Welsh School of Architecture
Cardiff University

Contribution to Westminster's Welsh Affairs Committee, "The environmental and economic legacy of Wales' industrial past".

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Introduction

The evidence contained within this document is based on teaching and research of the authors specifically related to questions 1 and 2 of the call:

1. What progress has been made in addressing the environmental legacy of Wales' industrial past?
    - How could the UK Government further support the remediation of former industrial sites in Wales?
    - **Can former industrial sites contribute to the green transition in Wales, and how could the UK Government help to maximise opportunities?**
2. How has deindustrialisation shaped socio-economic conditions in Wales today?
    - What does access to the labour market look like in former industrial areas of Wales that were once centred around heavy industries?
    - **How effective have UK Government policies and funding interventions been in responding to the consequences of deindustrialisation in Wales?**

In section 1, two pedagogical activities are presented relating to question 1 of the call, the first at primary level and the second in higher education. Both show how in different ways Welsh industrial heritage and former industrial sites can contribute to Wales's sustainable future. Section 2 covers a response to the call's second question with the presentation of an initial engagement and research workshop with a post-industrial community highlighting the need to understand their diversity and complexity.

Welsh Industrial Heritage

Of the four World Heritage Sites located in Wales, three are related to former industries (Cadw, 2025), underlining the importance of Welsh industrialisation in world history. However, at a local level, the UK and Welsh Governments' approach to deindustrialisation has generally been characterised by an eradication of traces of the industrial past, with less than 3% of Welsh listed buildings and 5.2% of Scheduled Ancient Moments given the broad classification of "industrial" (ibid.). Research has shown the positive impact that nostalgia can have for post-industrial communities (Smith and Campbell, 2017), however the survival of tangible evidence of industrial pasts is critical for this to be achieved.

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Question 1: Can former industrial sites contribute to the green transition in Wales, and how could the UK Government help to maximise opportunities?

Industrial Heritage as a Catalyst for Sustainable Education and Wales's Green Transition

Industrial heritage sites, especially those linked to historic carbon extraction, such as those of the South Wales Coalfield, focus the minds of current and future generations on the causes of anthropogenic climate change. By doing so, they provide unique educational opportunities for both structured and unstructured learning as we seek to confront the climate and ecological emergencies and broader aspects of sustainable development including the safeguarding of the sociocultural values associated with this form of heritage.

With regards to structured learning, an example of this is the work created and developed by Dr Melina Guirnaldos, alongside co-lead Antonio Capelao, with primary school pupils illustrates how industrial heritage can offer valuable insights into the education of future generations and the new Curriculum for Wales. Similarly, the work of the Master of Architecture Design Thesis unit, "Carbon Pasts, Low Carbon Futures" developed and delivered by Dr Chris Whitman, at the Welsh School of Architecture, Cardiff University (Whitman, 2024) utilises Welsh industrial heritage as the basis for creative and sustainable design solutions, with the potential to inspire real-world solutions.

Cardiff Kids Xmas Lights

The *Cardiff Kids Xmas Light* project engaged primary school pupils in reflecting on and exploring their local community, its identity, and its connection to the urban heritage and the values associated to it. By examining Cardiff's industrial past and the impact of migration on its built legacy, pupils were guided from conceptualisation to realisation, designing their own Christmas lights. This process fostered a sense of ownership and encouraged them to see themselves as future city-makers. The project also aimed to integrate STEAM subjects into the primary education curriculum, promoting interdisciplinary learning.

The initiative is built on two interconnected research approaches. First, it acknowledges space, and its values as socially constructed, shaped by diverse lived experiences. Second, it applies the "learning by doing" pedagogy from architectural education, encouraging hands-on engagement.

Launched in January 2024 with three years of funding (2024, 2025, 2026), *Cardiff Kids Xmas Light* is supported by Child Friendly City Cardiff Council, Cardiff Commitment, Cardiff Curriculum, the Royal Society of Architects in Wales, and private sector partners. Since its inception, the project has conducted four design workshops with over 120 pupils from St. Cuthbert's Primary School in Butetown, a historically significant area once linked to Cardiff's docklands. Butetown, recognised since the 19th-century coal trade as one of the city's most multicultural neighbourhoods, remains one of its most socio-economically deprived areas.

Through these workshops, pupils explored concepts of the built environment, place identity, and migration. These themes were introduced both theoretically and experientially during a field visit to the post-industrial surroundings of their school, including Cardiff's Dock Feeder Canal and the newly regenerated Canal Quarter, where their light designs would be displayed. Pupils learned about Cardiff's industrial heritage and its social values while tracing hidden remnants of the past on their journeys from school to the Canal Quarter, using simple architectural tools—walking and sketching.

The project's evaluation demonstrated significant learning outcomes. Pupils gained knowledge of the built environment and how light is used and celebrated within it. They developed a deeper awareness of Cardiff's industrial past and its connection to their everyday surroundings, as well as their role as future

heritage makers. Findings also highlighted an increased understanding of local communities, their cultures, and traditions, reinforcing how these elements shape a sense of place and identity. Additionally, pupils grew in confidence in drawing, sketching, and annotating spaces, feeling supported and encouraged to express themselves throughout the process. A recorded video summarises these outcomes:https://www.youtube.com/watch?v=PjyBMqVIgpA

The final pupil's designs were showcased from November 2024 to January 2025 in two relevant post-industrial hubs that continue to be integral to Cardiff's everyday landscape: Cardiff's Canal Quarter, and Cardiff Central railway station (Figure 2,3,4). The Cardiff Kids Xmas Light project has received recognition through a nomination for the Inspire Future Generations Awards from the Thornton Education Trust and is supported by the Building Centre.

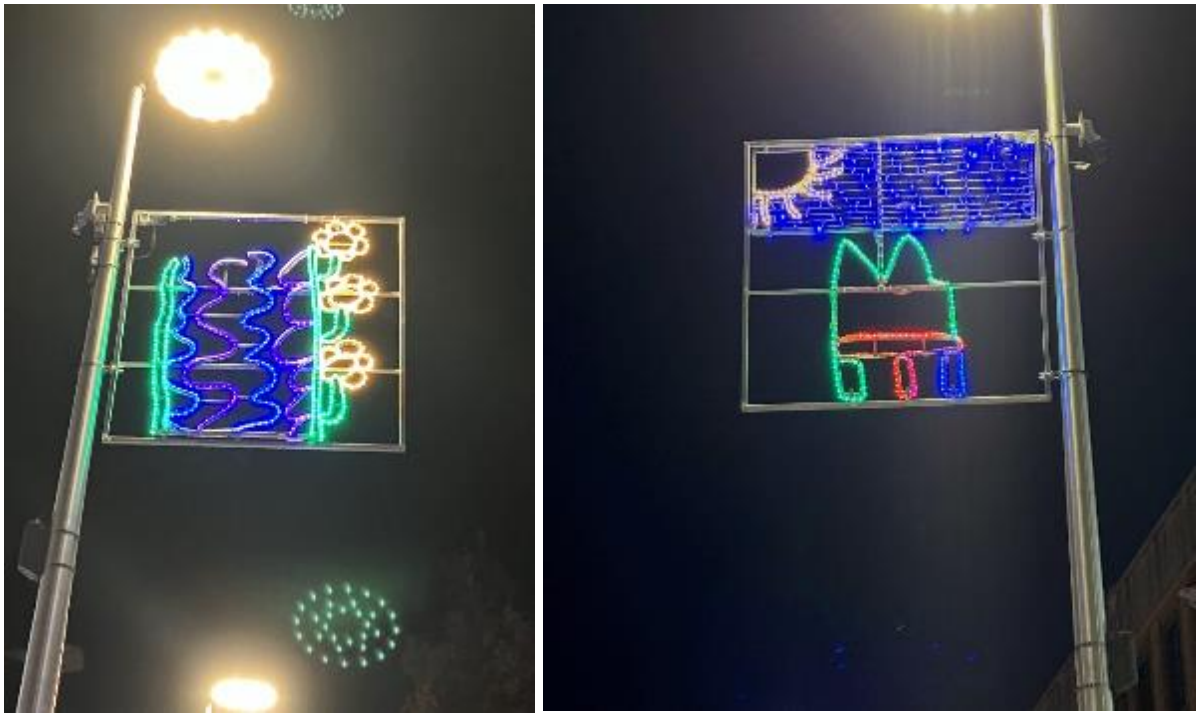

Figure 1 & Figure 2. Cardiff Kids Xmas Lights (Guirnaldos, 2024)

Figure 3. Cardiff Kids Xmas Lights inauguration event (Guirnaldos, 2024)

Carbon Pasts, Low Carbon Futures

Since 2021, four heritage sites related to the South Wales Coalfield have been the focus for proposals for low carbon futures, envisioned and designed by final year Architecture students at Cardiff University. The South Wales Coalfield was chosen as the design thesis unit's focus to immediately with the UK's carbon legacy, and the current climate emergency. The grade II* listed Crumlin Navigation Colliery (Figure 4), was studied 2021/22, grade II* Cefn Coed Colliery (Figure 5) 2022/23, the social infrastructure of industrial Pontypridd in the form of the grade II Market Quarter (Figure 6) 2023/24, and design work is ongoing for Penallta Colliery, whose grade II* Engine Hall (Figure 7) was recently added to SAVE Britain's Heritage's Building at Risk Register (Philips, 2024) and whose grade II* Pithead Baths is being considered by the C20th Society for inclusion on their own (Marshall, 2025).

Figure 4. Crumlin Navigation Colliery (Whitman, 2021)

Figure 5. Cefn Coed Colliery (Whitman, 2022)

Figure 6. Pontypridd Market and Town Hall Theatre (Whitman, 2023)

Figure 7. Penallta Colliery Engine Hall and Headframe No.1. (Source: Whitman, 2024)

The richness of these existing contexts has inspired the generation of a plethora of low carbon programmes and architectural responses. These have included renewable energy production, storage and distribution; reuse and recycling centres; low carbon manufacture; education and knowledge sharing; wellbeing facilities and intergenerational living; nature conservation; innovation and research centres; and community governance and support.

These outcomes have been shared with the sites' custodians, and through two public events, the first at Crumlin Navigation Colliery in 2022, and the second last year (2024) at Calon Taf in Ynysangharad Memorial Park, Pontypridd, with the work being well received by both local communities, owners and public bodies. The work has also received architectural recognition, with the work of the first year 2021/22 unprecedently nominated as an entire unit by the School for the RIBA Silver Medal, and one student from the second year 2022/23 awarded the Welsh School of Architecture prize for best in year and nominated for the RSAW medal.

Carbon Pasts, Low Carbon Futures - Selected Examples There follow five examples of students' work from academic years 2021/22, 2022/23 and 2023/24 which demonstrate the potential for these post-industrial heritage sites to be at the forefront of Wales's green transition.

a) MedTech Research Centre

For this project Jordan Grady explored the notion of building conservation and heritage as a continuous narrative (Lowenthal, 2015), perpetuating the industrial legacy of Crumlin Navigation Colliery through the proposal for Medical Technology, or MedTech, one of South Wales's emerging key industries. To achieve this, the new programme was conceived as the insertion of new "machinery" (Figure 8).

Figure 8. Internal render of proposal at Crumlin Navigation Colliery for MedTech Research Centre, showing inserted "machinery" (Grady, J., 2022)

Laboratory and research spaces were inserted as free standing boxes, allowing high environmental specifications to be achieved, with minimal interventions in the historic building fabric which encloses circulation. U-values of 0.1 W/m2K, excellent airtightness, controlled ventilation with heat recovery, acoustic separation and reverberation times of 1.2 sec, were all designed to be achieved within these new insertions.

b) Renewable Energy Storage Facility

Rowan Luckman, took as a starting point the past storage of solar energy in the form of coal at Crumlin Navigation Colliery. Exploring Burke's notions of the sublime (Burke, 2012) and subsequent ideas of the post-industrial sublime (Baptist, 2016), the resulting storage facility for renewable energy creates didactic and impressive alternatives to chemical batteries and their inherent environmental

impact. Technologies incorporated included pumped hydroelectric using the abandoned mine workings as the lower reservoir, winch-based gravity batteries in the south upcast mine shaft, and subterranean compressed air storage (Figure 9).

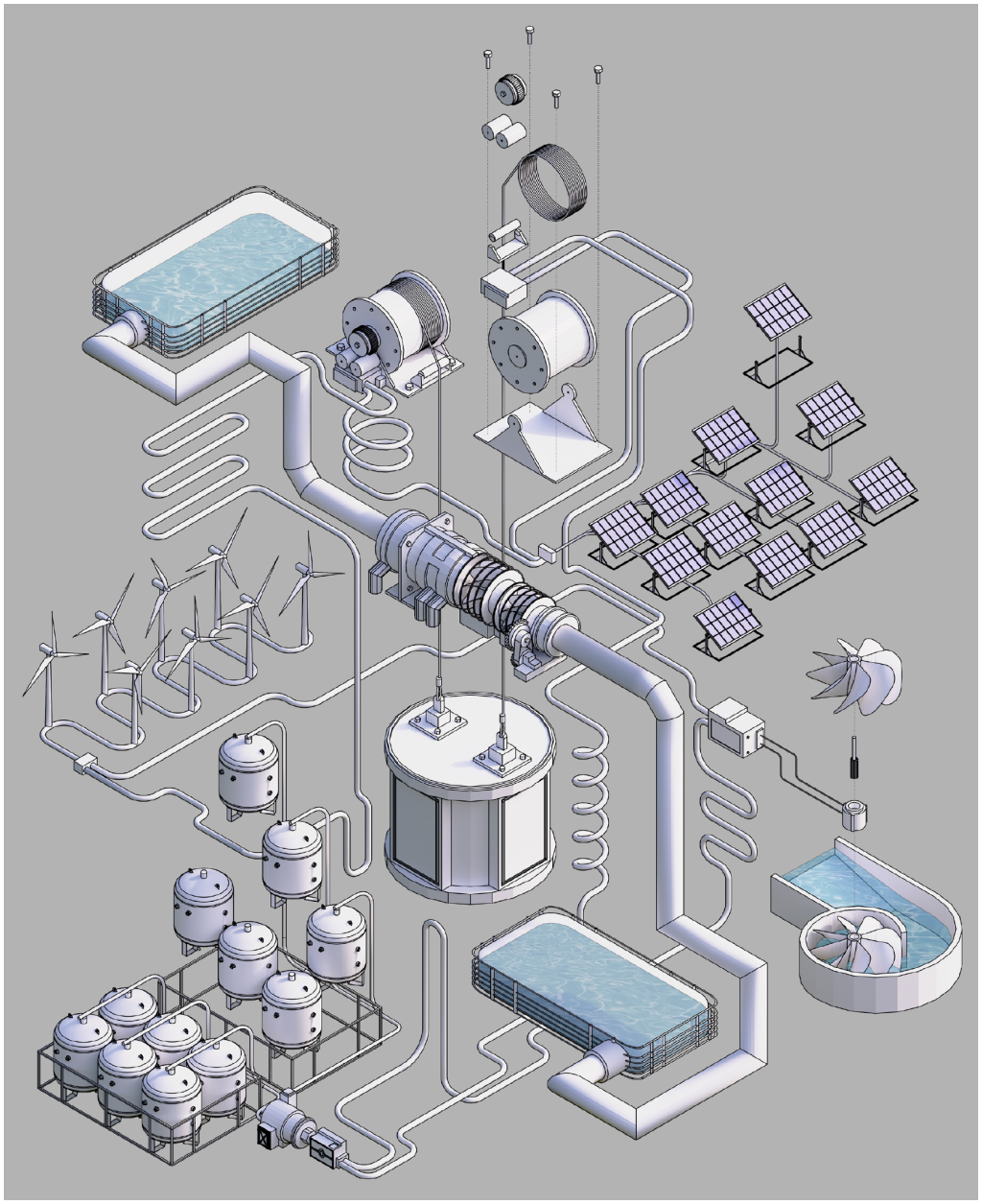

Figure 9. *Conceptual image of energy storage technologies for proposal at Crumlin Navigation Colliery for Renewable Energy Storage Facility (Luckman, R., 2022)*

This linked to a wider landscape masterplan, integrating photovoltaic, wind and small-scale hydro energy production. For the interventions on the existing buildings, lightweight materials were explored to reduce the loads on the historic fabric (Figure 10).

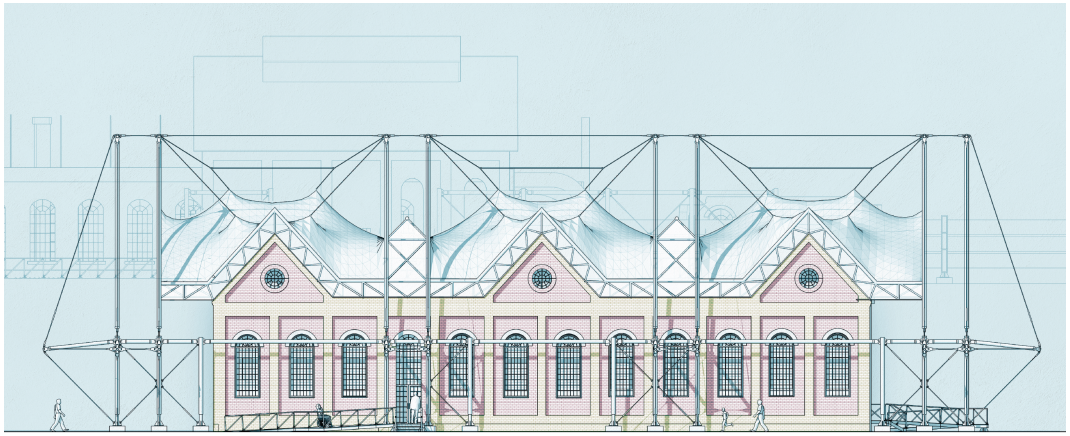

Figure 10. *Elevation of renovated Powerhouse, part of a proposal at Crumlin Navigation Colliery for Renewable Energy Storage Facility (Luckman, R., 2022)*

c) Mine Water Heat Recovery Research Centre and National Coal Archives

The third proposal for Crumlin Navigation Colliery presented by Alexander McCormick, was inspired by the subterranean elements of the site (Figure 11), using historic mine plans, borehole logs, and geological data to influence the design of a research centre for mine water heat recovery, combined with a National Coal Archives (Figure 12).

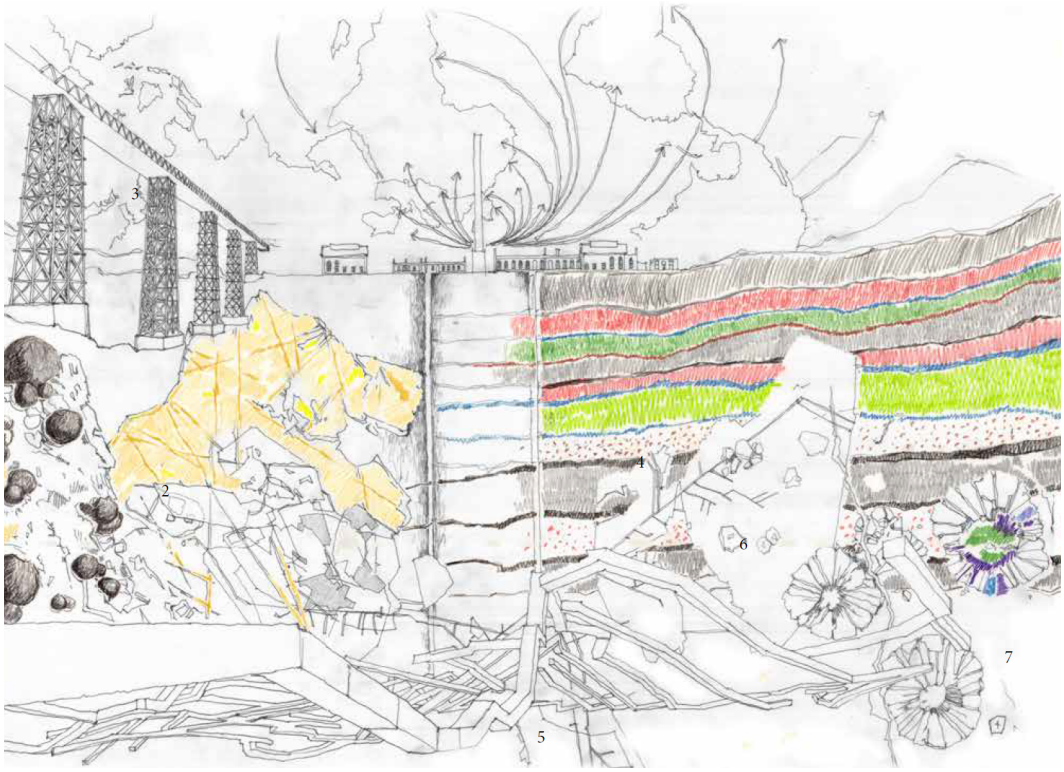

Figure 11. Conceptual collage of subterranean and global connections, leading to the proposal at Crumlin Navigation Colliery for Mine Water Heat Recovery Research Centre and National Coal Archives (McCormick, A., 2022)

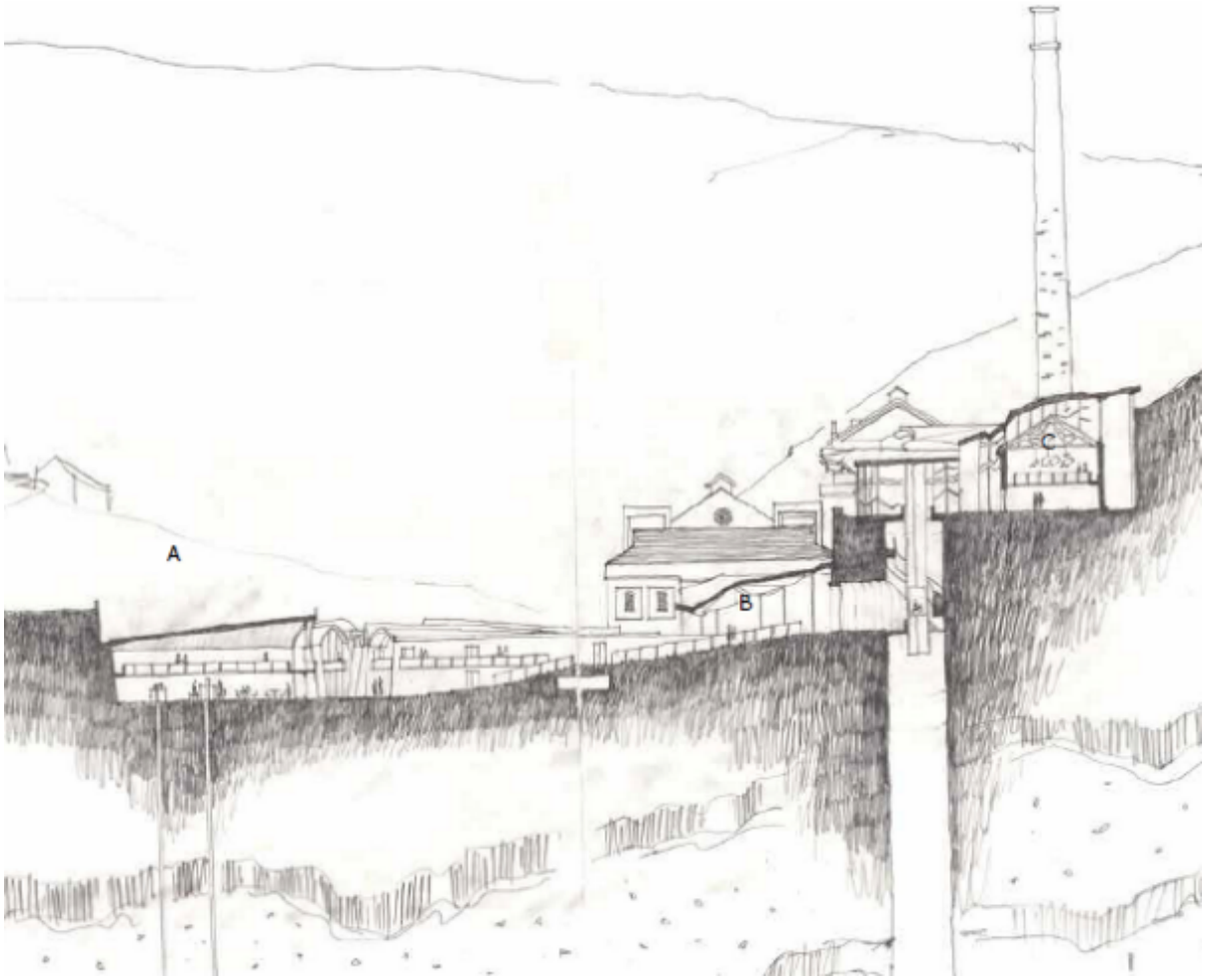

Figure 12. Cross section of proposal at Crumlin Navigation Colliery for Mine Water Heat Recovery Research Centre and National Coal Archives (McCormick, A., 2022)

Part of the project was designed as an earth sheltered building, using compressed earth blocks and charred Welsh larch. With the rest of the programme being incorporated into the refurbished existing buildings, connected by a timber framed roof, the geometry of which was derived from principal coal seams present below the site. Across the site, space heating was provided from mine water sourced heat pump, based on a mean temperature of the mine water of 15.2ºC (Farr et al., 2016).

d) Example 4 – National Museum of Energy and Renewable Energy development Park

During the academic year 2022/23 Morgan Taylor created designs at Cefn Coed Colliery proposing a National Museum of Energy, as part of the Amgueddfa Cymru (National Museum of Wales) portfolio, accompanied by a renewable energy development park (Figure 13).

Figure 13. *Aerial axonometric of proposal at Cefn Coed Colliery for a National Museum of Energy and Renewable Energy development Park (Taylor, M., 2023)*

The museum exhibits would depict industrial, transportation and domestic uses, curated into three themed areas covering energy past, present and future. Energy past is displayed in the renovated existing historic buildings, energy present takes the form of demonstration low energy dwellings based on current new-build and retrofit technologies, and energy future incorporates a mine water heat recovery and ambient loop and creates a new enclosure for the grade II* listed range of boilers, replacing the current condemned asbestos shelter (Figure 14). All this lies at the centre of a low carbon mobility masterplan.

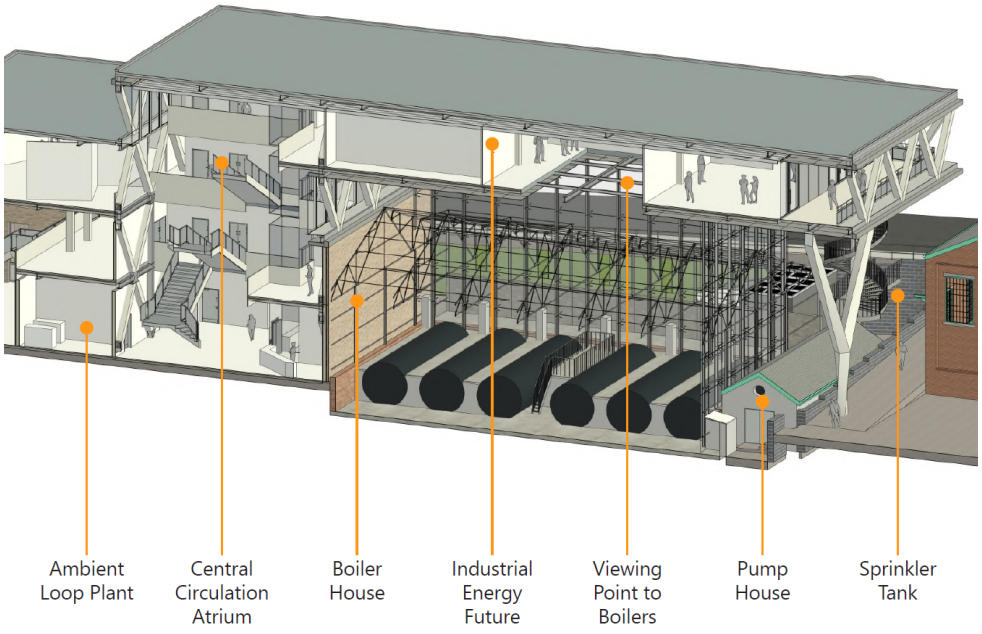

Figure 14. Sectional axonometric of the "Energy Futures" building, enclosing the grade II listed boiler house, as part of the proposal at Cefn Coed Colliery for a National Museum of Energy and Renewable Energy development Park (Taylor, M., 2023)*

e) Example 5 – The Memory Collective a story telling archive for a Sustainable Future

The final example, from last year (2023/24) by Connor Bryan, takes a different approach to tackling the climate and ecological emergencies, addressing the need for societal behavioural change, rather than more technical building based solutions. The project proposed the restoration and adaptation of the former Townhall Theatre as a story telling archive (Figure 15) and explores recapturing the art of communal storytelling in 21st Century, with the aim of aiding our transition to a low carbon society (Solnit and Young-Lutunatabua, 2023).

Figure 15. *The Memory Collective a story telling archive for a Sustainable Future (Bryan, C., 2024).*

Whilst not the principal programmatic driver for the design, low carbon strategies were still incorporated with waste heat from the datacentre meeting 45% space heating demand, the specification of cross laminated timber, a low carbon material, for principle new structural elements and the integration of photovoltaics in the new replacement roof design.

Carbon Pasts, Low Carbon Futures - Summary

These projects are just a sample of those produced by the MArch Unit Carbon Pasts, Low Carbon Futures. By May 2025 there will be 42 completed design theses on the adaptive reuse of Welsh industrial heritage. Should the committee be interest in seeing more of thse, please let us know.

Question 2: How has deindustrialisation shaped socio-economic conditions in Wales today?

The impact of the rapid industrialisation and deindustrialisation of Wales has been widely discussed in its historical, geopolitical, socio-economical perspective by various scholars (Wicke, 2018). The historian John Davies discusses how the coal industry underwent rapid growth in the second half of the 19th century when the sparsely inhabited rural Valleys became one of the fastest growing and heavily industrialized UK regions (Davies, 2007). Davies also speaks of the challenges the coal industry faced during the Great Depression and how it stabilized its production during WWII and went under public management in 1947. The coal industry saw its ultimate decline in the 1970s and 80s, decades that led to the closure of most collieries in Wales (Davies, 2007). In this later period of decline, characterized by high unemployment rates, food crises, and miners' strikes, the Aberfan 1966 disaster became emblematic of the price that Valleys' communities had paid for Wales' industrial growth. Around this period, the geologically rich region was renamed by mass media the Valleys of Sorrows. The broadcast of 1960s and '70s mining disasters seemed to renew and make visible the strong connections between the region's geological maps and its human geographies (Ntzani, 2024).

Recent historical research conducted by Prof Juliet Davis and Dr Lui Tam on the industrial landscape in the Upper Dulais Valley, in Onllwyn and its surrounding settlements, in the context of the Welsh Government's initiative to development a Global Centre for Rail Excellence (GCRE), reveals how deindustrialisation has drastically transformed the community structure in these former industrial settlements (Davis and Tam, 2023). Once a vibrant and tight-knitted industrial community with dynamic social infrastructures and a prominent political centre for solidarity and miners' welfare, Onllwyn lost its schools, chapels, railways, shops, and eventually most of its housing within a short period of time since the 1960s. Through our interviews with the community members, it is revealed that on the one hand, the community members feel that deindustrialisation has improved the natural environment of their villages, and on the other hand feel, that their valley has been forgotten in the development of a deindustrialisation society. One of the community members exclaimed that the Dulais Valley is like a 'forgotten valley', having lost the industries that it once prided itself with, while not getting development opportunities that can bring in new employment for the younger generation. Everyday life has also been drastically transformed since deindustrialisation. While community members could previously access most amenities in walking distance, they now need to drive to Swansea or Neath for many everyday activities. Challenges to access essential services like healthcare become particularly obvious with the loss of public transport and an aging community.

More recent efforts by colleagues in WSA on public engagement with local communities focus on the impact of these historical development on Welsh female population. The physical remains of post-industrial heritage, including the remains of the productive structures, the landscape formed and transformed by industrial activities, as well as settlements born alongside the industrial development, are tangible embodiment of a variety of Welsh identities intricately linked to the recent past and current state of these communities. Among these memories and identities, the voices of previously marginalised groups related to gender, ethnicity, age, and disabilities, have only recently started gaining attention. Particularly, recent revelations of women's involvement have highlighted the incredible sense of solidarity, grassroot social welfare, the sense of pride in community actions, and complexity of their identities and agency in the industrial landscapes of Wales. However, the narrative around the industrial past remains predominantly male-oriented. It calls for further exploration to reconstruct more gender-inclusive narratives of the industrial past. The 'Mark her Words workshop, led by Dr Lui Tam and Dr Dimitra Ntzani, was a collaboration with the Dove Workshop in Banwen, Dulais Valley, which created a safe space for women of the area to share their industrial stories and memories and by doing so determine its future. The workshop found shelter in the AHRC funds Being

Human Festival Hub of Cardiff University and initiates a cross-sector dialogue on women contribution and impact in Wales' industrial past and post-industrial future.

The stories told during the workshop has revealed that the impact is of deindustrialisation on the women community's lived experience is far more complex than currently understood. Post-industrialisation has admittedly pushed the women that sustained industrial communities in the public sphere turning them into main income providers in addition to collective memory keepers and/or archivists. Brexit however had a detrimental impact on these processes, taking away essential funding that facilitated if not secured women's access to education, digital literacy, vocational training etc. In their own words: "We had enough of well-being seminars. We need seminars that enrich our skills and knowledge and help us revitalise our communities." Local communities crave for the development of alternative economies, but these cannot be designed or established in its isolated local context without further support from policy and governance levels.

To better appreciate the impact and potential of de-industrialization in Wales, it is essential to appreciate their diversity and complexity and work with those as key strengths for any future policy or project. To this ends, the authors are preparing bids for UKRI funding to continue this work.

Conclusion

The evidence set out in this document, drawn together at short notice, seeks to highlight the need for further research into both the nation's industrial history and the impacts of deindustrialisation, especial with regards to the voices of previously marginalised groups related to gender, ethnicity, age, and disabilities. At the same time it showcases how Wales' industrial past can play a key role in its future green transition. The authors would be more than happy to discuss these topics further with the committee, and thank you for your time.

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