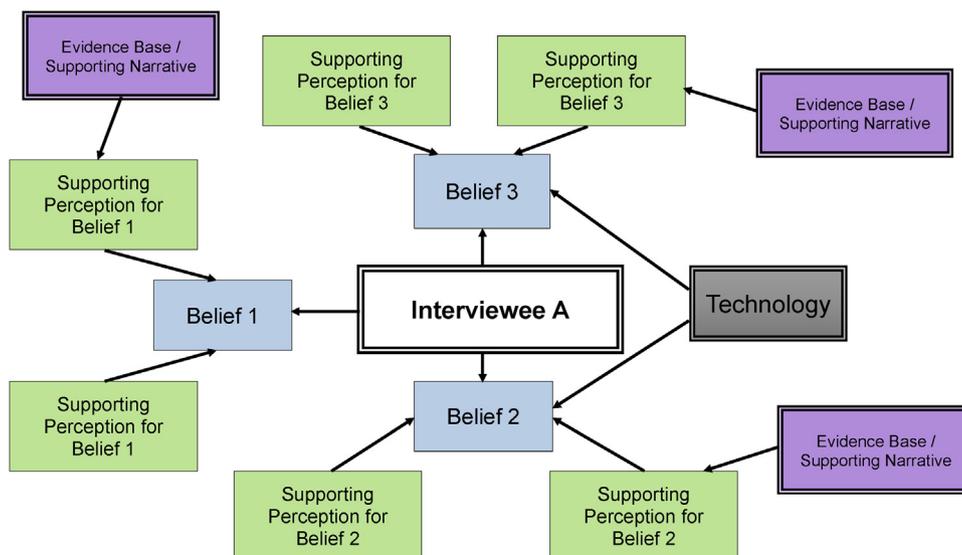


Fig. 3. Generic construction of a sociologic diagram.

operating in the community. How certain actors sought to exercise this power is explored in more detail in Section 5.4. The Liaison Committee meetings covered 56 meetings in total and were attended by 65 different individuals at different times. This list of meetings is not a complete record, but it is believed to be very close, and are the officially recorded minutes of these Liaison Committee meetings. The data is largely representative of the trends in the Committee's changing composition. Meeting data was entered into a spreadsheet where rows represent participants and columns are specific meetings. From this, a binary affiliation network was represented by an affiliation matrix that records the presence or absence of g actors at h events. The dimensions of the matrix are g rows and h columns. If actor i attends event j , for example, the entry in the ij th cell of the matrix equals 1. Otherwise the entry is 0. When this data was placed into the SNA software, Ucinet 6, it revealed a two-mode visual representation of the links between the 65 actors and the 56 meetings which took place over twelve years. The relative strength of linkages amongst actors and their relative involvement in the meetings over time was revealed in a table showing measures of centrality along with a graph showing that centrality in terms of visual proximity between actors and meetings (cf. Faust, 1997; Wasserman & Faust, 1994). Ucinet 6 was also used to produce a one-mode eigenvector analysis in tabular and graphical form for the structure of actors' links to other actors. This analysis involved assessing the co-occurrence of neighbouring data through the summing of cross-products. Where the sum of cross-products is high, high relative power of networked relations between actors can be inferred.

4. Case study – Crymlyn Burrows, Neath Port Talbot

In this section, we describe the detailed history of the community in which local perceptions of pollution were integral to shaping the opposition to the EFW proposal events. This place-specific history is linked to a number of reasons why the community responded so forcibly to the proposed EFW plant from 1998 (cf. Bickerstaff, 2012). We then outline who the key actors are in the three networks – regulator, developer, and dissenter. In Section 4.1 we begin to outline the views of key participants and these identified by their unique network codes, e.g. 'D1' is a member of the developer network.

In September 1998, a developers' network, led by two co-developers, Neath Port Talbot County Borough Council (NPTCBC) and a Portuguese-owned waste operator HLC (Neath Port Talbot) Ltd, proposed a £32m waste recovery and incineration development, the MREC. It was designed to operate for twenty-five years. NPTCBC hoped that this project, funded under the then Labour government's private-finance initiative (PFI), would help meet impending stiffer EC regulations on sending waste to landfill sites. The MREC project was financially attractive to NPTCBC because it could generate income by processing waste from neighbouring councils.

The planning laws for England and Wales are regulated locally by NPTCBC's planning department. Licensing regulations are policed by institutions in a regulatory network led by Environment Agency Wales (EAW) (now part of Natural Resources Wales). When, in 1998, the decision was made by NPTCBC to locate the MREC facility near to several communities on the western edge of Neath Port Talbot, a dissenters' network formed in response. This was made up of a wide variety of political, community and scientific advocacy groups who contested the development on the basis of social and environmental injustice, allegedly flawed engineering practice underpinning incineration, as well as the ways the process is regulated.

4.1. Pollution sources in the area

Local sensitivities to a potentially new polluting activity like the MREC were always going to run high (cf. Walker, 2012). Up until the 1980s, the communities around Crymlyn Burrows had been in the shadow of heavily polluting industry for decades (Humphrys & Williams, 2005). In 1935, a 150-megawatt (MW) power station was built nearby by Swansea Corporation. At the time, 'Tir John' was the biggest power station in Britain. It was in operation from 1936 to 1976 burning powdered anthracite duff, a cheap coal waste product from the pit-heads. This put sulphur dioxide into the local atmosphere and was a significant source of pollution on the East Side of Swansea and in the smaller settlements on the western edge of Neath-Port Talbot. However, Tir John power station went into intermittent operation in 1960 as newer sources of electricity were appearing (Ryland et al., 2011; Walker, 2007). In 1967, Tir John was linked to the very large Llandarcy oil refinery nearby and was converted to oil burning. It was decommissioned in 1976 as a result of the 1973 OPEC oil embargo (SWEP, 2012).

The next most significant historic source of pollution on Swansea's East Side was Anchor Chemical Ltd.'s notorious United 'carbon black' factory. Opened in 1948 in Port Tennant, this non-unionised, US-owned operation produced 'Dixie' and 'Kosmos' grade carbon blacks. These act as a pigment and reinforcing phase in car tyres and other rubber products. It was clear at the time that short-term exposure to high concentrations of carbon black dust could mechanically irritate the upper respiratory tract and produce discomfort. In and around Swansea's East Side, according to one contemporary account, the United factory created:

"clouds of black smut and dirt which constantly rain down on the houses nearby. This makes it impossible for washing to be hung outside. Within an hour it is filthy, so all washing has to be dried indoors. But the dirt also comes indoors, covering food, furniture, children and babies. A local manager of the factory once remarked that the people of the area were living in slums anyway, why were they complaining about dirt?" (Bone, 1971)

Similarly, Allen (1971, 34) notes that the "filth is appalling" and quotes local residents as saying:

"Windows and washing are all marked by the carbon," said one resident, Mr. Edgar Cutler. 'If I want a clean shirt my wife has to take it to the launderette to get it dry ... My wife and I have to scrub our carpets once every eight weeks and we have to redecorate three or four times for every once that other people have to do it.' Another resident, Mrs. Jessie Cottle said: 'I suffer from asthma and the air is seriously affecting my health. I cannot even open my bedroom window at night.'"

Allen (1971) also notes that some Port Tennant mothers claimed that their children got so dirty that they used detergents on them. In governance terms, the 'Alkali Inspectorate' – the key pollution regulator at the time – stated repeatedly that the pollution levels were perfectly legal. However, in recognising that the situation was clearly iniquitous, the purchase of pollution monitoring equipment was suggested (Allen, 1971). Protests by residents to Anchor Chemicals, to the local authority (Swansea), to local MPs and to the Health Authority went unheeded. This provoked direct action outside Swansea Council's Guildhall offices by Port Tennant housewives. They dumped their dirty washing on the Council steps and began a 23-day blockade of the factory. The dispute was only resolved when Anchor Chemicals agreed to invest £35,000 (in 1971 prices) in pollution monitoring equipment. A community liaison committee was also established (Bone, 1971). These two positive outcomes had direct relevance to the events we focus on in the late 1990s and 2000s. By the 1980s, the United plant had changed its name and relocated. The Port Tennant site was

cleared and turned into a community sports centre. However, further potential cumulative impacts have also been identified (cf. Vanclay & Bronstein, 1995).

Next to the carbon black factory works was a tar distillery. Up until the 1970s, it produced tar by partial combustion of heavy oil-based products, now considered potentially carcinogenic in humans (IARC, 2010). In 1980, Tir John power station was demolished. Yet the site soon became another source of pollution when it was designated a landfill by the District and City of Swansea (DCS). Ever since, there have been periodic concerns from local residents on Swansea's East Side about asthma, chest problems, and smells. At the time that the MREC development in nearby Crymlyn Burrows was announced in 1998, the Tir John landfill was approaching capacity. The operator, by then the City and County of Swansea (CCS), has since closed and reopened the landfill site due to capacity shortages similar to those in NPTCBC and elsewhere.

In October, 1996, there was an industrial accident in an underground pumping station at Crymlyn Burrows sewage pumping station. This resulted in the deaths of two council employees who were overcome by toxic fumes from Gower Chemicals whilst underground. Opinion amongst the local community was that industrial activity was not being regulated enough by Environment Agency Wales (EAW) to prevent such tragedies (Dix, 1999; Rees, 1998). This was despite successful prosecutions against the dead workers' employers, NPTCBC.

Dissenting local residents repeatedly draw upon this rich localised environmental narrative – which also includes further negative environmental inputs – in terms of their sense of place identity (cf. Pulido, 1994; Simmons & Walker, 2005). It is a narrative that is fuelled by, and further fuels, distrust of local governmental institutions, chiefly the CCS, NPTCBC, and EAW. In contrast to communities that may acquiesce in the face of such developments, the residents in and around Crymlyn Burrows were radicalised by events going back forty years and more when the new MREC development was proposed in 1998. One sentiment was repeated in the community repeatedly despite more recent improvements: residents had historically shouldered much more than their fair share of polluting industry than other communities had. Such industrial processes, it was said, would not be tolerated in more affluent areas, like the western districts of Swansea. Any new industrial processes, especially polluting ones, would therefore never be welcomed by those living in Crymlyn Burrows and in Swansea's East Side (SWEP, 1998a).

The waste planners and councillors in NPTCBC already knew much of the local context. The co-developer from HLC (Neath Port Talbot) Ltd. claims their company did not (D1 Interview, 2009). In the section below, we explore the history of the development proposal and the reactions that it triggered in 1998.

4.2. History of a waste development

The siting of an energy-from-waste (EfW) facility is a wicked problem (cf. Rittel & Webber, 1973). First, the siting decision itself is a symptom of another problem: the need to avoid sending material to landfill. Local authorities in England and Wales, like NPTCBC, were aware from the mid-1990s that a planned European Directive (1999/31/EC) would boost recycling by statutorily reducing the amount of waste allowed to go to landfill. To give meaning to the European legislation, the UK government began revising its approach to waste management in December 1995. The government published a White Paper *Making Waste Work: A Strategy for Sustainable Waste Management* (DoE, 1995). In 2002, statute, the *Landfill, England and Wales, Regulations* (OPSI, 2002), appeared.

One reason for the selection of this case study was that, during the 1980s and 1990s, Wales had a poor record for the recycling and recovery of waste. In fact, this particular local authority, NPTCBC, had the worst record for recycling in Wales in 1998 according to the Audit Commission (Peregrine, 1999). NPTCBC needed to significantly revise its approach to waste management as a result of external European policy drivers. These included the *Landfill Directive* (99/31/EC) (EC, 1999) and the *Waste Framework Directive* (75/442/EC) (EC, 1975) which actively discouraged the landfilling of waste and promoted recycling and recovery. In England and Wales, the *Waste Management Licensing Regulations* (OPSI, 1994) had implemented the *Waste Framework Directive* and required the Environment Agency to: “minimise waste and to encourage recycling and energy recovery” (DTI, 1996, 11). This language was significant because recycling and energy recovery became equivalent instead of the former being prioritised as previously in the waste hierarchy.

This meant that, between 1996 and 1998, NPTCBC drew up a new waste strategy aimed at much greater waste recovery. This strategy was devised in a technocratic fashion with the assistance of staff from a wholly-owned local authority waste disposal company, or LAWDC and engineering consultants, Currie and Brown. The waste plan was ambitious. It involved £32m of private-finance initiative (PFI) funding for a recovery facility. But revenue would be raised from planned agreements with neighbouring Bridgend County Borough Council (BCBC) and the City and County of Swansea (CCS) to take their waste.

The voices of the communities most impacted by the MREC siting decision needed to be added into NPTCBC's decision-making process. The broader social history of exposures to pollution in the area around Crymlyn Burrows, described in the previous section, meant there was little trust on all sides from the outset. This meant opportunities for constructive stakeholder engagement were undermined or, never properly considered (cf. Flyvbjerg, 1998).

At the time of the MREC proposal being announced publicly in October 1998, the greatest sense of distrust from local communities was aimed towards a range of public bodies. First, staff and politicians working at the City and County of Swansea were held in low regard for their historical failure to act over the governance of the United carbon black plant. Second, given the recent deaths, there was serious disaffection with staff and politicians at NPTCBC for its encouragement of ‘dirty’ industry, like Gower Chemicals, to locate in and around the Crymlyn Burrows industrial park. Third, there was incomprehension of EAW, and its predecessor the Alkali Inspectorate, for seeming unwillingness, or inability, to enforce environmental regulations.

NPTCBC's new twenty-five-year waste strategy, with the MREC at its heart, was never discussed publicly before its unveiling on October 1st, 1998, according to local residents and protestors (Fisher, 1998a; SWEP, 1998c). The local community councillor for Coedffranc, Harry Bebell, was quoted in the Swansea-based *South West Evening Post* (SWEP) saying that many residents felt the deal to build and operate the MREC was already signed, sealed and delivered: “If this isn't cut and dried then nothing is” (Fisher, 1998c). In truth, the Technical and Property Services Committee at NPTCBC had approved the project internally a week before announcing it publicly. This was on the basis of a presentation by HLC (Neath Port Talbot) Ltd. With internal approval in place, a four-year construction/licensing phase was then initiated. NPTCBC immediately held a community meeting in Crymlyn Burrows on the far eastern edge of Swansea but the public were not invited to make substantive inputs into the development plans. Within 24 hours, residents were vowing – in significant numbers – to fight it (Fisher, 1998a). Objections were based on the perceived social iniquity of locating what they felt would be a potentially hazardous industrial activity next to Swansea's deprived East Side.

In this rapidly polarising situation, concerns about the potential health effects of incineration, were swiftly raised. Some local residents said residents suffered high rates of poor health indicators in the area (SWEP, 1998a). Providing information on the MREC framed in terms of risk was never going to assuage community concerns (cf. Petts, 1992). HLC (Neath Port Talbot) Ltd, NPTCBC and Environment Agency Wales (EAW) put up further public displays at community meetings with unfavourable reactions. In spite of formal objections from the community, the NPTCBC Environment and Consumer Services Committee gave the MREC project unanimous support at a special meeting in March 1999 (Fisher, 1999; Porter, 1999). On this occasion, council leader Noel Crowley was visibly angry with dissenters from a local environmental group (NGO1) who were present. NGO1 handed out leaflets to councillors' suggesting that the engineering behind incineration was scientifically flawed. Councillor Crowley tore up the leaflets and demanded that the protestors leave.

The planning application for the MREC was approved by NPTCBC's planning committee in April 1999. The Welsh Secretary, Alun Michael, decided not to call in the application, i.e. take the approval decision away from NPTCBC (SWEP, 1999). On September 8th, 2000, a contract was signed between two councils, NPTCBC and Bridgend CBC, and the developer, HLC to jointly manage waste from these two neighbouring councils (SWEP, 2000). Later that month, NPTCBC promised to work closely with the community. On October 25th, however, neighbouring Coedffranc Community Council objected to a lack of consultation time on the detailed matters part of the planning permission. On November 1st, detailed matters were nevertheless approved at a NPTCBC Planning Committee meeting. The next day, NPTCBC Leader, Noel Crowley, reportedly accused Coedffranc Community Council of "telling lies" about the likely health impact of the plant claiming: "People are using this for politics" (Lewis, 2000).

Between 2000 and 2002, scientists and speakers sympathetic to the precautionary principle were enlisted by the dissenter network (e.g. Connett & Webster, 1987; Howard & Saunders, 1999; Webster & Connett, 1989). These scientists and speakers bolstered the dissenters' position. It was repeatedly suggested that knowledge about the cumulative and combinatorial impacts of incinerating polluting substances was still in its infancy and not scientifically clear cut, as EAW and the developers suggested (WOS, 2001).

By January 2001, construction of the MREC facility was underway. The local membership of the far-left Socialist Workers Party (SWP) linked with disaffected local community members. The SWP was committed to direct action against the MREC and refused to engage with the planning process. It circulated leaflets with information about the MREC. Two community-led protest groups, PG1 and PG2, then formed simultaneously. In March 2001, PG1 members began leafleting the community with information on health and environmental concerns about incineration. These were the citizen scientists (cf. Irwin & Wynne, 1996; Wynne, 1996).

Professor Ronan Lyons of Iechyd Morgannwg Health Authority (IMHA) was then included by the developer network as a consultee to the IPPC application. Lyons was concerned about potential health impacts. Later in March 2001, a community march went onto the MREC site. In April, a local Labour National Assembly Member, Val Field, brought stakeholders together in a consultation exercise (SWEP, 2001b, cf. Healey, 1992). All parties were deadlocked in a highly acrimonious atmosphere.

Marches and direct action reached a peak in the summer of 2001. The pressure group PG2, which pursued direct action against the plant, its operators and the regulator, now considered legal action against NPTCBC for its alleged lack of proper public consultation. The environmental group NGO1 and the community pressure group PG1 continued their contestation of the science of

incineration by targeting three powerful documents: an air quality report and two associated health impact assessments (HIAs) for the IPPC application (cf. Keller, 2009). On September 28th, 2001, results of a first HIA were given. Using the language of risk assessment familiar to the developers and the regulator, consultant JacobsGibb predicted that sulphur dioxide (SO₂) exposure could result in: "5 deaths and 6 hospital admissions ... [being] brought forward over the 25-year operating life of the plant" (JacobsGibb, 2001).

Alarm bells rang with the community. The matter was raised in the Welsh Assembly (Dicks, 2002; SWEP, 2001a; WM, 2002). Prof. Lyons of the IMHA asked for an independent review of the SO₂ modelling. JacobsGibb then submitted a "Revised Air Quality and HIA" Report to Environment Agency Wales (EAW) in late January 2002 (JacobsGibb, 2002). Professor Lyons was now satisfied statistical errors had been made in the first report. Amidst recriminations on all sides, EAW granted the MREC operators an IPPC licence on May 9th, 2002. Just as in the 1970s with the United carbon black plant dispute, the regulator set up a community liaison committee (discussed in detail in Section 5.4). The intention was to smooth relations between the community and the MREC's developer-operators (cf. Healey, 1992; Petts, 1995).

In 2002, the MREC began its operational phase. This was chequered with numerous governance problems (BBC, 2010, 2012; Elston, 2002; SWEP, 2003b). First, in August 2003, only a year into its planned 25-year operational phase, there was a major fire. It lasted five days and covered the local area in thick smoke and polluted local seawater (Greaney, 2003; SWEP, 2003a). Some of the facility's structure was extensively damaged. An inconclusive fire report suggested inefficient hydration of a bio-filter may have caused the blaze. Those in the developer network suspected sabotage by community members (Lewis, 2003; D1 Interview, 2009). A minute from a Liaison Committee meeting notes: "[a community member] stated that the fire was caused deliberately and that this was a well-known fact" (Point 4.2, Minutes, Liaison Committee meeting, 22.9.03).

Although the MREC was repaired within six months, the private co-developer HLC (Neath Port Talbot) Ltd. went into administration in October 2005 with debts of around £40 million. In 2006, it was reported that losses of £67m would accrue to owner NPTCBC over the original 25-year period unless a new operating partner could be found (Shipton, 2008). The Bank of Scotland (BoS), the PFI funder, claimed NPTCBC was liable for its losses on the original £40m loan. In November 2006, the council settled with the bank out of court. The MREC has since been run as a wholly-owned council operation: Neath Port Talbot Recycling Ltd. However, in 2008, NPTCBC faced a £5m breach-of-contract lawsuit from Bridgend CBC. In turn, NPTCBC demanded £54m from engineering consultants, Currie and Brown Group. This figure indicated the scale of NPTCBC's losses on the project at that point.

The dissenters' concerns about the scientific merits of incineration reignited in 2006 when emissions' data for that year apparently showed the incinerator operating periodically at up to twelve times the legal limit for dioxins. This was disputed by NPTCBC. But dioxin limits were breached again in 2010 (BBC, 2010) and again in 2012 (BBC, 2012). In 2010, the plant was forced to shut down for six months by EAW. It was reported that "Breaches were not ever at levels to cause health problems" (BBC, 2011). However, similar to the experience with the United carbon black factory forty years earlier, NPTCBC was forced to extensively refurbish the MREC site, clean it and install more sophisticated air pollution monitoring equipment. This ought to have ensured that better air quality standards were maintained. But, in late 2012, NPTCBC had again agreed to stop operations while an EAW investigation was launched into further dioxin breaches (BBC, 2012). NPTCBC had

accepted a formal caution from EAW in 2010 incident, but in 2012 the severity of the incident was disputed by the council's waste planner C1 at NPTCBC (C1 Interview, 2012). By contrast, B4 an environmentalist in the dissenter network, disagreed suggesting that the continuing problems at the site were "not insignificant" and were due to not operating the incinerator at full capacity (B4 Interview, 2012).

From this recent history of environmental governance in this case study area, the key networks and actors that we have identified are expanded upon below.

4.3. Networks

Fig. 2 shows the networks and actors classified by risk perception and governmentality. We begin with the regulatory network as it provides the context within which the decision-making process unfolds. The developer network must operate within the regulatory framework and is often closely aligned to the regulator's activities. The dissenters, however, respond to the new development as an unwanted imposition of power and seek to develop their own legitimacy to counter the dominant framing of the development process.

4.3.1. Regulatory network

In the regulatory network, E1 is a senior official at Environment Agency Wales (EAW). At the time the MREC was proposed, E1 and colleagues were based in EAW's south-west Wales regional office in Swansea. In relational terms, the EAW offices were part of a UK-wide regulatory network centred on the Environment Agency (EA) headquarters in Bristol, England. The EA's large network draws its political legitimacy from an array of powerful institutions and documents. The latter include European Union (EU) waste management laws which are transposed in Cardiff and London. At the time of the MREC application in 1998, E1 and colleagues in Swansea were dealing with various requests from developer networks for operating approval. The most economically powerful and legitimising document of all for developers was a waste management operating licence. The granting of a licence will 'make or break' most proposed waste industry developments. Determinations are done by EAW staff over several months by comparing the various forms of evidence provided by developers (see Section 4.3.2) with the procedural steps that take place inside the regulatory network. In doing this, E1 and colleagues expected to act closely with those in the developer network. E1 stated that, when EAW was involved with controversial developments, such closeness did not exist with representatives of local communities. Stakeholder engagement was therefore felt to be problematic.

4.3.2. Developer network

In the developers' network was C1, a senior waste planner from Neath Port Talbot County Borough Council (NPTCBC). There was also D1, a former senior manager from HLC (Neath Port Talbot) Ltd., the Portuguese-owned waste engineering firm. Unlike the regulator E1, C1 and D1 were 'the regulated', i.e. operating in a much more proscribed space (cf. Murdoch, 2006). C1 and D1 conformed to the rules on waste management regulated by E1 and colleagues but still had some room to negotiate thanks to their closer working relations with EAW. Between 1998 and 2002, the developer network systematically built up a wide range of powerful documents via the planning system to help achieve its aim of constructing and operating the MREC waste facility. These included planning permission, an Environmental Statement (ES) (HLC, 1998), two Health Impact Assessments (HIAs) (JacobsGibb, 2001, 2002) and an Integrated Pollution Prevention and Control (IPPC) operating licence.

4.3.3. Dissenter network

In the dissenters' network, B1 and B2 were two experienced local environmental activists from the south-west Wales region working for NGO1. They had heterogeneous links to a selection of community, political and precautionary science groups. The dissenters openly supported the precautionary principle (cf. Wiedemann & Schutz, 2005).

As part of their efforts to counter the plans of the developer network, NGO1 focused largely on the license determining activities of the regulator. NGO1 linked up with another environmental activist, B4, who operates nationally in the UK, as well as a local community protest group, PG1. Their members included A1 and A2. NGO1 and its supporters operated in a more fluid space than that of the developer and regulatory networks (cf. Murdoch, 2006). All of those in NGO1's dissenter network were determined to fight the MREC project. However, they chose to oppose it on its scientific merits and social (in)justice and did not engage in direct action. The dissenter network concluded that incineration was the most contentious technology on the site. They felt that it was a short-term waste solution that discourages recycling. They believed it was poorly regulated, potentially risky in terms of burning mixed waste (plastics) and a step backwards in terms of improvements to the environmental quality of the local area since the 1980s. In the following section, we analyse how power plays out in practice in our case study.

5. Exploring power in practice

We covered two distinct time periods with our qualitative interviews, primary source documents, database of publicly available secondary source material, and social network data:

- (1) 1998–2002 – the planning application and the issuing of a licence to operate, and
- (2) 2002 to the present – the subsequent operation of the plant.

In the sections that follow, we concentrate our analysis on both of these periods with interview data from 2009 and 2012. The former is largely about the decision making process of period 1, while the latter either introduces or strengthens the picture we have of period 2.

When the MREC facility was first proposed, on the one side were the technocratically-minded and procedurally-oriented developer and regulatory networks. On the other side was the dissenter network. The latter appeared unwilling to place the trust of its members in the expertise, power and authority being exercised by both the developers and the regulator (cf. Beck, 1999; Whatmore, 2009).

In presenting our analysis, we drew heavily upon our interviews. This was because these provide the best picture of the networks, the framing of the issues and of actors' perceptions of their own power to act (based upon the arrangement of theirs and others' key documents). Throughout, though, we have triangulated this material with a rich database of materials (e.g. press cuttings, documents, planning and licensing records and records of the Liaison Committee) to inform our interpretation. What emerges is a detailed portrait of the ways in which power works in practice with traditional top-down techniques of governmentality ultimately prevailing. The regulatory network is shown to marshal actors in the developer network with its similar technocratic framing of science, technology and engineering.

However, the techniques of governmentality that we suggest were deployed to get the MREC facility up and running can also be said to have failed. There was a significant loss of legitimacy for the waste licensing process when opportunities for public participation were not put forward (e.g. genuine consultation on the

planning application and meaningful engagement in the Liaison Committee).

Our results are structured around sociologic diagrams and social network analysis (SNA) figures. The former evidence the varied and changing social constructions of knowledge of the contributors. By using this unique analytical framework with its attendant high level of local detail, we convey the sophisticated knowledge deployed by the dissenter network in its bid to overturn the planning and licensing decisions. Our use of SNA shows networks operating at the local level within a liaison committee revealing how they are shaped by and seek to shape events (e.g. reactions to the 2003 fire). Together our sociologies and SNA figures provide insights into the dynamic and spatial reach of power over time through the three networks that we analyse. It is rare to be able to capture this level of detail in local studies of environmental protest.

5.1. Knowledge construction and power

The case study background in Sections 4.2 and 4.3 suggests that alternative framings of the potential risks of incineration in each network were underpinned by four key factors. First, the pre-existing lack of trust between networks; second, the presence or absence of shared framings of risk linked to the asymmetric power relations between networks; third, the rapid polarisation of views early in the MREC’s development as a result of that asymmetry; and fourth, the ways that all these factors contributed to failed attempts to engage in successful risk communication.

Sociologies are presented below for each network in 2009 and then again in 2012. These provide evidence for these alternative social constructions of knowledge with regard to power, planning and participation. In both of these periods, interviewees are shown in white boxes at the centre of each diagram (Fig. 3). Core beliefs surround this box in light blue boxes linked by straight lines. These

blue belief boxes are then connected via further arrowed lines to green and purple ‘evidence’ boxes offered in support of beliefs. In the 2009 set of sociologic diagrams, all the highly contested documents are shown in purple, on the right-hand side of the diagram, e.g. the developer network’s Environmental Statement (ES) and their two HIA and Air Quality Reports. Grey boxes indicate the contested technologies, chiefly incineration, deployed at the MREC site. In one of the 2009 diagrams, and all but one of the 2012 diagrams, the Liaison Committee is represented by a purple and yellow box. Overall, the internal logic of interviewee’s statements are illustrated by the ‘logic’ of connections made between stated beliefs and supporting evidence. In this way, mapping varied social constructions of knowledge help us to reveal the implications of knowledge construction and power for public participation (cf. Flyvbjerg, 1998, 2006).

5.2. 1998–2002 – planning application and licencing period

The initial period of activity covers the siting and licensing of the Materials Recovery and Energy Centre (MREC) at Crymlyn Burrows. Evidence for governmentality in the three actor networks – regulatory, developer and dissenter – is highlighted. Our analysis of the operation of the three actor networks is around three core themes: governance and power; following procedures; and power, space and risk. A network-by-network analysis then provides a systematic framework showing how power is being drawn upon by each network, how it is constructed inside and outside of the community, and how it is projected into the community.

5.2.1. Governance and power in the regulatory network

Fig. 4 represents the social constructions of knowledge for E1 from Environment Agency Wales (EAW) in 2009. At that time, this individual’s beliefs and ways of working were overwhelmingly procedural, technocratic and expert-led. As part of the wider

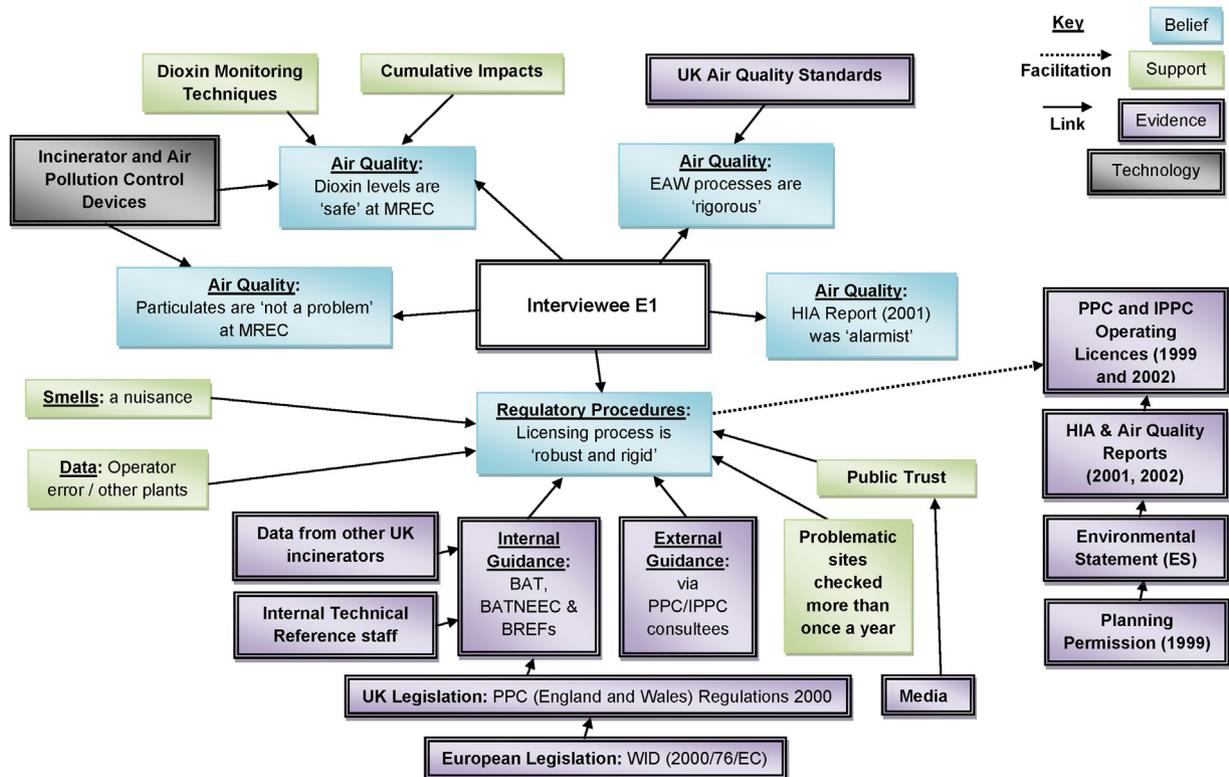


Fig. 4. 2009 sociologic diagram for Environment Agency Licensing Officer (E1) in the regulatory network. (For interpretation of the references to colour in text, the reader is referred to the web version of the article.)

regulatory network centred on the Environment Agency's Bristol headquarters, they were able to draw on a range of resources both internal and external to the EAW in support of their governmental role of evaluating the developers' application for an IPPC operating license. The demands of EAW's governmental role and the sharing of similar, technocratic frames of risk were significant in binding the regulator and the co-developers together in the pre-licensing phase of the MREC project.

Following procedures

There is a blue 'Regulatory Procedures' belief box in Fig. 4, just below E1's central purple box. E1 made it clear that when developers are successful with their pollution licence applications they must follow EAW's legally-binding procedures. EAW is then obliged to issue a permit. E1 stated that they always stick to the procedural parameters laid down in the law:

"[T]he Agency's duty is such that if the determination is done and we find that it meets the standards that we have got written down ... the Agency has no alternative ... [but] to issue the permit ... We [the Agency] are constrained by what the law tells us to do." (E1 Interview, 2009)

E1 revealed that their leading risk concern was procedural. EAW would not intervene and shut facilities down, they said, based solely on the public's perception of health risk:

"[O]urs is a technical ecological assessment. We don't have the freedom to say 'yes' or 'no' just because we don't like something or we think something else would be better, or that it should never have been there in the first place." (E1 Interview, 2009)

As Fig. 4 shows, such statements were supported by several named documents shown at the bottom of the sociologic. The regulatory network draws heavily upon external resources to be able to project power into communities. First, in terms of European Legislation, there is the *Waste Incineration Directive* (WID) (2000/76/EC) (EC, 2000) and its transposition into UK law, the *Pollution Prevention and Control* (PPC) (*England and Wales*) Regulations 2000 (OPSI, 2000). These documents were key for EAW as it provided a legal authority to hold together its network for incineration in governmental terms. Second, data came from other UK incinerators as well as internal guidance which E1 felt confident of. This meant support from powerful documents describing *Best Available Techniques* (BAT), *Best Available Techniques Not Entailing Excessive Cost* (BATNEEC), and *BAT References* (BREFs). Lastly, E1 noted that external guidance from PPC/PPC consultees, which included the Local Health Authority, the Local Authority, the then Countryside Council for Wales (CCW) (now part of NRW) and the public, further added to this individual's level of confidence in the procedures undertaken.

Together, these documents gave E1 confidence to shape interactions with other networks. For example, these documents codified ways in which developer networks and dissenter networks could behave. E1 believed that part of the problem with operating licences was that the legal definition of 'waste' was uncertain. Difficulties at other plants were largely put down to operator error which shifts the 'problem' of community and NGO-based dissent from the nature of the technology to the operator. With licensing, E1 thus framed the process of incineration as a straightforward managed operation. Only inputs and outputs mattered, not the technological nature of the process. For this reason, E1 was happy that in south-west Wales, once licensed, a site that was problematic was checked "more than once a year".

Of course, members of the dissenter network disputed this level of governance furiously in the licensing period. Like the Port Tennant housewives in the United carbon black factory dispute in 1970, they demanded that EAW do something more and enforce a

stricter regime. Specifically, this meant putting into place continuous air quality monitoring equipment. At a minimum, this would cover the dioxin emissions which the dissenters regarded as most contentious. They were rebuffed by the EAW on this issue. It said an equipment trial in Nottingham had proven too expensive. Members of PG1 responded by purchasing their own air quality monitoring equipment. They wanted 'independent' scientific data to keep alive the contested issue of health and emissions' quality during the operation of the plant. Ultimately, on trust issues linked to licensing, E1 stated that Agency staff generally "spent a lot of time with the public". However, in its governmental role of facilitating central government's pro-incineration policy, much Agency time involved countering attempts at dissent in terms of attacks on its legitimacy from the citizen scientists and/or direct action at their offices and the site.

Power, space and risk

Dioxins and other emissions were not considered likely to be problematic at Crymlyn Burrows by those in the regulatory network. E1's stated belief was that there were no health risks to the local community from incineration or from any other aspect of the MREC's operation (see blue 'Air Quality' belief boxes in Fig. 4). However, E1 agreed that smells could be a nuisance despite the design of the plant preventing smells escaping.

E1's definition of 'good health' was procedural and biophysical. E1 drew on studies that are 'tight focus' i.e. largely based on epidemiology and toxicology to make health risk assessments of technological processes (Kemmer, 2000). The broader impacts of the MREC facility on the well-being of the local community were from health impacts like noise, vibration and stress. These are generally excluded from tight focus studies (cf. Dahlgren & Whitehead, 1991). When it came to dissenters' questions about the potential for health impacts from dioxin and particulate pollution, E1 expressed exasperation:

"They don't seem to understand that if they burn something in their garden they are probably producing more [dioxins] ... [Also] going to the local social club once a year would give people a bigger dose of PM10 [particulate matter less than 10 microns in diameter] and plenty of other pollutants than they'll ever get from a year's worth of living within one mile of this incinerator." (E1 Interview, 2009)

Here, E1 relied on blue-boxed particulate and process 'Air Quality' belief statements shown in Fig. 4. EAW's position that it would maintain air quality standards and ensure the plant's processes only contributes to a small percentage of maximum ground level pollution concentrations was supported by a powerful document that shapes the Environment Agency's national behaviour: UK Air Quality Standards. Overall, E1's procedural focus, like the Alkali Inspectors at the United carbon black factory decades before, was not on 'upstream' questions central to the dissenters' espousal of the precautionary principle, i.e. 'why this technology?' and 'why here?' (cf. Wynne, 1996, 2003). Instead, EAW could only focus on downstream risk assessments of 'how damaging to health might it be?'. In this way, the dialogue between the regulator and the dissenters was at cross-purposes.

EAW was therefore disparaging about the first 'Air Quality and HIA Report' produced by the consultant JacobsGibb on September 28th, 2001 (JacobsGibb, 2001). This predicted five deaths and six hospital admissions possibly being brought forward during the plant's 25-year operating life from sulphur dioxide exposure (SO₂). This was later shown to be an error on the part of the consultant but significant damage was done to public trust. E1, normally reliant on such expert evidence, described the erroneous first Air Quality and HIA Report as "alarmist" and a "grand theoretical assessment" (E1 Interview, 2009).

5.2.2. Governance and power in the developer network

Lead developer C1 and co-developer D1 projected their own political power into the community with the MREC development in Crymlyn Burrows. NPTCBC had a mandate to maintain a waste strategy, a distinctly governmental role. The delivery of the MREC facility was a key piece of new waste infrastructure central to that strategy.

In 2009, C1, the co-developer from NPTCBC, and D1, the co-developer and former operator from HLC, said their leading concerns about the MREC were related to financial risk. They had few upfront concerns about potential health risks to the local community from incineration. Such health risk perceptions were based on the close exchanges between their engineering consultants and the regulatory network who all shared a technocratic, expert-led framing of risk and its governance.

Following procedures

C1 and D1 said they had little choice but to comply with rules and laws laid down in the politically more networked areas of Whitehall, Cardiff and Brussels. These were enforced locally by EAW (cf. Murdoch, 2006). Developer networks typically complain about the way that power that is exercised by regulators but research suggests that they are happiest dealing with statutory bodies (Glasson, 1999; Owens, 2000; Snell & Cowell, 2006). In general, similarly framed dialogues can save time and resources with costly document production (and breaches of the law).

According to C1, compliance was not a straightforward task. There is a blue box marked “Impact of ‘unanticipated events’” to the top right of Fig. 5. Part of this relates to C1’s belief that the Welsh Assembly Government (WAG) in Cardiff, now the Welsh Government (WG), changed its mind too often. C1 says this impacted upon Welsh councils’ ability to successfully judge the financial risks they were running with waste management projects:

“[I]t has been very difficult to say at any moment in time what is the best [waste] solution today and then be confident in two years that you’ll say the same thing.” (C1 Interview 2009).

C1 acknowledges that EAW’s approval was key to the whole project as it progressed. But the document marked ‘Power Relations’ near the centre right of Fig. 5 shows that C1 also felt that EAW was overly cautious and unreliable, a point also made by the dissenters.

The co-developer, D1, recognised the usefulness of the local experience of lead developer, C1, and their waste planning colleagues in tackling the regulatory hurdles of the UK planning system. D1 stated that they initially believed that local councils in South Wales were able to “get things done” thanks to historically rigid political party control centred on the Labour Party (cf. Flyvbjerg, 1998). However, D1 was surprised to discover the level of distrust based on the distinct local history of environmental degradation found the MREC development was fiercely contested. This included witnessing overt and covert attempts at dissent towards the development (D1 Interviews, 2009, 2012). Before D1 left the project in 2005 when HLC went into receivership, they recalled suspected criminal activity at the plant before and after licensing in 2002:

“There would be break ins at night, there would be vandalism and the fire which ultimately took the plant down for a long period of time. I’m not sure if it was ever officially proved to be arson, but it’s pretty strongly felt” (D1 Interview, 2009)

The project became much more time-consuming and costly than originally planned. This progressively added to D1’s negative perceptions of the project’s financial risk. This was even before the fire in 2003 had forced the MREC’s temporary closure and hastened HLC’s departure from the project in 2005.

D1 felt that NPTCBC’s traditional, top-down, trust-deficit approach to risk communication never satisfied the perceived health risk concerns held by the community:

“We were much too late coming to the game at Neath on this and we were beaten up because of it . . . [The lead co-developer, C1, from NPTCBC] . . . would often stand back and let me do the fight with the locals” (D1 Interview, 2009).

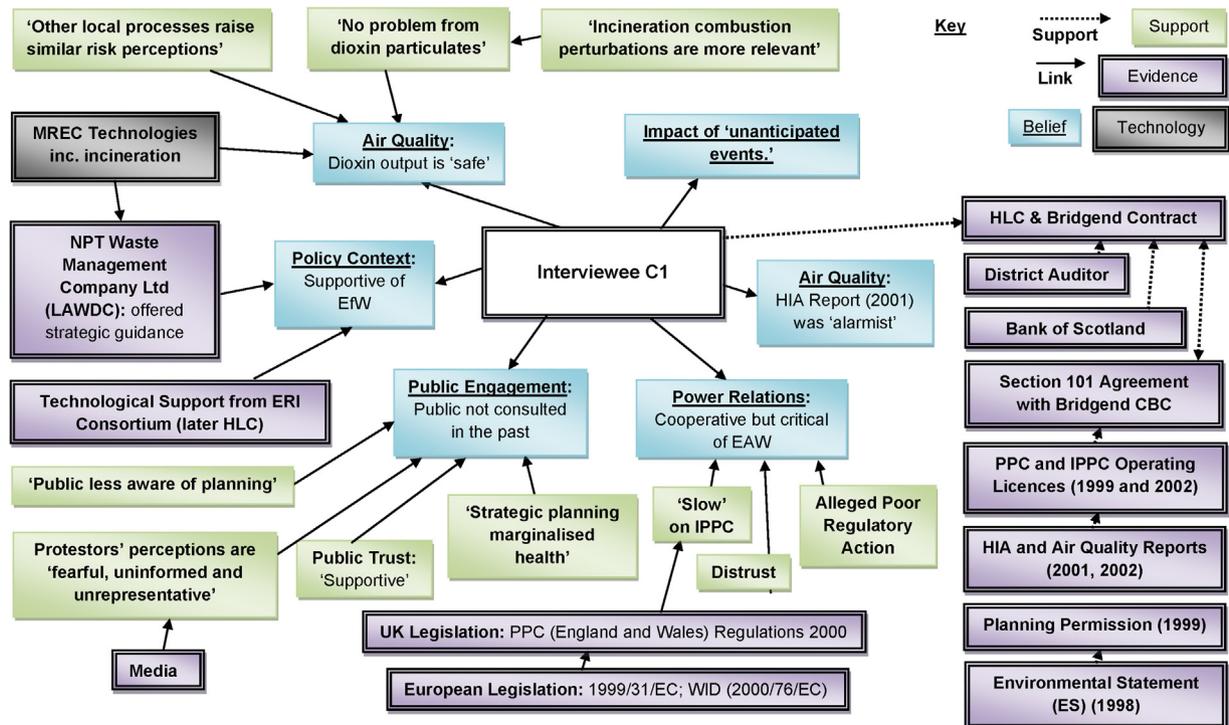


Fig. 5. 2009 sociologic diagram for council waste planner/co-developer (C1) in the developer network.

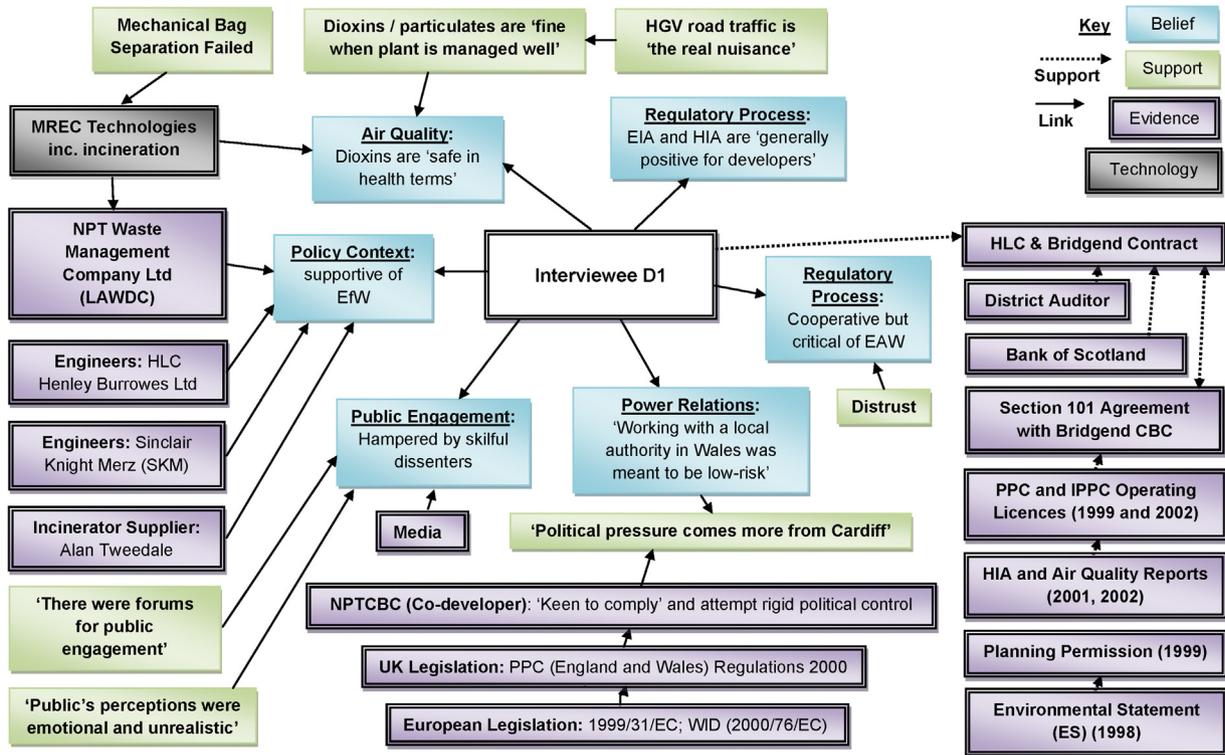


Fig. 6. 2009 sociologic diagram for co-developer (HLC) (D1) in the developer network.

This reinforced D1’s impression that NPTCBC had opted for a ‘realist’ approach towards stakeholder involvement in the MREC project, i.e. effectively stating ‘nothing we say can win these people over to our cause’.

Power, space and risk

In terms of power and social constructions of health risks, Fig. 6 shows a blue box with D1 referring to Energy from Waste (EfW) and incineration as ‘safe’:

“I will still maintain from a personal level that I believe things like energy-from-waste, even mass burning combustion, are themselves safe technologies.” (D1 Interview, 2009)

This belief, D1 stated, was contingent on EfW plants being well managed and run according to the strict regulatory regime set by the Environment Agency (EA):

“I’m comfortable myself with the science of the dioxins, impact and whatever it is from different sources, and ... at that site it is managed quite well.” (D1 Interview, 2009)

Note that this view, shared with C1 and E1, was diametrically opposed to that of the dissenters who claimed that UK waste plants are typically not well managed, nor well regulated.

When considering the potential health risks of the new MREC facility, D1 deferred to two key actors in their network: the incineration engineers at fellow HLC company, Henley Burrowes Ltd, and an external engineering consultant, Sinclair Knight Merz (SKM). This technological support gave D1 a strong belief their framing that were no health concerns at all with incineration. Between the planning and construction of the MREC facility, however, D1 changed their viewpoint on one potential health risk: heavy lorries going to and from the site (a health impact missed in ‘tight-focus’ EIAs and HIAs):

“I wouldn’t want to live next to one ... not because of emissions from the plant. It’s the traffic impact. You have got

all these vehicles going past your house.” (D1 Interview, 2009)

C1 claimed that between 1998 and 2001, at the time of MREC’s planning and licensing application, broad health impacts were not considered in the planning system and nor was the public consulted “as much as it is today” (i.e. in 2009). C1 said strategic planning between 1998 and 2001 took no note of health. Cumulative impacts of pollution in the communities around Crymlyn Burrows, for example, would not have entered calculations for any of the impact assessment techniques. C1 claimed that, people between 1998 and 2001 were less aware of the planning system and suggested that those fearing catastrophic failures had their risk framings coloured by the media not necessarily by the ‘facts’. Communities would struggle, said C1, to understand what the health issues are regarding waste planning, and added that the dissenters’ views were not representative of the majority in the community. C1 also said that dissenting activity is rare and that public trust still lies with this regulatory body: “The public has faith in regulatory authorities” (C1 Interview, 2009).

D1 recognised an implacably different framing of risk coming from the dissenters when they noted, early on in the licensing phase, that they were “very good” at raising environmental issues via the local press. This blue-boxed belief on ‘Public Engagement’ shown in Fig. 6 is supported by reference to the health of children creating emotional reactions, press coverage of mobile phone masts and electricity pylons alleging adverse health effects on children and demands for zero emissions from industrial processes as being unrealistic. Ultimately, this person said, the dissenters had an alternate conception of science which “parts company with the facts” (D1 Interview, 2009).

In summary, this adds further weight to evidence that members of the developers’ and dissenters’ networks could never be reconciled in terms of their world views. Characterising the public’s constructions of risk as unscientific and unrealistic was

useful to the developer network. It would have helped ensure that, post licensing, any alliance between the dissenters and the regulator was unlikely to form. However, the dissenters have held firm in their distrust of EAW to the present.

5.2.3. Governance and power in the dissenter network

As far as public participation was involved, the techniques and procedures of governmentality failed with this network. The dissenters, A1, A2, B1, B2 and B4 all expressed the opinion that the episode revealed distinct social and environmental iniquities that stemmed from the original siting decision in 1998.

(Not) Following procedures

Fig. 7, the combined sociologic diagram for B1 and B2 from NGO1 in 2009, shows this sense of social and environmental injustice feeding in the belief box entitled 'Power Relations'. B1 said in interview in relation to 'Political Distrust':

"There were seven sites originally and Crymlyn Burrows was chosen I think for the potentially low political impact. It's on the border between two authorities so Swansea people in Port Tennant don't have a say in the [NPTCBC-led] planning process, and Crymlyn Burrows is literally made up of just two streets of residents. If they kicked up a fuss, well, they could be ignored." (B1 Interview, 2009)

A2 from the community pressure group PG1 similarly added:

"If they'd put this on the West of Swansea, the people there are much more powerful than the people on the East Side ... If they fight something, they will win." (A2 Interview, 2009)

For A1, the perceived unfairness of the siting decision first motivated them to protest:

"[A]part from the environmental things it is the social injustice. That's what really, really annoys me as well. More so. It's not fair. It's really not fair ... Why are we always being dumped on?" (A1 Interview, 2009)

In Fig. 8, both A1 and A2 felt that the length and language of powerful documents, like the Environmental Statement (ES), was part of a deliberate way of keeping non-specialists from out of any debate over the merits of the MREC. According to A2:

"[Making the ES impenetrable] was the aim of producing such a bloody big document!" (A2 Interview, 2009)

In general, planning procedures were seen as anti-democratic.

The way that the developer network's political and economic power was imposed, in part via NPTCBC and the planning system, was also a key concern. Local environmental campaigner B2 described how NGO1 and certain community members were actively excluded from early NPTCBC-led meetings about the MREC:

"People in Port Tennant and Crymlyn Burrows asked for us to attend but we were shown the door" (B2 Interview, 2009).

Similarly, B1 remarked of NPTCBC Labour Leader, Noel Crowley, tearing up dissenters' leaflets at a public meeting (Fisher, 1999, Porter, 1999):

Local health studies

"[T]hat desire to exclude the public seems to have set the tone for the whole project. If you frame things in that way, you are bound to cause trouble for yourself ... [T]he fear and defensiveness about playing straight with the public, I think, led to much of the problems that we saw." (B1 Interview, 2009)

When details of the MREC project were placed on display boards in local community centres, B2 felt community members would not see it as an opportunity for engagement but rather one of informing them of a decision already made:

"The community were not getting a look in and these boards were telling them, effectively, that they weren't getting a look in." (B2 Interview, 2009)

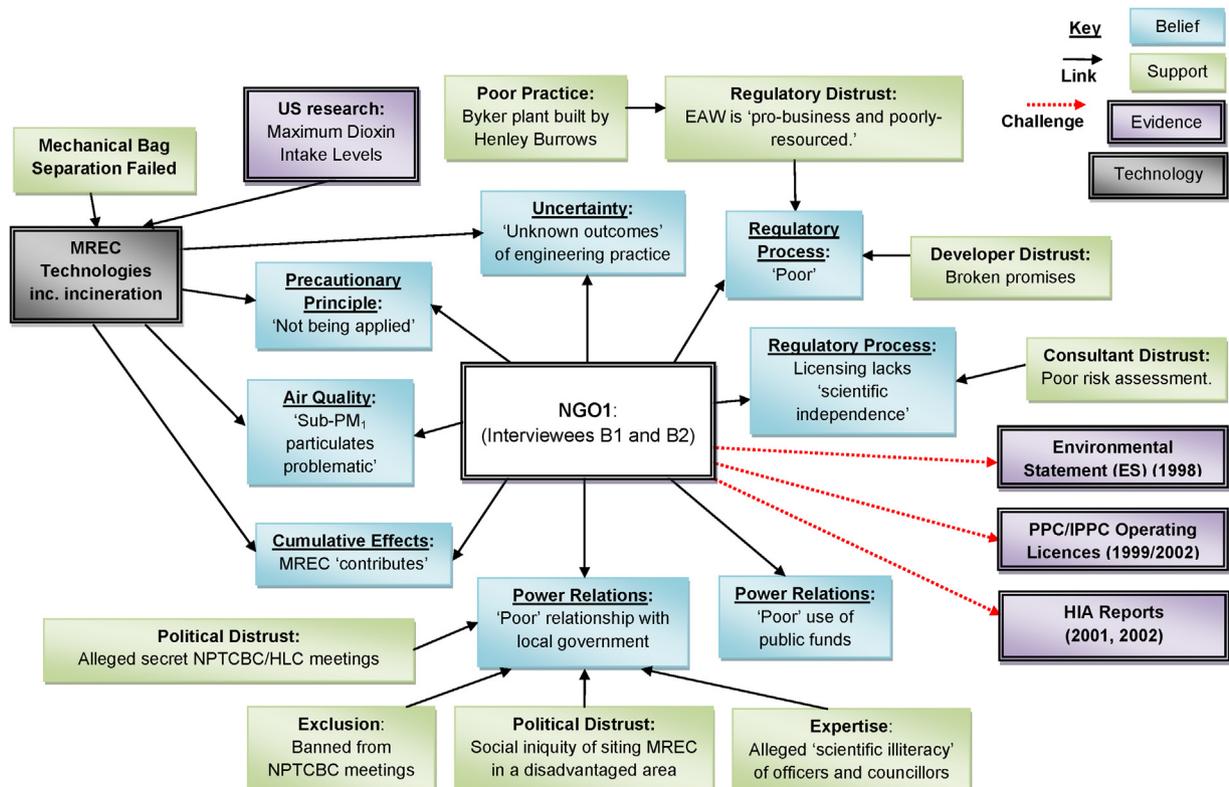


Fig. 7. 2009 sociologic diagram for environmental group 1 (local) (NGO1) in the dissenters' network.

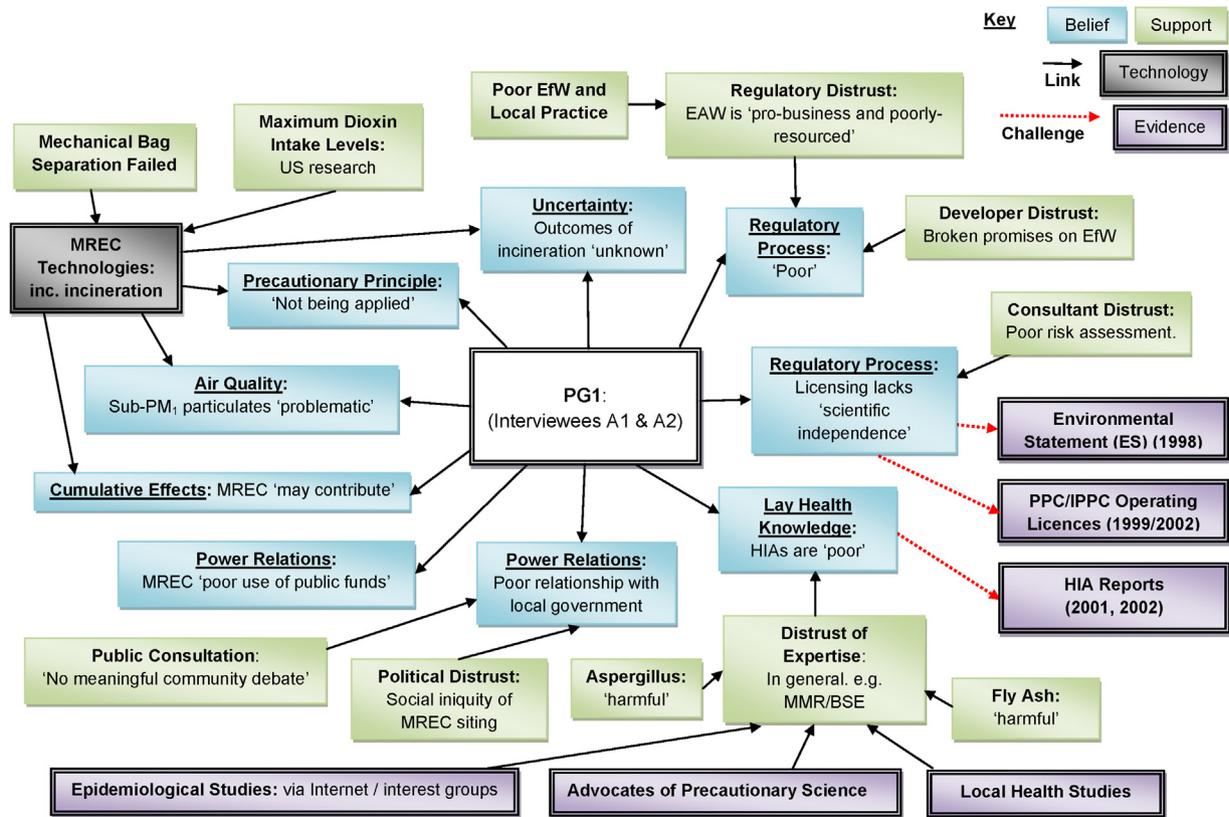


Fig. 8. 2009 sociologic diagram for community protest group 1 (PG1) in the dissenters' network.

Any potential opportunities that the developers may have had in boosting meaningful participation with the community in the pre-licensing period were rapidly lost. This was thanks to the apparently misplaced faith in the deficit approach to risk communication, pursued by the co-developers in public meetings and in the Liaison Committee (see below for a full discussion of the Committee). The developers assumed that opposition to the MREC was due to dissenters' lack of 'factual' information. For some of the dissenters in the community, their deep sense of mistrust was linked to fatalism about the end result. This may explain, at least in part, the attraction of direct action towards the site from some individuals. As A1 said in 2009:

"If something is to be decided to be given the go-ahead, it will be given ... [T]he council had given planning permission for the thing to be built so there was nothing we could do about that ... They don't consult us. No, you don't consult the public on an impact assessment. That's done by consultants." (A1 Interview, 2009)

In May 2002, however, the developers' approach to engagement changed when the regulatory network gave the MREC project the most powerful document of all – its licence to operate. A1 said:

"[A]fter a couple of years of treating us as morons, idiots, outsiders, troublemakers, then they tried the 'Let's be inclusive to the community.' It just doesn't wash. ... The whole consultation thing is an absolute sham." (A1 Interview, 2009)

The dissenters regarded incineration as a process that should be opened up to scrutiny and attacked. This citizen scientist approach (cf. Brown, 1992; Elliott et al., 2009) became central to NGO1's and PG1's resistance to the power arrayed by the developers' and the regulatory networks in the pre-licensing

phase. It was a strategy that would continue in the operational phase as well.

Power, space and risk

Figs. 7–9 show various members of the dissenter network all had heightened concerns for the environmental risks from the MREC facility, specifically the potential health risks. B4 from NGO2 said that their definition of 'good health' was broad and based on the World Health Organisation's (WHO) 1946 definition, something overlooked in the planning system in England and Wales:

"[T]he whole EIA regulation[s] are supposed to look at the direct and indirect effects of the application ... and that should include the anxiety, causes and concern that arise from that. The courts have accepted that anxiety is a real health effect and there is no doubt that it shortens people's lives; we've had doctors giving testimonies, public enquiries that they've lost patients because of the anxiety associated with applications." (B4 Interview, 2009)

Community activist A1 from the campaign group PG1, never openly defined good health. However, they stated:

"You don't wake up every morning thinking 'There's an incinerator coming and I'm going to be breathing in 2.5s, PM2.5s, and I might get asthma.' You don't live like that ... [but] once you've got kids you worry about every single thing ... All I know is my neighbours some of whom have never smoked in their lives, who do not drink, [who] like fish, who cook proper food, are getting very, very ill." (A1 Interview, 2012)

At the heart of the dissenter network's concerns was the scientific uncertainty perceived to be inherent from the burning of mixed waste. The dissenters drew upon external resources to increase their influence in relation to the developer and regulator

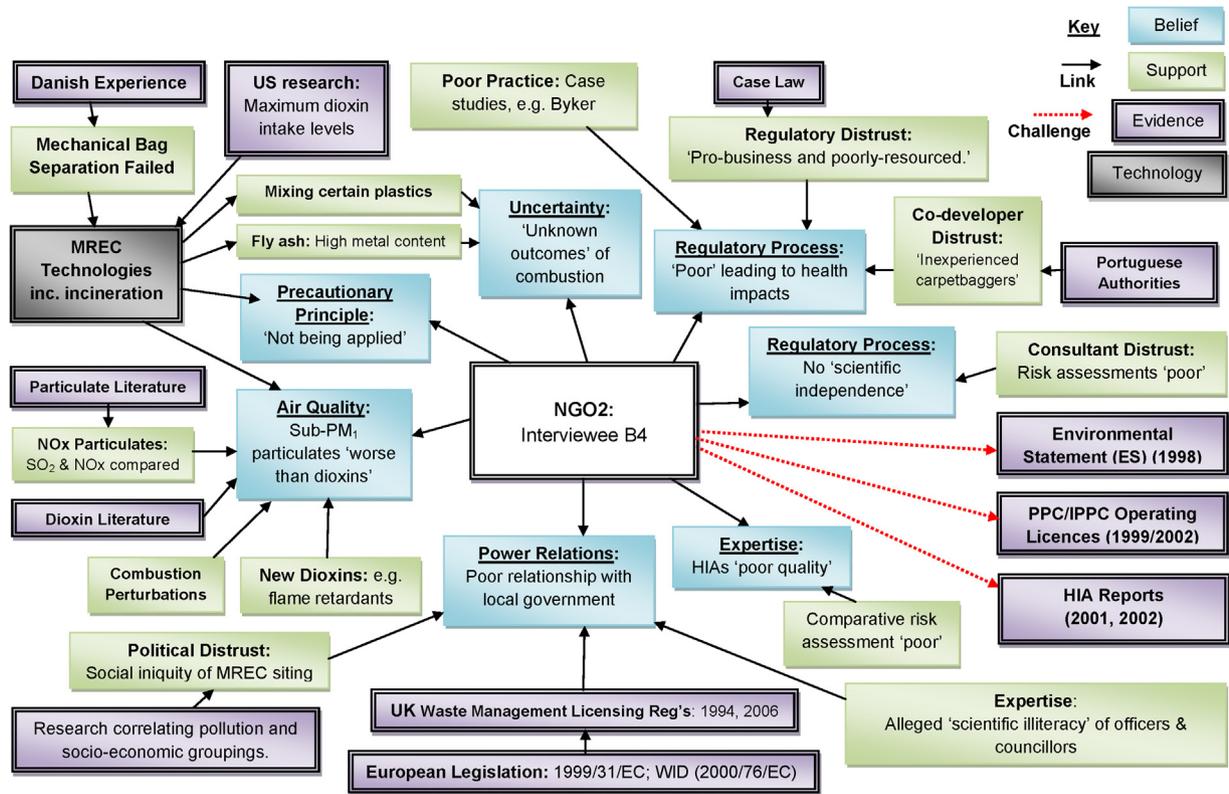


Fig. 9. 2009 sociologic diagram for environmental group 2 (national) (NGO2) in the dissenters' network.

networks. 'How would dioxins, furans, NO₂ and ultra-fine, sub-PM₁ particulates impact upon human health either alone or in combination?' they asked:

"On dioxins, [B4] quoted US figures for the TCCD (max)¹ and said that [internally] you shouldn't get [exposed to] more than a crystal of sugar in your lifetime. The data we were getting on Crymlyn Burrows suggested people would be getting exposed to more than that." (B2 Interview, 2009)

A2 also described the level of uncertainty regarding mixed waste:

"Now, no scientist ... has ever been able to say what happens when you burn different combinations of things. Nobody can tell you. With a coal-fired station, you know what's coming out, you know what to abate. But mixed rubbish, you can't, nobody can tell." (A2 Interview, 2009)

Fig. 9 shows that B4 expressed similar concerns in terms of uncertainty over the high metal content in the 'fly ash', the material caught inside the chimney which is removed and buried in landfill sites that are specially designed to take toxic materials contaminated with heavy metals:

"[I]f you can make something into a refuse-derived fuel it's more likely to burn better. Having said that there are a lot more variables in the process than just the feedstock ... it's very difficult from an engineering perspective to stabilise it ... unless you've got a fuel like gas. So any solid fuel can have problems ... [T]here are also basic chemical engineering issues ... If you put metals into something, elemental material will come out

and ... we're putting far too much metal into the residual waste ... [heavy] metals like lead and cadmium. They'll either come out of the chimney or go into the ash." (B4 Interview, 2009)

Fig. 9 shows that B4 believes lead and cadmium are the most hazardous heavy metals in the fly ash and need to be better regulated.

A1 meanwhile regards fly ash from incinerators as potentially the 'new asbestos'. Early on in the dissenter network's struggle, B4 examined the air quality issues for NGO1 and concluded that dioxin output would generally be better abated by air pollution control devices brought in after the Waste Incineration Directive (2000). However, for B4, the greatest uncertainty in terms of dioxin production was the creation of new dioxins, such as polybrominateddiphenylethers (PBDEs), from the burning of flame retardant material (see Birnbaum & Staskal, 2004; McDonald, 2002) as well as perturbations in the air flow to the stack, and this is indicated in Fig. 9. Perturbations are peaks in dioxin output which occur when stopping and starting a burner's operation (Howard, 2000; Wang & Chang-Chien, 2007).

B4's sociologic diagram in Fig. 9 also shows how this individual concluded from the scientific literature that non-dioxin emissions from the MREC plant would not be abated well enough to prevent damage to human health and the environment (COMEAP, 2009; Dockery et al., 1993; Seaton, Godden, Macnee, & Donaldson, 1995). B4 said:

"Dioxins [are] not the whole issue. The new incinerators are definitely different from the older ones, but not fundamentally ... The main difference is in the air pollution control devices ... [the developer-operator has] probably focused a bit too much on dioxin. If you looked at oxides in nitrogen, there's nothing

¹ 'TCCD (max)' refers to the maximum lifetime exposure to 2,3,7,8-tetrachloro-dioxin (TCCD) that is considered safe.

like the same sort of reduction and these are very significant sources of... a wide range of other pollutants ...[including] ultra fine particles [which are] sub-PM1 [in size²] ... [and] time and time again the science is well ahead of the engineering.” (B4 Interview, 2009)

B4 concludes that any risk of over exposure to pollutants comes down to regulatory failure. Cancer and ill-health were reasonably likely from ‘invisible’ sub-PM1 particles, B4 said. These would readily pass through the MREC abatement filter bags, according to B4.

In challenging the technology of incineration, A1 used B4’s knowledge of ultrafine particulates to question co-developer C1 from NPTCBC:

“[T]hey used a bag filter abatement system which catches PM₁₀s and under ... [Even] if you’re going to have the best abatement system the world’s ever made ... we [still] don’t know what’s going up the chimney and ... we don’t know how small the particles are. [At one point, C1 from NPTCBC] said [to me] “Yeah, but it’ll collect PM₁₀s down to [PM] 2.5.” I said “Yeah, but some things are going to be smaller than 2.5.” [And the reply was:] “Oh, that doesn’t matter.” (A1 Interview, 2009)

For the dissenters, to learn of this dismissal of PM₁₀s as insignificant to human health when studies were revealing the converse, suggested that the governance of environmental risk at the MREC was based on arbitrary interpretations of science. The developers, they felt, failed to appreciate the local circumstances. This included the negative environmental history of the site and the distinct topography around it. Local hills put the facility at greater risk of temperature inversions each year. This would lead to more episodes of intense localised pollution.

In the contestation between the different networks, the dissenters’ arguments for a precautionary approach to incineration – in terms of the science and engineering behind it – became at least as sophisticated as those of the other two networks. What they lacked, though, was the combined strength of sufficient networked individuals and documentary evidence powerful enough to win the day. This was the case in both the community setting and externally where key decisions would be made (e.g. siting decisions, licensing decisions). The regulatory network could make its power felt in the community (cf. Griffin, 2012), but the dissenters were embedded within it and struggled to reach into regulatory and/or developer spaces.

5.3. 2002 to the present – operational phase

In the second phase of activity, the siting and licensing of the MREC had been agreed. The plant at Crymlyn Burrows was operational. In this period, from 2002 to the present, we further highlight the evidence for governmentality in the three actor networks – regulatory, developer-operator and dissenter. In particular, we focus on how and where the pre-licensing contestation of the science of incineration continues, albeit in a more constrained and muted form in the Liaison Committee. Dissent over the MREC has shifted from Protest Group 1’s (PG1) public contestation over the scientific legitimacy of the whole enterprise to a more confined debate with the operator and the regulator over: (1) actual emissions data, (2) whether the plant should have continuous instead of semi-continuous monitoring for dioxins, and (3) the participatory nature of the forum for ongoing community engagement at the site (i.e. the Liaison Committee). In other words, in this period we witnessed an external regulatory space being increasingly subsumed within a local space.

In the operational phase from 2002, the continued contestation of the science of incineration (and of other technologies) at the Liaison Committee, reinforced the belief amongst the developer-operators and the dissenters when interviewed in 2009 that their respective opposition was inevitable. As shown above, this contestation was based upon different world views of risk governance and of what they mean in spatial terms (cf. Keller, 2009). For the regulator and developer, risk was always constructed in an aspatial manner. By contrast, for the community, risk was always about what it meant for them in their immediate area. The more confrontational disputes of the licensing period, mainly outside the Liaison Committee, were replaced around 2002 by more muted exchanges once the plant was a ‘fact on the ground’. The key issue of contestation and debate that emerges was access to and the quality of the actual emissions data, in particular for dioxins. This debate was now held in the Liaison Committee – the nearest available forum for dissenters to appeal in. This presented relatively little satisfaction to those community members who still believed, as they did at the very outset of their protest, that the governance of the site was not strict enough. From the outset, they demanded reassurance with continuous monitoring of dioxins. This was something the EAW had said was untried and likely prohibitive. In 2009, after seven years of operation, the original core community dissenters made up of five individuals and the MREC’s management were still prepared to sit down together. However, by 2011, the most vociferous of the community dissenters had begun dropping off the committee. They spoke of fatigue and disillusion. The work of the Liaison Committee and what it reveals about the dynamic of power are discussed further below in Section 5.4.

5.3.1. Continuing to impose regulatory space: the regulatory network

When the most powerful document, the Integrated Pollution Prevention and Control (IPPC) licence, was agreed for the MREC in 2002, the Environment Agency Wales’ (EAW) functional role changed significantly. As EAW’s role moved from licensing to enforcement, significant powers were conferred onto the developer-operator network which had the potential, in turn, to alter the EAW’s relationships with the other networks. The EAW and the dissenters, for example, might have become more sympathetic to each other’s points of view seeing as both apparently now wanted the plant’s operations scrutinised. As we show below, this has not turned out to be the case. Also, less unexpectedly given that they continue to share the same technocratic framing of the risks of incineration, the regulator and the developer-operator remain reasonably similarly aligned despite some qualms by the latter.

The interviewee from EAW in 2009, E1, refused to take part in our follow-up series of interviews in late 2012. However, the Agency did respond in writing to several questions. These responses are shown in green boxes in Fig. 10. Green boxes represent statements of perceived supporting ‘facts’ in each sociologic diagram as compared to the blue-boxed statements of ‘belief’.

Following procedures

The data presented in Fig. 10 from 2012 reveals how, just as was indicated in 2009, EAW attempted to govern operators’ behaviour through the following of procedures. As at the licensing stage, these are based on legal commitments many of which are decided elsewhere. In this case, many come from outside of Wales. For example, there is Internal Environment Agency Guidance, the *Waste Incineration Directive (WID)* (2000/76/EC) and UK National Legislation. In terms of governance, these procedures are meant to operationalise the enforcement functions of the EAW. In 2012, the Agency reiterated E1’s previously stated position on emission limit values (ELVs) (from 2009) saying simply that:

² Sub-PM1 is particulate matter less than 1 µm in diameter.

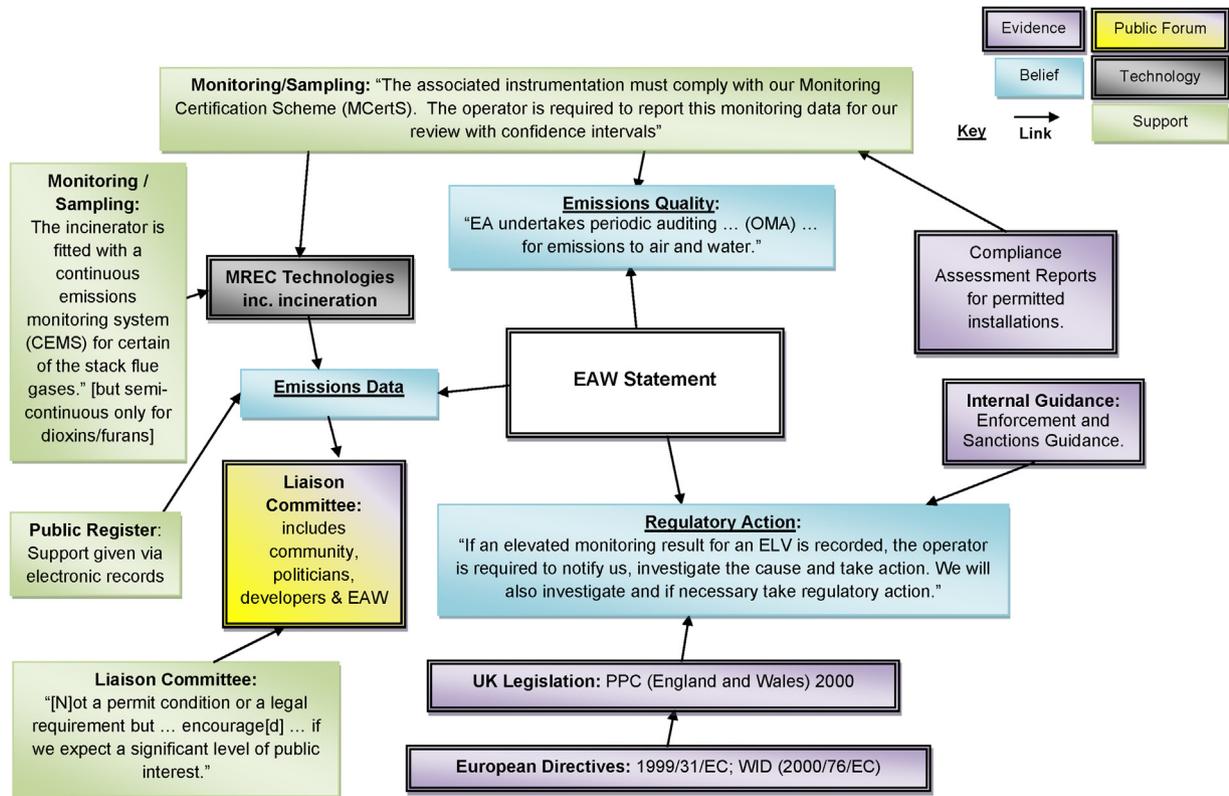


Fig. 10. 2012 sociologic diagram for Environment Agency Wales (EAW) in the regulatory network.

"I think these kinds of things actually do happen more often than is actually reported and the dialogue usually stays outside of any press interest and is dealt with between the operator and the Environment Agency."

Similarly, in terms of whether incineration emissions are monitored continuously or sampled periodically, EAW (2013) states:

"The incinerator is fitted with a continuous emissions monitoring system (CEMS) for certain of the stack flue gases."

What is not stated in EAW (2013), however, is that CEMS does not work continuously for dioxins. As C1 notes in interview in 2012, dioxins continue to be sampled periodically at the MREC site. Nothing had changed in the confrontation between both sides on this point since before 2002. In this way, EAW's position on enforcing the law on dioxin monitoring – i.e. it's not mandatory to monitor continuously – remains popular with operators who themselves might otherwise have to pay for any new equipment. Nevertheless, as the national environmental campaigner from NGO2 – B4 – points out below, continuous dioxin monitoring would at least buy the Environment Agency trust at contested incineration sites across the UK like Crymlyn Burrows (see also Donaldson, Lane, Ward, & Whatmore, 2013, for similar issues relating to flood risk).

The 'Monitoring/Sampling' and 'Emissions Quality' boxes in Fig. 10 show that EAW (2013) counters the dissenter networks' position on monitoring with arguments about resources. These statements support its provision of the CEMS system, the robustness of the monitoring equipment, the willingness to investigate troublesome sites, and periodic audits of emissions data in the local air and water. Such arguments, made since 2002 at Crymlyn Burrows, have not helped build trust with those most critical of the MREC plant. Members of the dissenter network

claim, as we show below, that the resources required to prevent the licensing of the MREC and better enforce a stricter regime later on have not been in evidence. A shift in allegiances by EAW and the dissenters – to a much closer alignment based on a shared sense of purpose – therefore did not occur largely because of this ongoing trust deficit. Such a deficit had existed for decades before the licensing phase began in 1998 given the long history of environmental degradation in the area (which was described in Section 4). According to the dissenters, this sense of mistrust was exacerbated by EAW's perceived failures throughout the licensing phase and then during the operational phase.

Similarly, the power relations between the EAW and the developer-operator's network continued much as they did pre-2002. EAW maintained its striated or proscribed space for NPTCBC and HLC to operate in (cf. Deleuze & Guattari, 1987; Murdoch, 2006) (at least up until 2005 for HLC when it went into administration). This controlled space first highlighted in the licensing phase nevertheless appeared to offer the operator(s) some room for manoeuvre despite a serious fire in 2003, disputed dioxin emissions data in 2006, and two shut downs for dioxin breaches in 2010 and 2012. On dioxins, for example, the public provision of emissions data can still be delayed by many weeks after a breach of an emission limit value (ELV) occurs. This apparently happened in 2010 and may well have occurred again in the autumn of 2012. EAW has a graduated regime of warnings, investigations and penalties before closure is sought and at each stage, evidence is presented by both sides and outcomes are negotiated.

Finally, in terms of responding to a specific question about public access to its public register of records, as indicated in the top left of Fig. 10, EAW (2013) states:

"We are legally obliged to maintain and make available public registers of specified information. We go beyond these legal requirements and also make available our Compliance

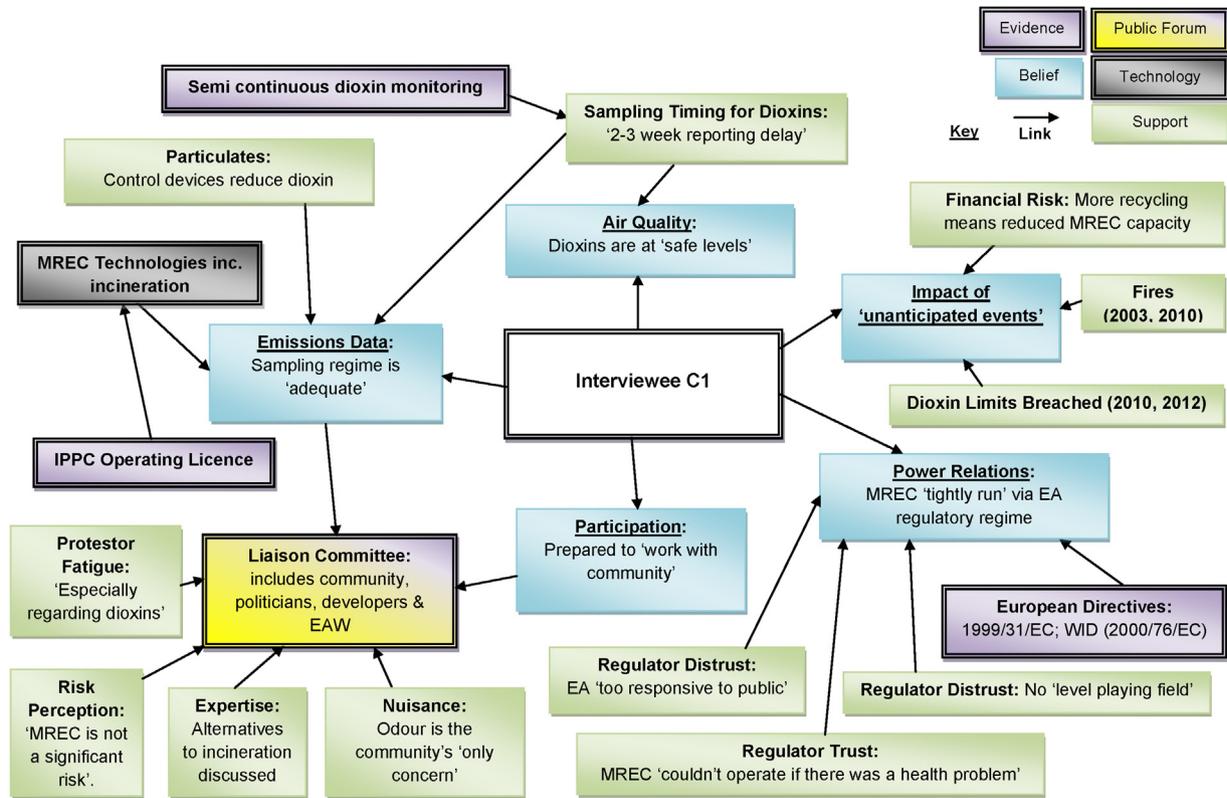


Fig. 11. 2012 sociologic diagram for council waste planner/co-developer (C1) in the developer network.

Assessment Reports for permitted installations. The public register is available during normal office hours and if an appointment is made we can also provide personal support to use the system.”

As we will see in Section 5.3.3, the dissenters continue to contest both the ease of access of these records and their interpretation.

5.3.2. Working in contested spaces: the developer-operator network

In Fig. 11, the IPPC licence (now on the left-hand side of the diagram) is clearly linked to the grey boxed technology of incineration. In 2012, it remained the focus of contestation between the operators and the dissenters. However, post-2002, this contestation had become progressively more muted as compared to the heated exchanges in the licensing period. This has been due in large part to the normalising experience of the Liaison Committee.

By 2012, former co-developer D1 had not worked at the site for seven years, but nevertheless remained aware of the changing financial circumstances at the MREC. For example:

“I think about . . . four or five years ago they did seek to re-tender the operation of the facility out to the private sector . . . it was stopped and the authority decided to carry on. It might have been a matter of just budgetary limitations and what they would need to pay a private contractor would have been a lot more than what they could manage themselves.” (D1 Interview, 2012)

D1 had also read media reports concerning the 2010 and 2012 shutdowns and considered the causes and implications below from the waste industry’s perspective.

Following procedures

In terms of following procedures for dioxin production, the striated or proscribed space in which council waste planners operate is unchanged:

“Dioxin production is very tightly controlled. We have had issues with dioxin, probably since 2009 but they are dealt with or you know if we have to take remedial action or whatever, we take remedial action . . . obviously the plant is operating under the waste incineration directive rules.” (C1 Interview, 2012)

Indeed, the actions of the locally-based regulator, EAW, shown to the right of C1 in Fig. 11, remain driven by the European-level Waste Incineration Directive (WID). C1 actively looked for legitimacy from EAW saying of the Materials Recovery and Energy Centre (MREC):

“The Environment Agency, they wouldn’t let the plant operate if they believed that there was a . . . significant health risk with it, whether it was dioxin or anything else.” (C1 Interview, 2012)

This statement was made despite C1’s known criticisms of EAW from 2009, and these are shown in Fig. 11. Here, C1 states that there isn’t a level-playing field for dioxin enforcement between small and large potential polluters (e.g. Corus). C1 also says that EAW was overly responsive to public pressure (something that the dissenters have claimed in 2009 and 2012 was not the case). By contrast, D1 remembers a three-way power struggle, at least up until 2005, with C1 allegedly putting pressure on EAW in order to get HLC to do things:

“I did sense that the [EAW] role went beyond what they would typically do. I had no feeling for whether this was driven by their own internal concerns or whether they were being goaded a bit . . . by [C1] at Neath Port Talbot Council who . . . was sometimes using the agency as kind of a whipping boy to put pressure on us to do various things.” (D1 Interview, 2012)

Power, space and risk

In interview in 2012, C1 reaffirmed their construction of knowledge about the safety of dioxin production at the MREC site.

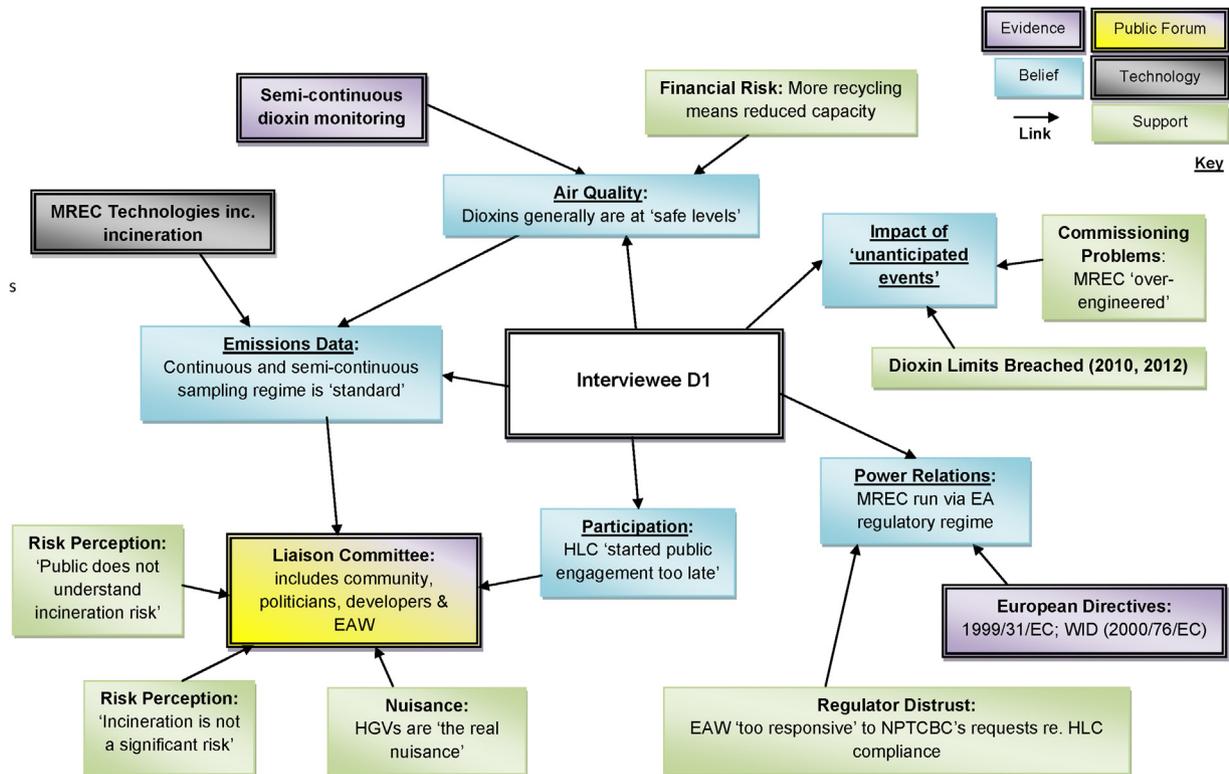


Fig. 12. 2012 sociologic diagram for co-developer-operator (HLC) (D1) in the developers' network.

They claimed that it is safe, and as shown above, legitimacy for this belief was sought from EAW. This is another unchanged belief from 2009. C1 therefore continued to counter the dissenters' central claim that in precautionary terms, incineration should be considered unsafe.

In the 'Emissions Data' box in Fig. 11, C1 stated that the semi-continuous sampling regime is fine. Then, C1 offered some comments about the importance of costs to getting the business model right. C1 stated in the "Impact of Events" box in Fig. 11, that 'poor' calculations in HLC's business model led to the loss of the PFI agreement. C1 then described how the continuing problems with the incinerator at the plant are proving costly. This is because of the need to comply with EAW's permitting levels:

"Very recently we've started to have a recurrence of tripping over the permit limits when we do ... tests and we're going to have to make a decision soon about whether in fact this ongoing expenditure that that creates for us in terms of locating and fixing the problems ... continues to be viable or not, compared with some of the other options, which are essentially burning the material off site." (C1 Interview, 2012)

D1 stated, however, that their understanding from industry press articles is that the MREC is currently operating well below capacity. This automatically introduces combustion problems including higher dioxin outputs:

"The authority itself is running [the MREC] in a slightly different configuration than how it was originally built and designed, but are doing so as kind of an interim measure ... It was working generally alright ... [But now] [t]he plant itself seems to be working at a much smaller scale than was originally designed ... The waste handled was only in the range of I think ... 12,000 tonnes as opposed to the design original, the design capacity in 2002 was around 50,000 tonnes. ... I suspect that the low

tonnage throughput relative to the size of the plant is one of the problems they're having." (D1 Interview, 2012)

Whatever the cause of the combustion problems, changing economic circumstances have made stopping incinerating at Crymlyn Burrows a more likely future option for C1. The business case suffered from the facility's troubled choice of technologies – as D1 notes in Fig. 12. Since 2002 there has been a much greater supply of pre-sorted household waste thanks to a greater uptake of recycling in the county borough. In this context, although it was not mentioned in interview, C1 would be even less likely to pay for continuous dioxin monitoring, which the dissenters continue to insist on. This lack of investment would make an already costly facility even less economically viable and suggests a decision to close or sell the MREC had already been taken in late 2012. The MREC and its contracts have since gone out to tender, in March 2014, but a buyer appears not to have been found (WG, 2014).

5.3.3. Reclaiming space? The dissenter network

In 2012, the contestation over making 'safe' the dioxin emissions from the Materials MREC remained at the heart of the dissenters' contestation. However, protest, whether via direct action or citizen science, appeared to have faded out at least from the original core community members. There was a distinct sense of campaign fatigue by 2012. Those in the dissenter network remain most upset about EAW, which was encouraged to act as a tougher enforcer of the WID regulations. The dissenters continue to be very critical of EAW in terms of its 'expertise' (cf. Wynne, 1996). The dissenters also remain unhappy with the developer-operators despite coming into more regular contact with them once the Liaison Committee meetings began.

(Not) Following procedures

By the end of 2012, the dissenters had been on the receiving end of hierarchical governance for well over a decade with the licensing

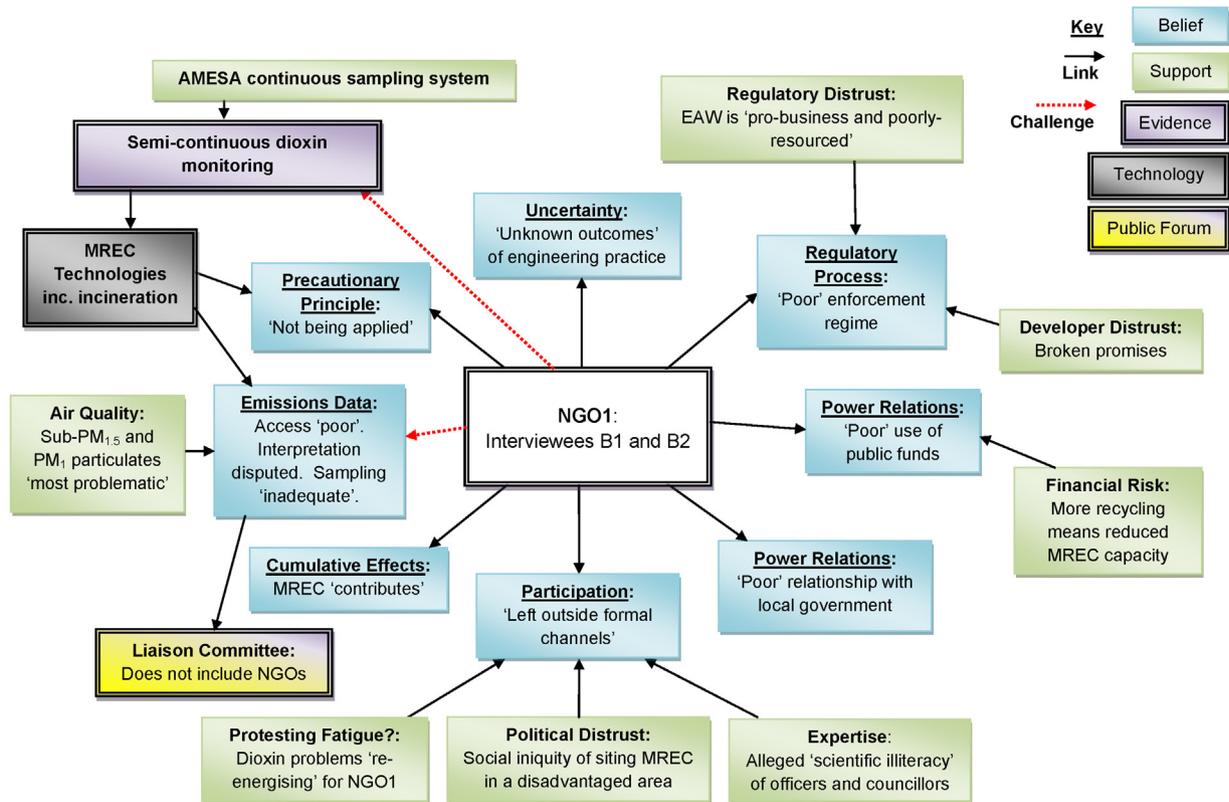


Fig. 13. 2012 sociological diagram for environmental group 1 (local) (NGO1) in the dissenters' network.

and operation of the site. Their fight during the operating period was over actual emissions data. As Figs. 13–15 all show, this was linked to the same beliefs about the MREC facility expressed in 2009, e.g. cumulative effects, the precautionary principle, uncertainty, expertise and the social injustice of locating the MREC in a disadvantaged area (cf. Rittel & Webber, 1973).

For the dissenters, the fight over access to emissions data has become the key to their hopes of getting the MREC shut down. They knew, like C1, that too many shutdowns would likely put the facility out of business both in terms of costs of repairs, and the public pressure on EAW to enforce its regulations and fears of the loss of marketability of the MREC to any third party buyer in the future. That said, getting access to the data in a timely fashion and its interpretation has not been straightforward. B1, from the local NGO, notes that the data produced by the MREC is only partial. It also gets delivered late to the community. In response to a question about the closure of the plant in 2012, B1 asked rhetorically:

“This [complete inventory of emissions] is not monitored 24 hours, so at what other times has it been breaching the limits and it just simply hasn’t been detected? ... I read in one of the [December 2012] reports that it was a few months ago that the emissions were exceeded and ... it’s only now they’re acting on it.” (B1 Interview, 2012)

B4 points out that, if the dioxin data were continuous, its publication by the MREC and EAW would boost transparency and public trust:

“After the first examples of the breaches [in 2010], which were certainly not insignificant ... I think from memory it was about 12 times, like 1.2 nanograms per cubic metre ... The Environment Agency ... could have acquired continuous sampling [technology via continuous emissions monitoring systems or CEMS] to

reassure the public and to make sure that the plant was operating more safely, but they didn’t. [But] they just carried on with the same old spot sampling which is almost inevitably going to ensure that the public don’t trust you ... Instead of trying to reassure ... the public in a meaningful way, they just pretend that they know what’s coming out.” (B4 Interview, 2012)

As well as demonstrating the continuing expertise of dissenters on emissions, B4 also revealed how a process of learning has been taking place on emissions monitoring. The emissions data is held on the public register at the south-west Wales office of EAW in Llandarcy. The community dissenters are nevertheless suspicious of its accuracy:

“You can go to the Environment Agency and look through their files at all the data and you know whether it’s accurate or not, who’s to say. But it’s all there you know, every time they measure things it goes on file within, I think it’s 28 days.” (A1 Interview, 2012)

They also feel that the recent computerization of the records made the register less useful:

“We were having problems with the public register. It’s not ... as good as it used to be because they appear to be wanting to do everything in a computerised fashion, rather than letting us be able to look through the files, which is much easier ... Although you think, well with a computer you can search things out, when you actually have the files in front of you and you can rootle through them, you actually find things that you weren’t looking for.” (B2 Interview, 2012)

This perceived failure to overcome dominant power relations by working within the established structures of governance has led some dissenters to reconsider their strategic approach and opt for more direct action. For example, A1 said in 2009, said that they

personally regretted having chosen the non-confrontational route of the ‘citizen scientist’:

“There’s no point. What I would want to see is more direct action ... The one thing I’ve learned over the ten years that we’ve been doing it [is] you keep on doing [conventional protesting], but there is absolutely no point at all.” (A1 Interview, 2009)

The same sense of frustration was again noted by A1 in 2012:

“You keep knocking your head against the wall. For instance, I haven’t been on the internet to look into any new research into health problems due to incinerators say. If I did and found some, what am I going to do with it? Talk to friends maybe ... And that’s about it.” (A1 Interview, 2012)

A2 felt the same:

Q. Would you recommend [to] a group today who is concerned to do what you all did?

“No, I would say don’t waste your stamps on the letters ... they’re being a nuisance to the Environment Agency, because all they do, from what I could see, is get somebody to file them away and I’m sure they were ignored.” (A2 Interview, 2009)

The dissenting voices here were originally drawn to an ethic of protest which was not revolutionary in a Marxist or Deleuzian way, but rather protesting in the face of power, i.e. local and central government control of a waste development. Arguably, the citizen science dissenters did beat the development on its own scientific and engineering terms – not least with the repeated dioxin breaches having proved their fears correct (as stated in the interviews of A1, A2, B1 and B2 in 2012). They used arguments based around evidence and ideas, but in terms of the power relations at work in the planning arena, the MREC became much more powerful once in place and so far harder, if not impossible, to shift.

5.4. The Liaison Committee: towards a hybrid forum?

Throughout this article we have made reference to the Liaison Committee. Despite the widespread adoption of liaison committees as ways of bringing together industrial and community interests there has been very little social science research on them. Such neglect is unfortunate since analysis of a liaison committee provides us with insights into how networks and power work in practice. Here we bring together actor perceptions of the MREC Liaison Committee with social network analysis to provide a rigorous evaluation of how a liaison committee operates. This reveals how power plays out in practice. A liaison committee also offers the potential to be what Callon et al. (2009) call a ‘hybrid forum’ in which different types of expertise are brought together and shared in an open and democratic forum. Our analysis of the power relations within the Crymlyn Burrows Liaison Committee, however, suggests the prospects for a genuinely hybrid forum were undermined.

Before the licence was granted in 2002, EAW advised the setting up of a liaison committee. It was an advisory measure given the deeply contested nature of the development. In response to a specific question about public participation, EAW (2013) gave ‘factual’ background on the MREC’s Liaison Committee:

“Chaired by the general manager of the MREC, [the committee] follows a structured meeting approach. [EA] regularly attend the committee meetings members are drawn from local residents, local Councillors and other interested parties.”

At the time of its formation, the Committee was a public arena where actors have a chance to express themselves, listen to others and debate (membership of the committee is exclusive, however, and members of local environmental NGOs are not invited). In a true hybrid forum, new knowledge is acquired and shared, and “new ways of thinking, seeing, and acting must be developed, pooled, and made available” (Callon et al., 2009, 33; Lane, Landström, & Whatmore, 2011; Lane, Odoni, et al., 2011). This, it is hoped, might begin to break down institutional and perceptual barriers of power and expertise:

“[Specialists] imagining that they are faced with an ignorant or even obtuse public, take on the mission of enlightening and instructing the other. The discussion established in hybrid forums wrong foots this model. It demonstrates that both categories of actors possess specific forms of knowledge (a capacity for diagnosis, an interpretation of the facts, a range of solutions) that mutually enrich each other” (Callon et al., 2009, 33).

There is, however, a tension between what the developer-operators of the MREC facility wanted to achieve with the Liaison Committee and what the dissenters come to regard it as. In the early years of the committee, i.e. from 2002, the developer and dissenter networks did not adopt the same or even similar perspectives on science, engineering and risk. But they did at least appear to respect and understand the position of others, as D1 recalls:

“Occasionally there was a hostile exchange, but generally speaking it was a good forum for getting views aired. And where they wanted more information on something experts would come in and give discussions and talks on it. It was good and I think it’s pretty standard now to have these things especially where there’s combustion plant’s involved.” (D1 Interview, 2009)

The Liaison Committee offered the potential for a hybrid forum given the citizen scientists from the community, the developer-operators, and other representatives of similarly-governed industries like the nearby Corus steelworks. As Callon et al. (2009, 35) suggest, however, a hybrid forum must achieve certain things at a minimum:

“By fostering the unfolding of these explorations and learning processes, hybrid forums take part in a ... partial challenge at least, to the two great typical divisions of our Western societies: the division that separates specialists and laypersons and the division that distances ordinary citizens from their institutional representatives. These distinctions, and the asymmetries they entail, are scrambled in hybrid forums ... Thanks to this double transgression, as yet unidentified overflows are revealed and made manageable.”

A functioning Liaison Committee in Crymlyn Burrows was seen by EAW as an important step in the developers’ efforts at governance of the plant. In particular, the Committee’s creation in 2001 was meant to provide an opportunity for the developer to reassure the community of the safety of producing energy from waste. Early on, however, it brought the lead developer and council waste planner, C1, and the co-developer, D1, into face-to-face contact with individuals who had very different social constructions of risk to their own:

“They would try to trap you. There would be a public debate going on. ‘Can you guarantee me there will be zero emissions from this plant?’ I said ‘No, I can’t guarantee you there will be zero emissions, there will be some emissions, but the risk of impact is the same as a bolt of lightning hitting me...’ But

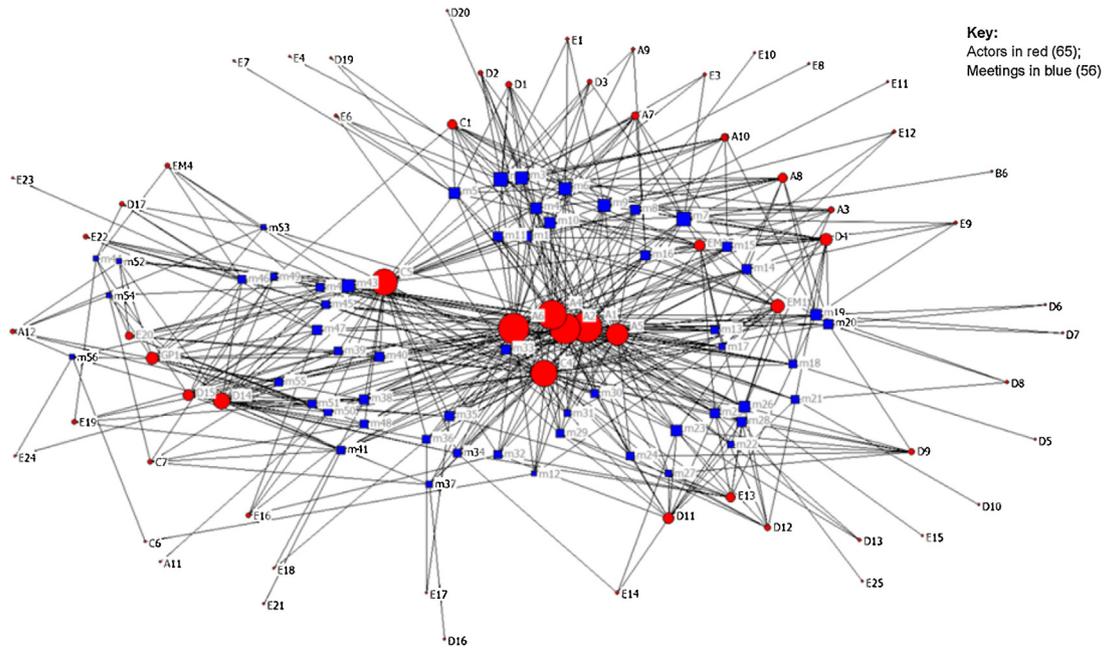


Fig. 16. Two-mode analysis in Ucinet 6 of actors and Liaison Committee meetings, 2001–2013.

because you cannot say indefinitely it will be zero then there’s a risk therefore [of] ‘No thank you’. . . . Reasonable argument goes out of the door, it’s an emotional reaction. And that’s what we were facing, no one was going to change their minds about it, no way, and it was just a matter of making sure that we could build faith and manage these risks sufficiently, which we didn’t do.” (D1 Interview, 2009)

So, could the Liaison Committee overcome this backdrop of competing interpretations of risk to become a true hybrid forum? Or would the developer and regulator networks simply exercise their authority in their attempts to assuage community concerns? Or would the Liaison Committee become a means by which the community could express its concerns and bolster its power to undermine the legitimacy of the EfW plant? To answer these questions, we first use SNA to examine how the Liaison Committee worked, to find out who participated, when they participated and to draw out messages about how power was operating. We then explore in more detail the perceptions of the Liaison Committee of network actors, again to examine how power operates in a community setting.

5.4.1. SNA and the Liaison Committee

We found that a closely bound group of community members and two waste planners from NPTCBC were most involved in meetings in this timeframe. This was after having undertaken a two-mode analysis of attendees at Liaison Committee meetings between 2001 and 2013 (see Section 3.3 for our methodological approach). The social network and meetings revealed by the data are shown in Fig. 16. Actors are displayed in red and meetings are shown in blue. The data shows that a core of community dissenters A1, A2 and A6 participated in 42 meetings out of the 56, A4 attended 39 while a waste planner from NPTCBC, C4, was at 26. As we move through the meetings from M1 to M56, attendances from this original core community group begin to fall away. This occurs, especially from 2011 to the end of the data collection in 2013. Fig. 16 reveals visually how the distance between the core community members and the meetings increased over time, showing how a gradual process of disengagement from the Liaison Committee took place. Other network members, the co-developers

(the Cs and the Ds apart from C4) appear generally further away from the core grouping of As. While individuals from the regulatory network, the Es, from the Environment Agency, appear most distant from the core community members and the meetings. This picture is confirmed by several SNA metrics. These include a figure for the density of the entire graph in Fig. 16 over the full time period of 0.161. This suggests a relatively fragmented network structure given that density is a tally of all the network ties as a proportion of all possible ties (cf. Rydin, 2013). In terms of centrality, i.e. the number of links between each actor and each meeting in this two-mode figure, we used Ucinet 6 to calculate the degree of closeness for each actor in their network, i.e. the shortest paths between these and other actors and the meetings. We also did a calculation of betweenness for each of the top five actors in each network to find which actors were on the shortest paths

Table 2

Three social network analysis indicators with top 5 actors in rank order for each.

Network	Analysis types					
	Two-mode				One-mode	
	Centrality indicators				Importance indicator	
	'Closeness'		'Betweenness'		'Eigenvector'	
	Results	Actors	Results	Actors	Results	Actors
Dissenter	0.797	A1	249.922	A2	0.374	A1
	0.797	A2	216.618	A6	0.374	A6
	0.764	A4	158.248	A4	0.370	A2
	0.671	A5	148.725	A5	0.341	A4
	0.797	A6	130.854	A8	0.264	A5
Developer	0.743	C5	194.152	C4	0.310	C4
	0.733	C4	182.910	C5	0.284	C5
	0.579	D4	159.706	D4	0.160	D14
	0.561	D14	129.790	D14	0.140	D4
	0.534	C1	88.627	D15	0.114	C1
Regulator	0.514	E13	78.303	E7	0.095	E13
	0.495	E6	64.180	E6	0.074	E20
	0.487	E1	62.280	E9	0.041	E22
	0.482	E9	61.798	E13	0.040	E9
	0.447	E8	60.370	E11	0.039	E16

between the other actors and the meetings (cf. Rydin, 2013). These results are shown in Table 2. The figures for both closeness and betweenness reveal that there is a distinct level of similarity amongst members of each network – dissenter, developer and regulator – than between these networks. The figures for the dissenter network show a high degree of commitment to each other and to attending the Liaison Committee. In contrast, the members of the regulatory network made up of staff from Environment Agency Wales (EAW) are evidently less engaged with one another and with EAW individuals being less able to commit to repeated attendances at meetings.

In terms of an indication of the relative importance of individual actors within their respective networks, we undertook a one-mode eigenvector analysis in Ucinet 6. The results are shown in the right-hand column of Table 2. This analysis further reveals distinct differences between the dissenter and regulatory networks in terms of the power of individuals' association with each other. The picture here is of a tightly-knit dissenter network versus a much more loosely bound group of EAW officers.

Fig. 16 also shows, unsurprisingly, that the most important meetings attracted the greatest number of attendees. These included the meetings that considered Environment Agency's decision to award a licence to the operator (e.g. 4th March, 2002, or 'M7') and the reaction to the 2003 fire at the plant (22nd September, 2003, or 'M19'). With the dropping off of core community dissenters on the Liaison Committee from meetings from 2011 onwards, the wider community nonetheless remains engaged, but the expertise of the core community dissenters has gradually been lost after a decade's attendance.

We also wanted to analyse the strength of the interactions between individuals and their networks. In a one-mode analysis of

actor-by-actor relative associations (eigenvector/sum of cross products) (see Fig. 17), the core community dissenter grouping of A1, A2, A4 and A6 are shown in the top left box. The core community's peaks in this box represent the strength of associations of these individuals through their attendance at the same Liaison Committee meetings. Next, the Council's waste planning staff, in particular C4, are revealed in a co-developer's box immediately surrounding the dissenters box. C4's peaks are lower here, reflecting the lesser number of meetings attended overall. By contrast, however, the individuals from the developers (the Ds), also shown in the co-developer network box in Fig. 17, are even less consistent in meeting attendance. The Environment Agency (the Es), shown in the very outer L-shaped governance network box in Fig. 17 attended the fewest meetings overall with only a handful of individuals making more than three. This lack of repeated attendance by the same staff was repeatedly commented upon in interviews with community members who felt that EA management lacked a commitment to longer term engagement.

Both Figs. 16 and 17, along with interviewee comments, provide insights into how power and legitimacy are reproduced in a community setting. The dissenters through their high level of attendance reflected an aspiration to engage in the Liaison Committee meetings despite their often well-stated cynicism towards the other networks and the decision making process. The community invested time and energy in this activity. From this came an expectation within the community of reciprocal engagement by other network actors. It was hoped that this would confer political legitimacy on decisions being taken that would affect the community. Whilst C4 from the Council's waste planning team did attend a significant number of meetings, the core community members repeatedly expressed in interview their disdain that

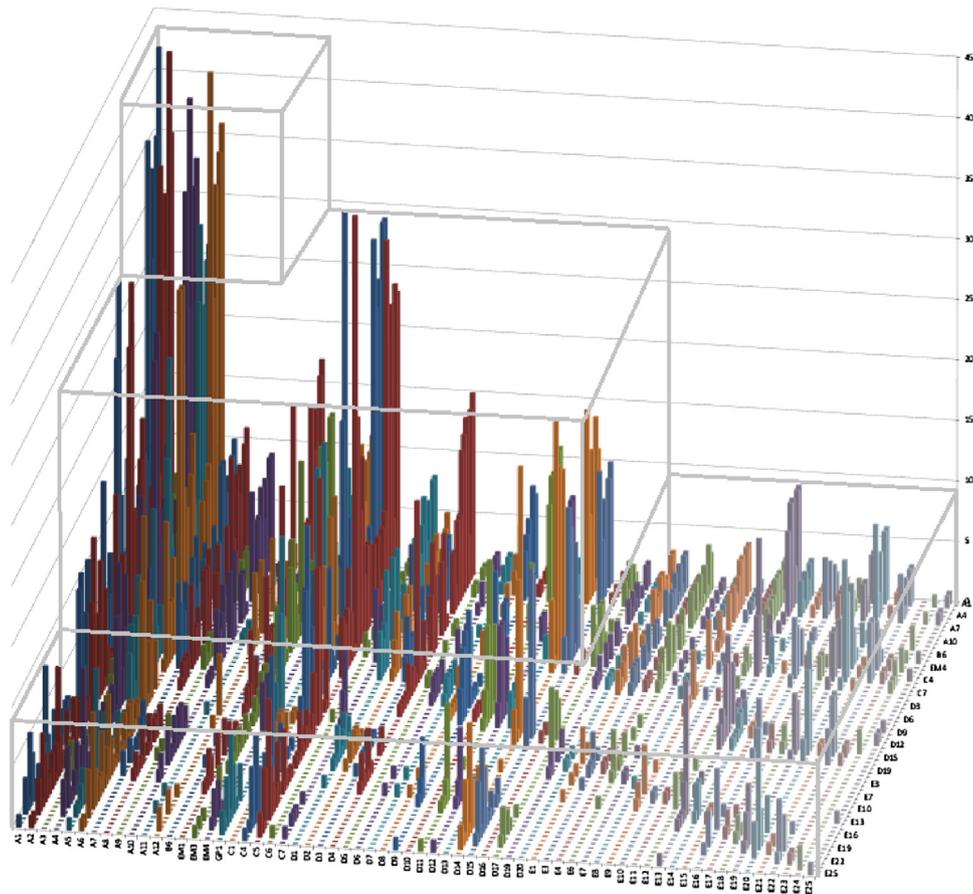


Fig. 17. One-mode eigenvector (sum of cross products) analysis of actors attending Liaison Committee meetings, 2001–2013.

individuals representing the developers (the Ds) and the Environment Agency (the Es) rarely attended more than a few consecutive meetings. This undermined the legitimacy of the Liaison Committee as a consultation body or one that could share knowledge or decision-making power. It also deepened the pre-existing cynicism of some community members that the Liaison Committee was simply a ‘talking shop’ with little or no power at all.

From the perspective of the developers and the regulators, the Liaison Committee has a rather different purpose. For both networks, and particularly the former, the Liaison Committee acts as a forum to communicate information on emissions, planned maintenance and future investment on the site. It is not perceived as a body that will share expertise or authority. Community-generated data, for example, is dismissed as unscientific (cf. Wynne, 1996, Irwin & Wynne, 1996). In Fig. 16, co-developers D1, D2 and D3 from the Portuguese-owned company, HLC (Neath Port Talbot) Ltd, are shown to attend the early meetings when decisions on licensing were being made. Later on, however, with the site recovering from fire damage in 2003, i.e. from the meeting on 22nd September, 2003 (‘M19’), D7, D8 and D9 attend only infrequently (most of these represent a public relations firm hired by HLC). By the end of the time period, with HLC (Neath Port Talbot) Ltd having gone into liquidation in 2005 with £40m in debt, the only individual associated with the development who is regularly attending meetings is C5, a waste planner from NPTCBC because the Council became the sole owner-operator. Individuals from HLC only attend haphazardly, just one or two meetings before being replaced (their numbers go to ‘D16’ showing that 16 different people from the developer side attended Liaison Committee meetings). The distinct peripherality of many of the Cs and Ds, and all the Es, from the core community members and the interactions at the meetings is shown numerically in Table 2 and visually in Figs. 16 and 17.

In Fig. 17, the attendance of council waste planner C5, for example, is indicated by the peaks in the first L-shaped block surrounding the dissenter network results which are shown in the top left. The distinct peaks of C5 suggest that this individual was expected to attend these meetings as part of their job. For those whom attendance may be a more voluntary matter (e.g. the other Cs and Ds) their engagement was significantly lower. This suggests that the co-developers (NPTCBC and HLC) are effectively able in practice to marginalise the potential significance of the Liaison Committee despite its establishment being a licensing expectation of the Environment Agency.

The most peripheral individuals to the Liaison Committee were those from the Environment Agency. Fig. 16 shows that Environment Agency staff members are distant from the meetings in terms of their attendance and even more remote from the regular core community attendees. Few Environment Agency staff attended more than two or three meetings. Fig. 17 shows the Environment Agency engagement with the Liaison Committee as the low peaks and dispersed points to the right and bottom of the figure. In terms of power relations this indicates a paradox: the Environment Agency had requested that the developers to establish a Liaison Committee but the lack of regular attendance by familiar faces who might offer both continuity and legitimacy appears to have undermined much of the potential for engagement of the Liaison Committee.

Together, Figs. 16 and 17 (along with the qualitative data from interviews with actors in all three networks) show an extremely complex set of perceptions: the Environment Agency believes that it has performed its role by encouraging the creation of the Liaison Committee, the developers believe that they have co-operated with the Environment Agency by creating the Liaison Committee and using it to disseminate their information to the community, and the dissenters believe that by engaging in the Liaison Committee they will be able to share in power and authority over

the making of future decisions affecting the plant. Instead, as a vivid illustration of asymmetric power relationships, there was little or no sharing of knowledge or expertise, and there was no enforcement of meaningful engagement by EAW, and so high levels of cynicism and mistrust persisted for many in the community. It is clear that the Liaison Committee did not, and could not, perform in this context as a hybrid forum.

5.4.2. Exercising power in the Liaison Committee: regulatory and developer networks

A positive relationship does exist between the regulatory-network and the Liaison Committee. Emissions data provided by the developer-operator and EAW is circulated relatively swiftly for community consumption before it becomes more widely available. From the point of view of some community representatives, the Liaison Committee is a positive development. They are given access to data in a useable form and can discuss its interpretation with the operator, Environment Agency staff and others with technical knowledge. This plays to the technical expertise that some in the community have developed over time (cf. Irwin & Wynne, 1996).

The Liaison Committee, however, still falls short of what Callon et al. (2009) expect of a hybrid forum. In a hybrid forum, expert participants are expected to be completely open to alternative framings of understanding of others. In this committee, as C1 describes below, the expertise of certain members with industrial experience was not relinquished. The EAW stated in 2013 that the Liaison Committee was “not a permit condition or a legal requirement but is something that we would encourage” (EAW, 2013). Having used its power in 2001 to urge the developers to create a committee, the Agency does not then discuss how, or even if, it monitors the qualitative nature of exchanges for participants. Nor does it appear to report publicly on how the micro-politics of the changing picture of community and business representation is taking place over time.

In terms of ‘following rules’, the council waste planner and co-developer, C1, is following rules (or rather guidance) by continuing with the Liaison Committee. C1 speaks about this at some length in 2012 (compared to not at all in 2009). This suggests that C1 and colleagues are keener to talk about the work they do with the community (but still not about the NGOs who remain actively excluded):

“I don’t think we have a problem with the Liaison Committee, they understand that the plant itself is not a significant risk. I think that they, the majority on the Liaison Committee never did believe the plant was a significant risk. I mean we’ve got ex-Corus employees on the Liaison Committee. We’ve got chemists on the Liaison Committee. We’ve got people who have always been on the Committee and who have always known what they were talking about. The people who have been the vociferous protesters if you like, have tended to drop off the Liaison Committee over the years.” (C1 Interview, 2012)

Some learning amongst committee members took place around alternative waste technologies such as gasification and pyrolysis. However, the alternative framing of risk of the community-based dissenters has not been accommodated by those in the developer-operator network. In fact, the comment above by C1 suggests that the reverse may be true, i.e. the Liaison Committee like any other has become subject to asymmetric power relations. Over time, those individuals with a similar framing of risk to C1 (EAW also attends) appear to have come to dominate matters in recent years. The ‘protestor fatigue’ of the community-based dissenters, referred to by C1, is strongly suggestive of only limited public participation, i.e. tokenism, taking place with the committee (cf. Arnstein, 1969). The public participation that is occurring is with individuals who, by accident or design, are deemed to be more ‘acceptable’, i.e. less

'vociferous' in their dissent. In interview in 2012, C1 stated a belief that the previously most combative dissenters were no longer contesting dioxin emissions. Instead, they were said to be solely interested in pursuing a court case for environmental nuisance due to site smells.

5.4.3. Contesting power in the Liaison Committee: the dissenter network

There were initial hopes that the Committee could provide a forum in which mutual learning could take and this included many in the dissenter network (cf. Healey, 1997, 1998c, 2003). From a community perspective, the Liaison Committee also offered the potential to raise issues, and gain answers, with the plant operator and regulator that they could not otherwise easily be done. So, for instance, the Liaison Committee has been a place where emissions data has been discussed when breaches occur. Rather early on, though, a sense of disaffection with the Liaison Committee began to set in amongst the dissenter network. This began with HLC's responses in the Committee minutes from 2003, for example, which recorded the constrained agency of the community dissenter network:

"On being requested for a monthly [liaison] meeting, HLC [the plant operator] regarded this as too frequent. The constitution refers to quarterly meetings after six months of operation or at a frequency as the committee may decide. A request for a mass meeting was rejected by HLC. [Community member A4] reacted against this decision. Discussion continued and a request for rotating the Chairman and Secretary of the Liaison Group was rejected by HLC. The purpose of the Liaison Committee meetings is for executives of HLC (Neath Port Talbot) Ltd to share relevant information to the residents Liaison group and for the residents group to ask questions accordingly. [Community members A4 and A1] left the meeting before the meeting officially ended." (Point 4.2, Minutes, Liaison Committee meeting, 22.9.03)

The comments of A1 are typical. There were claims that the meetings were not been particularly illuminating especially when something significant has taken place on site:

"All I get is minutes of meetings and [they] are very, very vague ... lots of things are left out ... There was total denial from some people, total denial from the company and sort of red faces from the council representatives." (A1 Interview, 2012)

Some dissenting community members have since dropped off attending (see Fig. 16). These individuals felt for some time co-opted into a process in which they no longer saw any prospect for the kinds of changes that they originally hoped for taking place. For example, provision of continuous monitoring of dioxins and more meaningful levels of public participation.

"The meetings have been dropped to every two or three months now ... [O]riginally the liaison meetings were monthly, but there wasn't much being spoken about. And the people running the plant, the manager, they're far more cooperative. We can, if we want to go round and have a look at the place they'll take us round, try and identify where smells are coming from, where noise is coming from, which affects only the local couple of streets you know. It's not a big thing for the whole community." (A2 Interview, 2012)

The dissenting network has not been able to mobilise additional resources or legitimacy through participation in the Liaison Committee. It has not proved to be a forum in which they can challenge the central principles of the plant's initial approval or its operation. At best, the Liaison Committee has been an opportunity to scrutinise the day-to-day operation of the plant.

5.5. Reflections

Our reflections draw together our analyses. These are organised around the three networks that we have studied. What our longitudinal case study demonstrates is the continuity of the three networks in terms of their membership, their relations within and between one another and the resources that they draw upon to promote their authority. In part, the persistence of the networks is to be expected: regulatory and operational activities account for the continuity of two networks. Similarly, for the dissenters, their key source of concern – the perceived health risks arising from the incineration of waste – did not disappear with the development's approval. The persistence of such concerns also helps to animate the other two networks in a symbiotic way. Post-regulatory decision analysis therefore matters in understanding how power plays out in practice in communities. Power reproduces itself through these networks. As we shall see, though, there is a dynamism to these relations that has the potential to undermine the dominant mode of governance suggested here, i.e. governmentality, in the context of waste planning (cf. Bulkeley et al., 2005).

5.5.1. Regulator

Environment Agency Wales (EAW) continues to perform a procedural role in a governmentality framing. Its procedures are practice oriented, expert-led, and focus on downstream risk assessments (cf. Wynne, 1996, 2003). Before the development approval for the MREC was given, EAW was constrained by not offering genuinely meaningful engagement in upstream siting and choice of technologies largely due to local politics and to the dominant risk discourse. Once approval is given for the plant enforcement of regulations becomes the Agency's purpose. From a dissenter perspective, enforcement is as problematic as licensing because of poor resourcing and the "British approach" to regulation (Bell & McGillivray, 2006, 298) in which a (deliberately) under-resourced regulator can appear to be effectively 'captured' by industry (Macrory, 2014; Ogus & Abbot, 2002; Sherlock, Kirk, & Reeves, 2004).

The Liaison Committee, a potential hybrid forum suggested by EAW, has been used by actors and networks in ways that fit with the governmentality approach. For example, it was arguably a means of controlling and/or mediating dialogue just before the 'facts on the ground' were to change with the start of the plant's construction in 2001. The dissenter network in part rejects the forum as being a presentational talking shop (e.g. A1, B1 Interviews), but, post-decision, is unable to provide an alternative bottom-up power structure/forum, such as a 'rhizome' (see below), more especially given that the 'facts' have changed.

It would appear that the enforcement role, however, is proving problematic for the EAW's governmental role, laid down in Whitehall and Cardiff, of helping keeping UK incineration policy ticking over. If, as B4 suggests, the plant will continue to have combustion problems so long as it's running well below capacity, then the MREC will likely risk further dioxin breaches and suffer further shutdowns. In 2012, C1 talked of reviewing the entire economic basis of the MREC. Closing the MREC would involve significant losses under the terms of the PFI contract. It would put NPTCBC in breach of contract with Bridgend CBC. Closure would also go against Whitehall's stated national policy (enforced by the Environment Agency) of promoting incineration as a way of meeting EC landfill targets. While the dissenters are still asking for the MREC to be closed on a precautionary basis, the current operator (C1) has arranged for a tender based on financial risk management (WG, 2014). The battles over access to the emissions data for communities around Crymlyn Burrows have evidenced, for example: (i) poor public access to EAW records at the remote

Llandarcy office (B2), (ii) the allegedly poorly updated records (B2), and (iii) an allegedly antiquated computer system (B2). This has suggested that EAW's slim resources may not be being prioritised for the public registers, although this has been denied by EAW (EAW, 2013). Nevertheless, EAW's role can be broadly inferred as being industry-focused, or less generously, captured by industry (Ogus & Abbot, 2002, cf. Bell & McGillivray, 2006). The details of these localised skirmishes still need to be seen as part of a much bigger power struggle, i.e. how successfully can the UK's pro-incineration policy be made to work in very specific places?

Ultimately, the regulator and developer/operator remained relatively closely aligned to each others' interests, despite public protestations to the contrary. Whether by bureaucratic failure (most likely) or by design, EAW retains the power, first seen in the licensing phase which ended with a decision in 2002, to effectively exclude dissenting voices through its data access policies. Both of the other networks want a lot from the Agency, but as shown below EAW appears institutionally unable to engender the trust necessary to build more reciprocal relations with all stakeholders in the MREC facility.

5.5.2. Operator

The plant operator (C1) continues to perform their role in governmentality mode, i.e. within the confines of a striated or proscribed space of governance fashioned by E1. When the facts on the ground changed significantly in 2002 with the licensing decision, C1 made much of EAW's 'strict' and continuing governance regime – saying in essence 'if there was a real problem they'd shut us down'. There have been temporary plant closures, but ceasing operations entirely due to pollution breaches is much less likely. Shutdown would only take place if dioxin breaches were framed in a precautionary way by the EAW, and only if the EAW was devoting significant – i.e. more than minimal – resources to enforcement. Instead, breaches in permit levels are treated as a technical problem but one which can be solved through improved technologies or process management. For all C1's protestations about E1's 'strict' levels of governance, C1 has still had some latitude to lobby EAW on matters of C1's interest.

Post-decision, C1 also makes much of the Liaison Committee (the potential hybrid forum). They suggest this shows 'commitment' to participation with the community (alongside a range of people from business, like ex-Corus and laboratory staff, all with similar framings of risk and experience of EAW as C1). However, the Committee is not a space to fundamentally challenge the 'normal science' approach of operator C1. Rather, it is a power-based forum that has been joined by an ever-greater number of actors supportive of C1's framings of risk. The Committee therefore appears to be a useful forum for limited exchanges (Arnstein, 1969) by those that created it where access to data is contested, but a truly open forum where power and expertise is set aside is not on offer. Despite enforcement notices and threats of further regulatory action, the developer and regulatory networks are close. This has ensured broader, continuing legitimacy of the project as a development activity, but not for some in the community. The latter appear unable to negotiate about EAW's regulatory framework in ways that the developer network can to some degree.

What is lacking, largely because EAW (and the developer) have not been able to engender trust is a creation of space for debate between the three networks. The developers and regulators remain distanced from dissenters. The debate remains polarised between the camps. For a true hybrid forum to work, as Callon et al. (2009) suggest, there needs to be conditions nurtured in which trust and mutual respect can develop. Whilst the regulator and the developer networks continue to pursue governance in this governmental fashion in this particular place it seems unlikely that such a shared negotiating space will be created.

5.5.3. Dissenters

As is evident from the discussion above, dissenters did not realign with EAW after the development decision was made. At one level, this is something of a surprise as both dissenters and EAW had an interest in emissions from the plant. However, trust between dissenters and EAW had been lost pre-2002 and did not return afterwards. High and possibly idealistic expectations of what a regulator could achieve on the part of the dissenters were dashed in both periods largely by EAW's governmental approach to its role – it was expert-led and appeared uncommitted to seeing meaningful public participation. Poor EAW resources also played a key role in the dissenters' discovery of the *realpolitik* of the "British approach" to regulation (Bell & McGillivray, 2006, 298) – they expressed frustration throughout that, in general, their calls for tougher enforcement were not apparently heeded, and specifically their demands for continuous or semi-continuous dioxin monitoring were refused (on grounds of cost and bureaucratic procedure).

For the dissenters, the levels of distrust of other networks remained high in the enforcement period. While the Liaison Committee became the focus of debate over data, especially in 2006 and 2010, members of NGO1 were not allowed to sit on the committee. Thus, the power to exclude was exercised by developer and regulatory networks which, in combination with an apparent refusal to step back from the power once conferred by expertise, appear to have undermined opportunities for genuine engagement. Instead, NGO1 members receive the minutes and participant comments second hand. At the same time, some community members on the committee, said they felt effectively co-opted into a 'talking shop' that is unsatisfactory in terms of resolving each sides' alternative scientific framings and unable to achieve their more radical initial aim of halting the project. In 2009 and 2012, the community-based dissenters expressed frustration and fatigue at this negotiated outcome.

Although there has not been a free and open exchange of views on the Liaison Committee, there has, however, been a process of mutual learning. To begin with there was not a shared sense of purpose from participants. Initially there were deep asymmetries in perceptions and practices of power. For the developer, the committee provided an opportunity to *communicate* directly with dissenters, with the hope that they could 'bring them on side'. Dissenters, meanwhile, wished to hold the operator to *account* for their activities. Whilst the hopes of neither side have been fully met, there have been some compromises which have arisen through a shared learning experience. For dissenters, this involved negotiating in the face of the demands of others. For example, during the 2006, 2010 and 2012 emission events when data was argued over, there was a degree of recognition amongst the dissenters that they would not necessarily get the plant shut down. Dissenters have had to 'learn to compromise' on their original demands. The dissenters' precautionary approach has forced them to engage and, perhaps, better respect something of the alternative expertise-led approach of the operator.

The record suggests that the evidence of this case study is that power relations and the articulation of competing perspectives that go with them continue to matter over time. Opportunities for a true hybrid forum, where power relations dissolve and expertise is set aside to a greater or lesser extent, were undermined at Crymlyn Burrows because the Liaison Committee was created and maintained by two networks – those of the developer and regulator – which have only extended an offer of dialogue to community members and not all dissenters represented in the local community (i.e. the local NGO). By encouraging a certain number of business members to the forum who share the same perceptions of risk management, whilst seeing more vociferous community member participation fade, the developer-operator continues to

undertake governmentality techniques created by EAW by structuring both the means of engagement and the content and framing of what is discussed.

It is worth reflecting a little further on the Liaison Committee. It can help us to understand how power is played out at the local level. In the licensing phase, when the MREC facility was built and became “hard to shift” (B4 Interview, 2012), the EAW and the MREC’s operators managed to create a landscape for public participation with only one outlet – the Liaison Committee. This was done in a governmental fashion, which was relatively low in terms of Arnstein (1969) ladder of participation. In this case, the perceived tokenism and lack of agency of the Liaison Committee has forced some community-based dissenters to drop out through campaign fatigue and/or disillusion. The present-day reality of the Liaison Committee – a governmental procedure that results in meaningful ‘engagement’ according to EAW – remains low on the ladder of participation (Arnstein, 1969) and some way from a hybrid forum (Callon et al., 2009).

For the dissenters, there is now no alternative protest space. Popular dissent, including a range of activities classed as civil disobedience, ended when the IPPC license was granted in 2002. There are no bottom-up, alternative discussion groups in the community campaigning or talking about the MREC except for NGO1 (but no campaigning is active). The MREC Liaison Committee is now the only forum which debates the plant’s activities. Dissenters find this unsatisfactory for reasons detailed above. Local, potentially rhizomic, activity has been curbed because of the nature of the governmentality approach pursued by central government and its local agents, in this case, EAW. The result of the British approach to regulation is that state/private networks are effectively able to manage this local space. These can put down their own ‘cuttings’ (e.g. the Liaison Committee) – to continue the plant metaphor – into the community to ‘manage’ the landscape of dissent. In the case of the environmentalists and the citizen scientists based in and around Crymlyn Burrows, it was a successful strategy from the point of view of the regulator and the developer/operator. However, there were times when direct action was witnessed which, as we indicate from our case study, showed that the authorities underplayed how the local landscape can or should be managed (at least from a realist governmentality perspective).

6. Conclusions: limits to governmentality

This study takes as its starting point the ways that the planning arena, and associated notions of the public interest, are typically contested. Our review of the planning literature revealed the ways that a focus on power relations offers a means of evaluating different approaches to public participation. Understanding the myriad ways that power as knowledge plays out in practice required that we develop a nuanced approach that drew on a variety of theoretical tools. This necessitated a theoretical overview of the nature of contested framings of developments and how those relate to power relations of varied actors in a range of networks over time. This pluralistic theoretical framework demands much greater attention being given to community histories (cf. Bickerstaff, 2012; Devine-Wright, 2011; Simmons & Walker, 2005). We found that a dissenter network embedded in a locality has longevity far beyond that of a planning approval or licensing decision. Over several decades in the same area in south-west Wales, the repeated siting of potentially polluting industrial activities became something of a self-fulfilling prophecy (cf. Walker, 1998, 2012). Community protests on the border between Swansea and Neath-Port Talbot were repeatedly faced by staff and politicians involved with these two local authorities as well as the regulator, Environment Agency Wales (EAW). To begin with, at least, a realist governmentality reading of events most closely matched what actually took place on the ground

throughout, i.e. top-down, state-led governmental activity ultimately overwhelming a long-running, bottom-up, community- and NGO-led protest. The Marxist critique is powerful for understanding the land-value basis for the initial siting decision (cf. Beck, 1999), and the advocacy, radical/transactive and collaborative planning approaches help to explain what *should* be done in terms of boosting public participation in the application and licensing phases. Adopting a longer term perspective to the case study, however, also enables us to explore the way in which power is “spatial and subject to the contingencies of events and relationships that may lie outside the immediate here and now” (Allen, 2011, 17). The longitudinal analysis demonstrates the value of a more nuanced approach to power and that multiple tools need to be utilised to explore how actors and networks interact. For instance, waste planners and the regulator appeared to ‘want to get things done’ in a technocratic and procedural fashion before considering doing them more equitably through more meaningful public participation. The regulatory space that these actors were able to carve out had its own set of power relations, knowledge claims and norms. These aspects were often distinct from those arising from interactions with oppositional actors (Allen, 2009, 207). This suggests that planners need to operate with a variety of theoretical perspectives and approaches given competing claims to knowledge, expertise and power, instead of being caught in the silo mentality that sometimes exists in planning theory (Ferreira, Sykes, & Batey, 2009; Rydin, 2007).

The case study showed a central government-led regulatory network involving the EAW sharing a technocratic framing of risk with the private sector. It continues to hold sway over the Materials Recovery and Energy Centre (MREC), the energy-from-waste (EfW) facility owned and operated by NPTCBC. The administrative capacity of public and private bodies – their capacity to reproduce repertoires of knowledge – contrasts starkly with the fatigue that set in amongst many dissenters in the decade since MREC received its licence. Along with declining enthusiasm goes the individual and collective knowledge that has been generated. The placement of potentially polluting processes in the same geographic areas (Blowers, 2003; Walker, Mitchell, Fairburn, & Smith, 2005), plus the bureaucratic hurdles faced by concerned community members in terms of alternative frames of risk, rationing access to decision-makers and the lack of resources do suggest serious structural imbalances in the planning system for those who are most likely to be affected by it.

The resources expended on ensuring the delivery of the MREC demonstrate both the success and weaknesses of governmentality in relation to waste incineration. Successes include the delivery of the MREC in the face of a knowledgeable and well organised community opposition. This was a key achievement in meeting contemporary waste planning goals. Weaknesses that have been revealed are the loss of credibility within the community of governing bodies (the local planning authority, EAW) and of the regulatory processes that they are entwined within. Furthermore, the regulatory process and developer and regulatory networks have been unable to stifle the continuing debate over the operation of the plant. However, our SNA results showed that the EAW’s involvement in the Liaison Committee was relatively peripheral and this point was raised by in interview by several community members. Whilst the procedures of governmentality can be seen to have been particularly successful in this case, as society changes (cf. Beck, 1999), the erosion of trust in civic and private institutions appears to be making it harder for adherence for local government bodies to achieve their ends using governmentality. Our longitudinal case study approach has demonstrated how in governing spaces tensions are also created within governmentality (see also Bulkeley et al., 2005). In Crymlyn Burrows these crises of legitimacy have arisen since at least the 1960s. Local strategies of resistance are becoming ever more nuanced and therefore if

ignored harder to deal with. As we have seen, the regulatory and developer networks fail to sufficiently recognise the salience of spatial issues. This includes the ways that power relations operate in networks. Links and social capital embedded in them (via the norms of trust, reciprocity and mutuality, for example) are continually made and remade (Rydin & Falleth, 2006). The power to selectively include and exclude certain actors, for example, shapes networks by altering the inter-dependencies between actors (Rydin, 2013). For the regulatory and developer networks, regulation (such as EIA or licensing) takes place in a uniform manner – the privileging of procedure – wherever it occurs. The dissenter network, though, prioritises local space and its significance. Quite simply, for them and for us, local issues matter. The dissenter network responded to the intrusion of regulatory and developer power in the community by seeking to construct its own power relations which for the most part work within regulatory and governmental norms. Even so, there were a number of points up until 2002 in the Crymlyn Burrows case study when local resistance to the MREC was at a tipping point between protesting within and outside the system.

We conclude, therefore, that, based upon our case study of an Energy-from-waste (EfW) plant in west Wales, there are limits to the governmentality approach. More meaningful public participation can be achieved with ‘hard-to-reach’ communities, but only when the dynamic and asymmetric nature of power relations are appreciated in their local context. And, ultimately, given our SNA analysis which revealed the more disengaged approach of the regulatory network compared to that of the dissenter network, it seems that this mismatch in engagement undermined the credibility and legitimacy of the regulator and so weakened its efforts at public engagement pre- and post- the development and licensing decisions.

6.1. Implications for planning practitioners

The detailed evidence revealed in our case study has successfully highlighted several important, linked social activities at work. A mixed method research design helped with our unique, interdisciplinary approach which drew on qualitative interview material and a range quantitative data. A social constructivist picture emerged linking several social processes together revealing what takes place when communities are faced with developments that are perceived to have a significant degree of environmental risk. This picture, where power relations inevitably predominated, is a much more useful characterisation of the ensuing, polarised land-use dispute than one based on a typical and often simplistic dualism of ‘there is no alternative’ (TINA) versus ‘not in my back yard’ (NIMBY) (Bickerstaff, 2012). In such case study examples, trust in public and private institutions can be shown to have been significantly eroded for many sections of the local community. In Crymlyn Burrows, we saw this trust deficit as part of a decades-long lack of, or breakdown in, reflexivity. This lack of reflexivity amongst the dissenter network was closely linked to the deeply ingrained sense of social injustice due to potentially polluting industry having been imposed upon the area in a governmental fashion for many years. It was also linked to the markedly divergent framings of environmental health risk and associated scientific practice which were held by each side. Tactically, the politically disaffected dissenters who experienced the imposition of a development into their community via what they regarded as a heavy-handed display of political/governmental power, chose to fight the development on the basis of contested science and became so-called citizen scientists (cf. Irwin & Wynne, 1996; Keller, 2009; Wynne, 1996). Others, meanwhile, took more direct political action. Given the asymmetric power ranged against them, the dissenters almost inevitably lost most of the battles that they faced within the planning system. However, they

arguably won the war given the MREC plant’s crippling costs to its owner, Neath-Port Talbot County Borough Council (NPTCBC) and the significant loss of legitimacy when the MREC was revealed by the regulator, Environment Agency Wales (EAW), to have been repeatedly in breach of agreed dioxin output levels on several occasions over a number of years.

The lessons of Crymlyn Burrows for professional planners are four-fold. First, with such developments, self-organising resistance and dissent must be anticipated by certain interest groups. From the very start, the planning process will likely be antagonistic. Second, this suggests that professional planners should consider adapting their favoured *modus operandi* and reflexively consider developing several *modi operandi* based upon their own discretionary view of the most appropriate theoretical planning perspective needed for a particular situation (Ferreira et al., 2009; Rydin & Pennington, 2000). Given that irreconcilable land-use conflicts mediated via the planning system are commonplace, should alternative modes of planning practice based, for example, on conflict theory not be made accessible through planning schools? Third, in the case of developments like that at Crymlyn Burrows, where support for rival networks polarised very quickly, the more empowering stakeholder based on a consensual, Habermasian approach would not have been the most appropriate perspective to work with (cf. Flyvbjerg, 1996). This is, of course, not to say that collaborative planning does not have a place – it is simply one mode of operation. However, at Crymlyn Burrows, the members of the various networks did not initially want to get around the table. When they did, the mutual recriminations continued. Their framings of risk, expertise, scientific practice and environmental justice were simply too far apart for mutual engagement: there was nothing for them to reflexively build trust upon. Finally, this case study raises the question of what stakeholder engagement might achieve for both planning theory and practice. Another study on a waste development from South Wales (e.g. Chadderton, Elliott, Hacking, Shepherd, & Williams, 2013) suggests community participation in planning, when the local authority is also the developer, is equally poor. The temptation to exclude voices via planning system machinery and with ‘non-decision making’ bodies like liaison committees remains strong (cf. Harvey, 2010). The “British approach” to environmental regulation, based on relatively low levels of resources given by the state for enforcement, also continues (Bell & McGillivray, 2006, 298). However, in an age of austerity, the Environment Agency has even less resources (cf. Porritt, 2015). Ultimately, land-use conflicts remain wicked problems for practitioners. But, given that the very costly events in Crymlyn Burrows were the result of a central governmental policy stretched to breaking point in one particular region, opting to pursue a more reflexive community engagement strategy in future ought to be an obvious way forward for the planners on the ground.

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References

- Agyeman, J., Bullard, R. D., & Evans, B. (2003). *Just sustainabilities: Development in an unequal world*. Cambridge, MA: The MIT Press.
- Agyeman, J., & Evans, B. (2004). ‘Just sustainability’: The emerging discourse of environmental justice in Britain? *The Geographical Journal*, 170, 155–164.
- Alexander, E. R. (2002). The Public Interest in planning: From legitimization to substantive plan evaluation. *Planning Theory*, 1, 226–249.
- Alinsky, S. (1969). *Reveille for radicals*. Chicago, IL: University of Chicago Press.
- Allen, J. (2004). The whereabouts of power: Politics, government and space. *Geografiska Annaler. Series B. Human Geography*, 19–32.

- Allen, J. (2009). Three spaces of power: Territory, networks, plus a topological twist in the tale of domination and authority. *Journal of Power*, 2, 197–212.
- Allen, J. (2011). Topological twists power's shifting geographies. *Dialogues in Human Geography*, 1, 283–298.
- Allen, R. (1971). Ecopolitics. *The Ecologist*, 1, 33–34.
- Allmendinger, P. (2009). *Planning theory*. London: Palgrave Macmillan.
- Altshuler, A. (1965). The goals of comprehensive planning. *Journal of the American Institute of Planners*, 31, 186–195.
- Alty, R., & Darke, R. (1987). A city centre for people: Involving the community in planning for Sheffield's central area. *Planning Practice and Research*, 2, 7–12.
- Ambrose, P. (1974). *The quiet revolution: Social change in a Sussex village, 1871–1971*. London: Sussex University Press/Chatto & Windus Ltd.
- Ambrose, P., & Colenutt, B. (1973). *The property machine*. Harmondsworth, UK: Penguin.
- Ambrose, P. J. (1986). *Whatever happened to planning?* London: Routledge.
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, 35, 216–224.
- Barry, A. (1996). Lines of communication and spaces of rule. In A. Barry, Osborne, Thomas, & N. Rose (Eds.), *Foucault and political reason: Liberalism, neo-liberalism and the rationalities of government*. London: Routledge.
- BBC (2010, December 24th). Neath waste plant closed over emissions. *BBC News South West Wales (Online)*.
- BBC (2011, June 9th). Neath waste plant reopens after closure. *BBC News South West Wales (Online)*.
- BBC (2012, December 4th). Dioxin breaches halt Crymlyn Burrows waste plant. *BBC News South West Wales (Online)*.
- Beard, V. A. (2003). Learning radical planning: The power of collective action. *Planning Theory*, 2, 13–35.
- Beck, U. (1999). *World risk society*. Wiley Online Library.
- Bell, S., & McGillivray, D. (2006). *Environmental law*. Oxford: Oxford University Press.
- Bevir, M. (1999). Foucault and critique: Deploying agency against autonomy. *Political Theory*, 27, 65–84.
- Bickerstaff, K. (2012). "Because we've got history here": Nuclear waste, cooperative siting, and the relational geography of a complex issue. *Environment and Planning – Part A*, 44, 2611–2628.
- Birnbaum, L., & Staskal, D. (2004). Brominated flame retardants: Cause for concern? *Environmental Health Perspectives*, 112, 9–17.
- Blowers, A. (2003). Inequality and community and the challenge to modernization: Evidence from the nuclear oases. In J. Agyeman, R. D. Bullard, & B. Evans (Eds.), *Just sustainabilities: Development in an unequal world*. Cambridge, MA: The MIT Press.
- Bone, I. (1971). Carbon black. In *Solidarity: For workers' power*. London: London Group.
- Brown, P. (1992). Popular epidemiology and toxic waste contamination: Lay and professional ways of knowing. *Journal of Health and Social Behavior*, 267–281.
- Bryant, B. I., & Mohai, P. (1992). *Race and the incidence of environmental hazards: A time for discourse*. Westview Press: Boulder, CO.
- Bulkeley, H., Watson, M., Hudson, R., & Weaver, P. (2005). Governing municipal waste: Towards a new analytical framework. *Journal of Environmental Policy and Planning*, 7, 1–23.
- Bullard, R. D. (1983). Solid waste sites and the black Houston community. *Sociological Inquiry*, 53, 273–288.
- Bullard, R. D. (1990). *Dumping in Dixie: Race, class and environmental quality*. Boulder, CO: Westview.
- Bullard, R. D. (1994). *Unequal protection: Environmental justice and communities of color*. New York: Random House.
- Callon, M., Lascoumes, P., & Barthe, Y. (2009). *Acting in an uncertain world – An essay on technical democracy*. Cambridge, MA: MIT Press.
- Castells, M., & Sheridan, A. (1977). *The urban question: A Marxist approach*. London: Edward Arnold.
- Chadderton, C., Elliott, E., Hacking, N., Shepherd, M., & Williams, G. (2013). Health impact assessment in the UK planning system: The possibilities and limits of community engagement. *Health Promotion International*, 28, 533–543.
- Christensen, K. S. (1985). Coping with uncertainty in planning. *Journal of the American Planning Association*, 51, 63–73.
- COMEAP (2009). *Long-term exposure to air pollution: Effect on mortality*. London: Committee on the Medical Effects of Air Pollutants.
- Connett, P., & Webster, T. (1987). An estimation of the relative human exposure to 2,3,7,8-TCDD emissions via inhalation and ingestion of cow's milk. *Chemosphere*, 16, 2079–2084.
- Corden, A., & Millar, J. (2007). Qualitative longitudinal research for social policy: Introduction to themed section. *Social Policy & Society*, 6, 529–532.
- Coyne, R. (2008). The net effect: Design, the rhizome and complex philosophy. *Futures*, 40, 552–561.
- Cutter, S. L. (1995). Race, class and environmental justice. *Progress in Human Geography*, 19, 111–122.
- Dahlgren, G., & Whitehead, M. (1991). *Policies and strategies to promote social equity in health*. Copenhagen: World Health Organisation (WHO) Regional Office for Europe.
- Dahrendorf, R. (1959). *Class and class conflict in industrial society*. Redwood City, CA: Stanford University Press.
- Damer, S., & Hague, C. (1971). Public participation in planning: A review. *Town Planning Review*, 42, 217.
- Davidoff, P. (1965). Advocacy and pluralism in planning. *Journal of the American Institute of Planners*, 31, 331–338.
- Davidoff, P. (1971). Community planning and the advocate in the suburbs'. *Planning Comment*, 7, 2–13.
- Davoudi, S., & Atkinson, R. (1999). Social exclusion and the British planning system. *Planning Practice and Research*, 14, 225–236.
- Dean, M. (1999). *Governmentality: Power and rule in modern society*. London/Thousand Oaks/New Delhi: Sage Publications Limited.
- Defert, D., & Ewald, F. (1994). *Dits Et Ecrits*. Paris: Editions Gallimard.
- Deleuze, G., Guattari, F., & Massumi, B. (1977). *Anti-Oedipus: Capitalism and schizophrenia*. New York: Viking.
- Deleuze, G., & Guattari, P. F. (1987). *Thousand plateaus: Capitalism and schizophrenia*. Minneapolis: University of Minnesota Press.
- Devine-Wright, P. (2011). Place attachment and public acceptance of renewable energy: A tidal energy case study. *Journal of Environmental Psychology*, 31, 336–343.
- Dicks, M. (2002, January 26th). Incinerator health survey under fire, university experts say risk report on plant flawed. *South Wales Evening Post*.
- Dix, P. (1999, March 24th). Fault lines. *The Guardian*.
- Dockery, D., Pope, C. A., Xu, X., Spengler, J., Ware, J., Fay, M., et al. (1993). An association between air pollution and mortality in six US cities. *New England Journal of Medicine*, 329, 1753–1759.
- DoE (1995). *Making waste work: A strategy for sustainable waste management in England and Wales*. London: Department of Environment/HMSO.
- Donaldson, A., Lane, S., Ward, N., & Whatmore, S. (2013). Overflowing with issues: Following the political trajectories of flooding. *Environment and Planning C: Government and Policy*, 31, 603–618.
- Dovey, K. (2005). Home as paradox. In G. Rowles & H. Chaudhury (Eds.), *Home and identity in late life – International perspectives*. New York: Springer Publishing Company.
- Dovey, K., Woodcock, I., & Wood, S. (2009). A test of character: Regulating place-identity in inner-city Melbourne. *Urban Studies*, 46, 2595–2615.
- DTI (1996). *Energy from waste: A guide for local authorities and private sector developers of municipal solid waste combustion and related projects*. Harwell: Harwell Laboratory, Energy Technology Support Unit/Department of Trade and Industry.
- DTLR (2001). *Planning: Delivering a fundamental change*. London: Department for Transport, Local Government and the Regions.
- EAW (2013). *Re: Letter 'in response...' Typed to HACKING, N.*
- EC (1975). *Council Directive 75/442/EEC of 15 July 1975 on waste*. Brussels: European Council.
- EC (1999). *Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste*. Brussels: European Council.
- EC (2000). *Directive 2000/76/EC of the European parliament and of the council of 4 December 2000 on the incineration of waste*. Brussels: European Council.
- Elam, M., & Bertilsson, M. (2003). Consuming, engaging and confronting science – The emerging dimensions of scientific citizenship. *European Journal of Social Theory*, 6, 233–251.
- Elkin, S. L. (1974). *Politics and land use planning: The London experience*. London/New York: Cambridge University Press.
- Elliott, E., Harrop, E., & Williams, G. H. (2009). Contesting the science: Public health knowledge and action in controversial land-use developments. In P. Bennett (Ed.), *Risk communication and public health*. Oxford: Oxford University Press.
- Elliott, J., Holland, J., & Thomson, R. (2008). Longitudinal and panel studies. In *The SAGE handbook of social research methods* (pp. 228–248).
- Elston, L. (2002, May 9th). 'Health fear' campaigners fail to stop incinerator. Press Association.
- Fainstein, N., & Fainstein, S. (1972). Innovation in urban bureaucracies. Clients and change. *American Behavioral Scientist*, 15, 511–531.
- Fainstein, N., & Fainstein, S. (1974). *Urban political movements: The search for power by minority groups in American cities*. Englewood Cliffs, NJ: Prentice-Hall.
- Fainstein, N., & Fainstein, S. (1979). New debates in urban planning. *International Journal of Urban and Regional Research*, 3, 381–403.
- Fainstein, S. (2010). *The just city*. Ithaca, NY: Cornell University Press.
- Faludi, A. (1971). Problems with 'problem-solving'. *Journal of the Royal Town Planning Institute*, 57, 415.
- Faust, K. (1997). Centrality in affiliation networks. *Social Networks*, 19, 157–191.
- Ferreira, A., Sykes, O., & Batey, P. (2009). Planning theory or planning theories? The hydra model and its implications for planning education. *Journal for Education in the Built Environment*, 4, 29–54.
- Fisher, P. (1998, October 7th). Residents vow to fight burner, heated debate at new incinerator public meeting. *South Wales Evening Post*.
- Fisher, P. (1998, October 9th). Waste plant chiefs to meet objectors. *South Wales Evening Post*.
- Fisher, P. (1999, March 11th). Waste burning plan approved. *South Wales Evening Post*.
- Flyvbjerg, B. (1996). The dark side of planning: Rationality and 'realrationalit'. In S. Mandelbaum, L. Mazza, & R. Burchell (Eds.), *Explorations in planning theory*. New Brunswick, NJ: Rutgers University: Centre For Urban Policy Research.
- Flyvbjerg, B. (1998). *Rationality and power: Democracy in practice*. University of Chicago Press.
- Flyvbjerg, B. (2002). *Making social science matter: Why social inquiry fails and how it can succeed again*. Cambridge: Cambridge University Press.
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12, 219–245.
- Flyvbjerg, B., & Richardson, T. (1998). *In search of the dark side of planning theory*. Paper presented to the Planning Theory Conference, Oxford Brookes University.
- Flyvbjerg, B., Richardson, T., Allmendinger, I. P., & Tewdwr-Jones, M. (2002). Planning and Foucault. *Planning Futures: New Directions for Planning Theory*, 44–63.

- Forester, J. (1989). *Planning in the face of power*. Berkeley, CA: Univ of California Press.
- Forester, J. (1999). *The deliberative practitioner: Encouraging participatory planning processes*. Cambridge, MA: The MIT Press.
- Foucault, M. (1975). *Surveiller Et Punir, Naissance De La Prison*. Paris: Éditions Gallimard.
- Foucault, M. (1976). *Histoire De La Sexualité*. Paris: Éditions Gallimard.
- Foucault, M. (1980). *Power/knowledge: Selected interviews and other writings*. New York: Pantheon.
- Foucault, M. (1982). The subject and power. *Critical Inquiry*, 8, 777–795.
- Foucault, M. (1991). Governmentality. In M. Foucault, G. Burchell, & C. Gordon (Eds.), *The Foucault effect: Studies in governmentality*. Chicago: University of Chicago Press.
- Foucault, M., Burchell, G., Gordon, C., & Miller, P. (1991). *The Foucault effect: Studies in governmentality*. Chicago, IL: University of Chicago Press.
- Friedmann, J. (1973). *Retracking America: A theory of transactive planning*. New York: Anchor Books.
- Friedmann, J. (1987). *Planning in the public domain: From knowledge to action*. Princeton, NJ: Princeton University Press.
- Friedmann, J. (1998). Planning theory revisited. *European Planning Studies*, 6, 245–253.
- Friedmann, J. (2008). The uses of planning theory a bibliographic essay. *Journal of Planning Education and Research*, 28, 247–257.
- Friedmann, J., & Hudson, B. (1974). Knowledge and action: A guide to planning theory. *Journal of the American Institute of Planners*, 40, 2–16.
- Geiser, K., & Waneck, G. (1983). CBs and Warren county. *Science for the People*, 15, 13–17.
- Glasson, J. (1999). The first 10 years of the UK EIA system: Strengths, weaknesses, opportunities and threats. *Planning Practice and Research*, 14, 363–375.
- Goldstein, B., & Butler, W. (2010). Expanding the scope and impact of collaborative planning combining multi-stakeholder collaboration and communities of practice in a learning network. *Journal of the American Planning Association*, 76, 238–249.
- Grabow, S., & Heskin, A. (1973). Foundations for a radical concept of planning. *Journal of the American Institute of Planners*, 39, 106–114.
- Greaney, S. (2003, August 11th). Fire drama at burner. *South Wales Evening Post*.
- Griffin, L. (2012). Where is power in governance? Why geography matters in the theory of governance. *Political Studies Review*, 10, 208–220.
- Gunder, M. (2010). Planning as the ideology of (neoliberal) space. *Planning Theory*, 9, 298–314.
- Habermas, J. (1968a). *Erkenntnis und interesse*. Frankfurt: Suhrkamp.
- Habermas, J. (1968b). Technik und Wissenschaft Als "Ideologie"? *Man and World*, 1, 483–523.
- Habermas, J. (1981). *Theorie des Kommunikativen Handelns*. Frankfurt: Suhrkamp.
- Hacking, N., & Flynn, A. (2014). Networks, protest and regulatory systems: The case of energy from waste. *Local Environment*, 19, 334–355.
- Hall, P. G., & Peacock, B. (1973). *The containment of urban England*. London: Pep.
- Harvey, D. (1973). *Social justice and the city*. London: Edward Arnold.
- Harvey, D. (2000). *Spaces of hope*. Berkeley, CA: University of California Press.
- Harvey, D. (2010). *Social justice and the city*. Athens, GA: University of Georgia Press.
- Healey, P. (1973). *Urban planning under conditions of rapid urban growth* PhD University of London.
- Healey, P. (1992). Planning through debate: The communicative turn in planning theory. *Town Planning Review*, 63, 143–162.
- Healey, P. (1995). The institutional challenge for sustainable urban regeneration. *Cities*, 12, 221–230.
- Healey, P. (1997). *Collaborative planning: Shaping places in fragmented societies*. Vancouver: University of British Columbia Press.
- Healey, P. (1998a). Building institutional capacity through collaborative approaches to urban planning. *Environment and Planning – Part A*, 30, 1531–1546.
- Healey, P. (1998c). Collaborative planning in a stakeholder society. *Town Planning Review*, 69, 1.
- Healey, P. (2003). Collaborative planning in perspective. *Planning Theory*, 2, 101–123.
- Healey, P., Underwood, J., Mcloughlin, J. B., & Diamond, D. (1978). *Professional ideals and planning practice: A report on research into planners' ideas in practice in London Borough Planning Departments*. Oxford and Elmsford, NY: Pergamon.
- Hillier, J. (1993). To boldly go where no planners have ever. *Environment and Planning – Part D*, 11, 89–113.
- Hillier, J. (2005). Straddling the post-structuralist abyss: Between transcendence and immanence? *Planning Theory*, 4, 271–299.
- Hillier, J. (2007). *Stretching beyond the horizon: A multiplanar theory of spatial planning and governance*. Aldershot, Surrey: Ashgate Publishing Ltd.
- Hillier, J. (2008). Plan (e) speaking: A multiplanar theory of spatial planning. *Planning Theory*, 7, 24–50.
- HLC (1998). *Neath Port Talbot proposed waste reclamation plant, environmental summary, Part 2, Non-technical summary*. HLC Environmental Projects Ltd/Erri Neath Port Talbot Ltd.
- Howard, C. V. (2000). Particulate aerosols, incinerators and health. In P. Nicolopoulou-Stamati, L. Hens, & C. V. Howard (Eds.), *Health impacts of waste management policies: Proceedings of the seminar 'health impacts of waste management policies'*. Berlin: Springer.
- Howard, C. V., & Saunders, P. T. (1999). Sensible precautions make good science. *Nature*, 401, 207.
- Hudson, B. M., Galloway, T. D., & Kaufman, J. L. (1979). Comparison of current planning theories: Counterparts and contradictions. *Journal of the American Planning Association*, 45, 387–398.
- Humphrys, G., & Williams, M. (Eds.). (2005). *Presenting and representing environments*. Berlin: Springer.
- IARC (2010). Carbon black, titanium dioxide, and talc. In *IARC monographs on the evaluation of carcinogenic risks to humans*. Lyon: International Agency for Research on Cancer.
- Innes, J. E. (1995). Planning theory's emerging paradigm: Communicative action and interactive practice. *Journal of Planning Education and Research*, 14, 183–189.
- Irvin, R. A., & Stansbury, J. (2004). Citizen participation in decision making: Is it worth the effort? *Public Administration Review*, 64, 55–65.
- Irwin, A., & Wynne, B. (1996). *Misunderstanding science: The public reconstruction of science and technology*. Cambridge: Cambridge University Press.
- JacobsGibb (2001, September). Proposed Neath Port Talbot materials recovery and energy centre. *Health Impact Assessment*.
- JacobsGibb (2002, January). Proposed Neath Port Talbot materials recovery and energy centre. *Revised Air Quality and Health Impact Assessment*.
- Kaplan, M. (1969). Advocacy amid the urban poor. *Journal of the American Institute of Planners*, 35, 96–101.
- Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., et al. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis*, 8, 177–187.
- Keller, A. C. (2009). *Science in environmental policy: The politics of objective advice*. Cambridge, MA: MIT Press.
- Kemm, J. R. (2000). Can health impact assessment fulfil the expectations it raises? *Public Health*, 114, 431–433.
- Knoke, D., & Yang, S. (2008). *Social network analysis*. Sage.
- Kravitz, A. (1970). Mandarinism: Planning as handmaiden to conservative politics. In T. Beyle & G. Lathrop (Eds.), *Planning for politics: Uneasy partnership*. New York: Odyssey Press.
- Lane, M. (2005). Public participation in planning: An intellectual history. *Australian Geographer*, 36, 283–299.
- Lane, S., Landström, C., & Whatmore, S. (2011). Imagining flood futures: Risk assessment and management in practice. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 369, 1784–1806.
- Lane, S., Odoni, N., Landström, C., Whatmore, S., Ward, N., & Bradley, S. (2011). Doing flood risk science differently: An experiment in radical scientific method. *Transactions of the Institute of British Geographers*, 36, 15–36.
- Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.
- Lewis, P. (2000, November 2nd). Council is accused of lying over plant, political storm brews before recycling work begins. *South Wales Evening Post*.
- Lewis, P. (2003, October 2nd). Plant blaze 'deliberate'. *South Wales Evening Post*.
- Mackinnon, D. (2000). Managerialism, governmentality and the state: A neo-Foucauldian approach to local economic governance. *Political Geography*, 19, 293–314.
- Macrory, R. B. (2014). *Regulation, enforcement and governance in environmental law*. London: Bloomsbury Publishing.
- Margerum, R. (2002). Evaluating collaborative planning: Implications from an empirical analysis of growth management. *Journal of the American Planning Association*, 68, 179–193.
- Marriott, O. (1969). *The property boom*. London: Pan Books.
- Marshall, J. (1995). Michel Foucault: Governmentality and liberal education. *Studies in Philosophy and Education*, 14, 23–34.
- Massey, D. B., & Catalano, A. (1978). *Capital and land: Landownership by capital in Great Britain*. London: Edward Arnold.
- Mazziotti, D. F. (1974). The underlying assumptions of advocacy planning: Pluralism and reform. *Journal of the American Institute of Planners*, 40, 38–47.
- Mcdonald, G. T. (1989). Rural land use planning decisions by bargaining. *Journal of Rural Studies*, 5, 325–335.
- Mcdonald, T. (2002). A perspective on the potential health risks of PBDEs. *Chemosphere*, 46, 745–755.
- Mckee, K. (2009). Post-Foucauldian governmentality: What does it offer critical social policy analysis? *Critical Social Policy*, 29, 465–486.
- Meyerson, M., & Banfield, E. C. (1955). *Politics, planning, and the public interest: The case of public housing in Chicago*. New York: Free Press.
- Miller, P., & Rose, N. (1990). Governing economic life. *Economy and Society*, 19, 1–31.
- Mills, C. W. (1956). The power elite. In C. W. Mills (Ed.), *The mass society*. Oxford, UK: Oxford University Press.
- Murdoch, J. (2004). Putting discourse in its place: Planning, sustainability and the urban capacity study. *Area*, 36, 50–58.
- Murdoch, J. (2006). *Post-structuralist geography: A guide to relational space*. London/Thousand Oaks/New Delhi: Sage Publications Limited.
- Nyseth, T., Pløger, J., & Holm, T. (2010). Planning beyond the horizon: The Tromsø experiment. *Planning Theory*, 9, 223–247.
- Ó Tuathail, G. (1996). *Critical geopolitics: The politics of writing global space*. Minneapolis: University of Minnesota Press.
- ODPM (2002). *Sustainable communities: Delivering through planning*. London: Office of the Deputy Prime Minister.
- ODPM (2004). *Community involvement in planning*. London: Office of the Deputy Prime Minister.
- Ogus, A., & Abbot, C. (2002). Sanctions for pollution: Do we have the right regime? *Journal of Environmental Law*, 14, 283–298.
- OPSI (1994). *The Waste Management Licensing Regulations (SI 1994/1056)*. London: Office of Public Sector Information.

- OPSI (2000). *The Pollution Prevention and Control (England and Wales) Regulations 2000 (SI 2000/1973)*. London: Office of Public Sector Information.
- OPSI (2002). *The Landfill (England and Wales) Regulations (SI 2002/1559)*. London: Office of Public Sector Information.
- Owens, S. (1994). Land, limits and sustainability: A conceptual framework and some dilemmas for the planning system. *Transactions of the Institute of British Geographers*, 19, 439–456.
- Owens, S. (2000). 'Engaging the public': Information and deliberation in environmental policy. *Environment and Planning – Part A*, 32, 1141–1148.
- Pahl, R. (1970). *Whose city?: And other essays on sociology and planning* London: Longman.
- Peattie, L. R. (1968). Reflections on advocacy planning. *Journal of the American Institute of Planners*, 34, 80–88.
- Peregrine, C. (1999, May 20th). Recycling record is appalling – Welsh figures. *South Wales Evening Post*.
- Petts, J. (1992). Incineration risk perceptions and public concern: Experience in the UK improving risk communication. *Waste Management and Research*, 10, 169–182.
- Petts, J. (1995). Waste management strategy development: A case study of community involvement and consensus-building in Hampshire. *Journal of Environmental Planning and Management*, 38, 519–536.
- Piven, F. F. (1970). Whom does the advocacy planner serve? *Social Policy*, 1, 32–35.
- Pløger, J. (2001). Public participation and the art of governance. *Environment and Planning – Part B*, 28, 219–242.
- Pløger, J. (2004). Strife: Urban planning and agonism. *Planning Theory*, 3, 71–92.
- Porritt, J. (2015, June 22nd). The greenest government ever? By no stretch of the imagination. *The Ecologist*.
- Porter, N. (1999, March 11th). Waste site approval fury. *South Wales Evening Post*.
- Pulido, L. (1994). Restructuring and the contraction and expansion of environmental rights in the United States. *Environment and Planning – Part A*, 26, 915–936.
- Pulido, L. (1996). A critical review of the methodology of environmental racism research. *Antipode*, 28, 142–159.
- Purcell, M. (2013). A new land: Deleuze and Guattari and planning. *Planning Theory & Practice*, 14, 20–38.
- Raco, M. (2003). Governmentality, subject-building and the discourses and practices of devolution in the UK. *Transactions of the Institute of British Geographers*, 28, 75–95.
- Rees, M. (1998, June 12th). Plant plans major spend, GBP 400,000 improvement on drainage system following deaths. *South Wales Evening Post*.
- Rein, M. (1969). Social planning: The search for legitimacy. *Journal of the American Institute of Planners*, 35, 233–244.
- Rex, J. (1961/2010). *Key problems of sociological theory*. Abingdon, UK: Routledge.
- Richardson, T. (1996). Foucauldian discourse: Power and truth in urban and regional policy making. *European Planning Studies*, 4, 279–292.
- Rittel, H. W. (1972). On the planning crisis – Systems analysis of the 'first and second generations'. *Bedriftsøkonomien*, 8, 390–396.
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155–169.
- Rose-Redwood, R. S. (2006). Governmentality, geography and the geo-coded world. *Progress in Human Geography*, 30, 469–486.
- Rose, N., & Miller, P. (1992). Political power beyond the state: Problematics of government. *British Journal of Sociology*, 43, 173–205.
- Rydin, Y. (2007). Re-examining the role of knowledge within planning theory. *Planning Theory*, 6, 52–68.
- Rydin, Y. (2013). The issue network of zero-carbon built environments: A quantitative and qualitative analysis. *Environmental Politics*, 22, 496–517.
- Rydin, Y., & Falleth, E. (2006). *Networks and institutions in natural resource management*. Cheltenham, UK: Edward Elgar Publishing.
- Rydin, Y., & Pennington, M. (2000). Public participation and local environmental planning: The collective action problem and the potential of social capital. *Local Environment*, 5, 153–169.
- Ryland, J. S., Bishop, J. D., De Blauwe, H., El Nagar, E., Minchin, D., Wood, C. A., et al. (2011). Alien species of Bugula (Bryozoa) along the Atlantic coasts of Europe. *Aquatic Invasions*, 6, 17–31.
- Seaton, A., Godden, D., Macnee, W., & Donaldson, K. (1995). Particulate air pollution and acute health effects. *The Lancet*, 345, 176–178.
- Sherlock, K. L., Kirk, E. A., & Reeves, A. D. (2004). Just the usual suspects? Partnerships and environmental regulation. *Environment and Planning – Part C*, 22, 651–666.
- Shipton, M. (2008, July 12th). £54m claim turns up the heat over authority's troubled incinerator; Neath Port Talbot sues project advisers over Crymlyn Burrows. *Western Mail*.
- Shirani, F., & Henwood, K. (2011). Continuity and change in a qualitative longitudinal study of fatherhood: Relevance without responsibility. *International Journal of Social Research Methodology*, 14, 17–29.
- Simmie, J. M. (1974). *Citizens in conflict: The sociology of town planning*. London: Hutchinson.
- Simmons, P., & Walker, G. P. (2005). Technological risk and sense of place: Industrial encroachment on place values. In A. Boholm & R. Lofstedt (Eds.), *Facility siting: Risk, power and identity in land use planning*. London: Earthscan.
- Snell, T., & Cowell, R. (2006). Scoping in environmental impact assessment: Balancing precaution and efficiency? *Environmental Impact Assessment Review*, 26, 359–376.
- Stenson, K. (2005). Sovereignty, biopolitics and the local government of crime in Britain. *Theoretical Criminology*, 9, 265–287.
- Stenson, K. (2008). Governing the local: Sovereignty, social governance and community safety. *Social Work & Society*, 6, 2–14.
- SWEP (1998, December 21st). Residents fear industry move. *South Wales Evening Post*.
- SWEP (1998, October 1st). Waste site go-ahead. *South Wales Evening Post*.
- SWEP (1999, April 22nd). Plant protest battle goes on. *South Wales Evening Post*.
- SWEP (2000, September 8th). Recycle plant deal signed. *South Wales Evening Post*.
- SWEP (2001, November 22nd). Burner deaths fears raised. *South Wales Evening Post*.
- SWEP (2001, March 27th). Experts to face incinerator questions. *South Wales Evening Post*.
- SWEP (2003, August 23rd). Anti-burner row hots up. *South Wales Evening Post*.
- SWEP (2003, May 17th). Managers in danger of mistrust. *South Wales Evening Post*.
- SWEP (2012, 25th February). Pioneering power plant. *South Wales Evening Post*.
- Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, 27, 237–246.
- Vanclay, F., & Bronstein, D. (1995). *Environmental and social impact assessment*. Chichester, UK: John Wiley & Sons.
- Walker, A. (2007). The history of the Tir John power station and its relationship with the Crymlyn Bog. *The Swansea History Journal – Minerva*, 15, 66–85.
- Walker, G. (1998). Environmental justice and the politics of risk. *Town and Country Planning*, 67, 358–359.
- Walker, G. (2012). *Environmental justice: Concepts, evidence and politics*. Abingdon, UK: Routledge.
- Walker, G., & Bickerstaff, K. (2000). Polluting the poor: An emerging environmental justice agenda for the UK? In *Critical urban studies occasional papers*. London: Centre for Urban and Community Research, Goldsmiths College, University of London.
- Walker, G., Fairburn, J., & Bickerstaff, K. (2001). Ethnicity and risk: The characteristics of populations in census wards containing major accident hazards in England and Wales. In *Occasional papers*. Staffordshire University.
- Walker, G., Mitchell, G., Fairburn, J., & Smith, G. (2005). Industrial pollution and social deprivation: Evidence and complexity in evaluating and responding to environmental inequality. *Local Environment*, 10, 361–377.
- Wang, L.-C., & Chang-Chien, G.-P. (2007). Characterizing the emissions of polybrominated dibenzo-p-dioxins and dibenzofurans from municipal and industrial waste incinerators. *Environmental Science and Technology*, 41, 1159–1165.
- Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, UK: Cambridge University Press.
- Webster, T., & Connett, P. (1989). Cumulative impact of incineration on agriculture: A screening procedure for calculating population risk. *Chemosphere*, 19, 597–602.
- WG (2014). *Sell2Wales – Notice details [Online]*. Llywodraeth Cymru/Welsh Government Available at http://www.sell2wales.gov.uk/search/show/search_view.aspx?ID=MAR024619
- Whatmore, S. (2009). Mapping knowledge controversies: Science, democracy and the redistribution of expertise. *Progress in Human Geography*, 33, 587–598.
- Whatmore, S., & Boucher, S. (1993). Bargaining with nature: The discourse and practice of 'environmental planning gain'. *Transactions of the Institute of British Geographers*, 18, 166–178.
- Wiedemann, P. M., & Schutz, H. (2005). The precautionary principle and risk perception: Experimental studies in the EMF area. *Environmental Health Perspectives*, 113, 402.
- WM (2002, January 12th). Waste plant decision delayed; company ordered to provide more information. *Western Mail*.
- Wood, S. (2009). Desiring docklands: Deleuze and urban planning discourse. *Planning Theory*, 8, 191–216.
- WOS (2001, July 8th). Renowned pollution expert Dr Dick van Steenis has branded a proposed incinerator at Crymlyn Burrows a 'disaster'. *Wales on Sunday*.
- Wynne, B. (1996). A reflexive view of the expert-lay knowledge divide. In S. Lash, B. Szerszynski, & B. Wynne (Eds.), *Risk, environment and modernity: Towards a new ecology*.
- Wynne, B. (2003). Seasick on the third wave? Subverting the hegemony of propositionalism: Response to Collins & Evans (2002). *Social Studies of Science*, 33, 401–417.
- Yiftachel, O. (1994). The dark side of modernism: Planning as control of an ethnic minority. In S. Watson & K. Gibson (Eds.), *Postmodern cities and spaces*. Oxford: Blackwell.
- Yiftachel, O. (1998). Planning and social control: Exploring the dark side. *Journal of Planning Literature*, 12, 395–406.

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