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Energy Workers in Transition: The Skilled Manual Workers' Structure of Feeling in Britain's Electricity, Nuclear, and Oil and Gas Sectors

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Worker reflections are central to understanding how energy transitions develop and what they feel like. This article uses lifestory testimonies from British energy workers to assess how they have narrated their working lives, which have been structured around transitions in fuel sources and technological change since the 1950s. They are drawn from power stations and the nuclear sector as well as North Sea oil and gas. Contrary to dominant contemporary political presentations, transitions are not a new challenge for energy workers, who have address prior experiences of fundamental change to energy system. Worker narratives nevertheless emphasise continuity in their industrial skills and societal demands for energy generation, challenging "just transition" perspectives centred on forms of disruptive change. Drawing on Raymond Williams' cultural theory, the paper develops the concept of an energy worker structure of feeling. Williams explained that residual structures of feelings are ones that are still present in a given societal context but have foundations in an earlier, past, period. Energy workers are influenced by the major postwar expansion of electricity, the era of the British nuclear project and the birth of oil and gas as well as by powerful continuities that link coal mining pasts to these newer sectors. The analysis is broken into two sections, with the first exploring place-attachment centred on the dichotomy affective pairings of security and regimentation on the one hand and familiarity and novelty on the other. A second section is centred on workplace order and conflict through the affects of danger and safety and tension and pride. It finds strong continuities in perceived experiences of risk and hierarchies. Overall, this article demonstrates the centrality of labour to capital-intensive energy transitions and challenges empirical accounts of transition by underlining the inherently interpretive faculties of understanding human experience.

Introduction

Energy transition has become increasingly widely accepted as the dominant ecological, political and economic challenge of the twenty-first century. The United Nations' Intergovernmental Panel on Climate Change and the International Energy Agency have come together in imploring "a dramatic acceleration in the transitions to clean, sustainable energy."[1] Concurrently, Energy Humanities has evolved as an interdisciplinary field "that attends to the social, cultural, and political challenges posed by global warming" through examining the space between infrastructures and subjectivities.[2] Evolving experiences of work in energy sectors and the meanings ascribed to it are central to understanding these ongoing transformations.

The destruction of Britain's fading coal economy exemplifies shifting geographic and cultural energy landscapes. Former mining settlements are among Britain's poorest places, marked by low levels of economic activity and poor health and educational outcomes.[3] In 2021, Ben Houchen, the Conservative Mayor of Teesside in north-east England, celebrated instigating the "explosive demolition" of the Dorman Long Tower coal bunker, boasting he would bring renewable energy jobs to a former steelworks site.[4] Weeks after Glasgow hosted the COP26 climate talks the same year, Scotland's Nationalist First Minister, Nicola Sturgeon, ignited explosives which brought down the large chimney of Longannet power station in Fife. Sturgeon hailed the levelling as "symbolic" of ambitions to deliver "good, green jobs, strengthened energy security, and benefits for local communities."[5]

Longannet was the largest electricity generating unit in Europe when it was commissioned in 1969.[6] The Dorman Long Tower was built during the 1950s as part of the Redcar steelworks, which largely closed in 2015.[7] Neither were artefacts of a distant era, but Houchen and Sturgeon's actions designated them as archaic. Scottish Power, the privatized utility that owned Longannet from 1991, illuminated the chimney with the slogan "Make Coal History," affirming the environmental intent behind the demolition.

But this slogan also had a double meaning: making coal history consigns the economic security sustained by mining and power stations to the past. By contrast, energy workers see long continuities in their experiences of employment across sectors through their skills, experiences of danger and union activism. Depicting movement towards a green energy economy as an explosive rupture jars with the Scottish Government's commitment to a "just transition" based on dialogue with workforces and communities who depend upon fossil fuel sectors.[8] Just transition is a term with origins in trade unionism predicated on securing worker and community interests.[9] Its meaningful practice is reliant on the exercise of worker voice and realization of social and economic along with environmental justice during movement between energy sources.

Dominant sociotechnical perspectives on transition often prioritize systems of technology and government, industry and enterprise level policymaking.[10] Yet workers' perceptions of their position during transitions are central to grasping the equity or inequity they create as well as to understanding the changing character of social relations molded by major transformations to crucial infrastructures. Energy systems are above all else regimes of labor which facilitate and denigrate the realization of autonomy, security and social and economic justice. Given the centrality of energy production to economies and societies, these labor relationships have outsized implications that extend beyond energy workforces and locales which are heavily dependent on energy employment. Richard White's polemical insistence that blue-collar workers understood nature, pollution and environmental dangers due to their workplace practices extends to the unique vantage energy workers obtain on the meaning and experience of changes unleashed by transitions.[11]

This article uses worker perspectives to understand the experience and memory of energy transitions through examining instances from Britain since the mid-twentieth century. It explores how workers have interpreted both positive and negative dimensions of transitions related to the rewards of employment, workplace governance and evolving patterns of risk and danger. The findings draw on important episodes of transition that took place within living memory, adding to a growing literature on the shift from coal to oil in Western Europe and North America after the Second World War which has rarely examined testimonies from current and former workers across a range of sectors.[12] This research also contributes to the contemporary just transition discussion, demonstrating the importance of emphasizing persistent rather than transformative dimensions of employment when offering pathways of security to workers facing sectoral decline.

My analysis draws on the New Left cultural theorist Raymond Williams' concept of structure of feeling, a sense of understanding rooted in subconscious everyday practices which operate "in the most delicate and least tangible parts of our activity." Structures of feeling are rarely formalized in writing but depend on "style" and are transmitted through shared contexts. Williams emphasized the role of labour in structures of feeling, explaining they are "kept alive by social inheritance and by embodiment in particular kinds of work."[13] In his most developed definition, Williams underlined the importance of emotional responses, specifying his interest in the interrelationship between affects and intellectual commitments to principles:

> We are concerned with meanings and values as they are actively lived and felt, and the relations between and formal or systematic beliefs are in practice variable (including historically variable), over a range from formal assent with private dissent to the more nuanced interaction between selected and interpreted beliefs and

> acted and justified experiences. ... We are talking about characteristic elements of impulse, restraint, and tone; specifically affective elements of consciousness and relationships: not feeling against thought but thought as felt and feeling as thought: practical consciousness of a present kind, in a living and interrelating continuity.[14]

Structures of feeling center on the interrelationship between emotion and deliberation, which was apparent in energy workers' recollections of sociability, workplace danger and of hierarchy and conflict.

Subsequent scholarship has underlined the value in disputing the distinction between "practical experience" and "received interpretation."[15] These observations build on Williams' schema of the historical evolution of structures of feeling. Williams delineated between "emergent," "hegemonic," and "residual" structures of feeling. In the 2020s, the skilled manual energy worker structure of feeling can be understood as residual:

> Effectively formed in the past, but it is still active in the cultural process, not only and often not at all as an element of the past, but as an effective element of the present. Thus, certain experiences, meanings, and values which cannot be expressed or substantially verified in terms of the dominant culture, are nevertheless lived and practice on the basis of the residue – cultural as well as social – of some previous social and cultural institution or formation.[16]

The energy worker structure of feeling has roots in the nationalized energy industries of the mid-twentieth century. During this period, electricity generation expanded in huge new power stations such as Longannet, and there was prestige attached to Britain's nuclear project whilst employment in coal reached its postwar peak in the late 1950s. North Sea oil and gas was born a decade later as a pioneering new industry.[17] These experiences shape energy workers' sense of their centrality to society which underpins their structure of feeling. They often understand their own position through geographical and familial connections, especially where newer energy sectors have replaced coal mining jobs. Ahmed emphasizes the potential for affective slippage provided by "the displacement between objects of emotion."[18] Through viewing emotions "as social and cultural practices," scholars can understand how perceptions of qualities are transmitted from one situation to another.[19] Energy workers demonstrate this logic in emphasizing continuities within their work across distinctive settings. They have preserved occupational identities as a basis for career-based lifestories. The affective responses which are organized by the structure of feeling were apparent in deliberations over workplace conflict and hazards. Hierarchy and resistance were

implicated within everyday practices of authority and emotionally charged moments of subversion. Danger was recalled in terms of fear, "an anticipation of hurt or injury," conditioned by prior personal and collective experience.[20]

These themes are developed across the three further sections of this paper. Section one addresses the role of labor in energy histories, locating the value of worker testimony to understanding a period marked by major changes to Britain's energy economy. Both subsequent sections are organized around pairs of affects in tension. Section two is themed around place-attachment, understanding how both regimentation and security and familiarity and novelty in their experience of work shaped energy workers' embeddedness in localities as well as perceptions of their node in the larger British energy system. In the third section, the meaning of skilled manual labor is studied through danger and safety along with workplace tensions and occupational pride. Together they demonstrate the centrality of human labor to capital-intensive energy transitions.

Labor in Energy Histories

Energy studies has recently reorientated towards labor relations.[21] Scholars previously demonstrated a "marked decline in interest" after unions were marginalized in both oil and gas and coal.[22] Kaveh Ehsani criticized scholarship concentrated on oil's environmental, political and cultural impact "without the workers."[23] Timothy Mitchell's *Carbon Democracy* prompted renewed interest through its conclusion that imported oil displaced coal within advanced capitalist economies under an agenda of weakening unions that grew around mining and railways.[24] Important criticisms of Mitchell include his chronology of transition in the mid-twentieth century, leading him to overstate coal's displacement in the United States, which has similar implications for Britain.[25]

By looking beyond individual sectors, this article provides a new perspective on the creation of "a world of plenty in energy" in Britain that took shape between the 1950s and 1980s.[26] This era was marked by the major extension of electrification as well as the huge growth of domestic oil consumption, which came to replace coal as the nation's leading fuel. David Edgerton underlines that these changes were instigated through "a national effort by interconnected industries," incorporating domestically mined coal, North Sea oil and gas, nuclear power and electricity produced by burning fossil fuels, primarily coal.[27] Energy transition can only be understood meaningfully with the workers. Peyman Jafari's account of economically and politically decisive Iranian oil workers' strikes challenge Mitchell's "carbon determinism" which discounts the "mediating role" of culture and patterns of organization.[28] These conclusions apply to the British context too. Historical memories of coal mining along with the context of the

expanding energy economy created through harnessing novel technologies between the 1940s and 1970s conditioned worker understandings of sectors and movement between them. A multi-fuel perspective is crucial to shaping analysis based around experiences of long-lasting transitions and demonstrating the need for an assessment that includes persistent continuities in workers' conception of their labor.

Rather than a recent change, transition has been the dominant experience for workers employed in energy sectors, their families and locales which were transformed by changes brought by the generation of energy. The coalfields molded the new energy economy, even as deep mining employment fell from around 700,000 miners to zero between the 1950s and 2010s.[29] Existing British studies demonstrate the value of testimony in exploring workers' understanding of their industry but have tended to concentrate on individual sectors.[30] Familial and local connections to mining influenced nuclear, electricity and oil and gas workers, demonstrating the "messy" nature of the transition from a coal economy to an energy system dominated by hydrocarbons with a significant nuclear component.[31] Applying a structure of feeling framing to worker narration generates new understandings of how these transitions were experienced in different contexts. There was no singular experience of transition, instead coal gave way to a multi-fuel economy which looked and felt different across varied regions. The narratives further challenge empirical accounts of energy transition, underlining the inherently interpretive dimensions of understanding human experience.

The source base includes interviews with twelve current and former energy workers from Scotland, England and Wales as well as a focus group of nuclear industry union officials.[32] Participants ranged from their early thirties to their eighties, with working experiences extending from the 1950s into the present. All the testimonies are from male respondents, which demonstrates the overwhelmingly male manual workforces of the sectors addressed, at least historically speaking. The affects explored below are masculine responses to transition. Examining them enriches understanding of how gender and class position fused to shape the emotional repertoires of energy workers.

Affective dimensions were important to interviewees recalling what they saw as unique occupational group experiences. These tended towards sensory descriptions that underlined scale, temperature and distance to emphasize how removed their workplaces were from routine white-collar or service sector employment. This has affinity with the "smokestack nostalgia" that typifies memories of manufacturing employment.[33] However, these discussions often related to ongoing energy generation rather than ones confined to history, and it was in fact the very dependency of British society upon electricity and oil and gas which was at the forefront of testimonies. Persistent hierarchies and distinctions between salaried managerial staff and waged

workers within energy workplaces were a marked feature of the testimonies, despite the comparatively high earnings and security the interviewees often enjoyed. These perspectives align with the aim of "a renewed analysis of experience" in interpreting contemporary British history, centered on continuities in class relations which energy sectors continue to be an important instance of.[34]

Figure 1: Map of places discussed (created on *MapCustomizer*):

1. Shetland Islands, and Brent field in the East of Shetland Basin, Scotland
2. (behind 4) FMC works Dunfermline, East Fife, Scotland
3. Mossmorran gas plant, West Fife, Scotland
4. Longannet coal-fired power station, West Fife, Scotland
5. Hunterston nuclear power station, North Ayrshire, Scotland
6. Sellafield nuclear reprocessing facility, West Cumbria, England
7. Heysham nuclear power station, Lancashire, England
8. Trawsfynydd nuclear power station, Gwynedd, Wales
9. Rugeley coal power station, Staffordshire, England
10. Didcot coal power station, Oxfordshire, England

Place-Attachment: Energetic Locales in a National Economy

The workplaces assessed in this article are strongly embedded in localized communities but also understood as sites within Britain's wider national energy economy. These dimensions of place -attachment gave a strong geographical dimension to the structure of feeling. Connections and tension between the local and national are explored through the polarized affects of security and regimentation and of novelty and familiarity. Changes in ownership and the concentration of power generation within large units underpinned an emergent national energy economy during the mid-twentieth century. Concurrently with decolonization, Britain ceased to be a major coal exporter whilst patterns of private and municipal ownership gave way to nationally owned and organized industries. These developments were possible following the nationalization of coal mining and power generation by Clement Attlee's Labour government after the Second World War and the beginning of Britain's nuclear project. Power stations were developed by the Central Electricity Generating Board (CEGB) and its predecessors, which were responsible for England and Wales as well as the South of Scotland Electricity Board (SSEB), with the involvement of the Atomic Energy Authority (AEA) and its offshoot, British Nuclear Fuels Limited (BNFL). All were under public ownership between the 1940s and 1990s.[35]

Former BNFL and CEGB workers remembered this new order imbued both feelings of security and stifling regimentation. It drew from the ethos of armed service, demonstrating energy's strategic importance and the overlap between the nuclear power and weapons programs. Joe Bell's father was a Cumbrian miner who found work building the first nuclear piles at Sellafield in north-west England and was later employed reprocessing spent nuclear fuel. Joe followed his father into the same role. He recalled that Sellafield had a military character. With no experience of service himself, Joe deployed a jibing tone in his description of his older colleagues: "they employed a lot of men who came out of the forces … And they were like little soldiers walking round, maybe that's the mentality they wanted."[36]

In 1969, Ken Rochester began work as a plant operative at the recently opened Rugeley B coal-fired power station in the English Midlands, having previously served as an apprentice mechanic in the Royal Air Force (RAF). He saw close similarities between the two: "The Generating Board in many ways was like coming out the Air Force and going into another regime where you had officers and men."[37] Ken's background disadvantaged him when he was employed under a chargehand who had served in the Royal Navy. His recollections reveal the intensely hierarchical nature of Rugeley B: "The shift charge engineer was your god. Here comes the shift charge engineer. look like your busy! Mine was an ex-navy commander. He didn't like RAF guys. So that was me. The guy that got promoted over me was an ex-Royal Navy guy. You couldn't believe it."[38]

Figure 2: Rugeley A and Rugeley B power station (Ben Brooksbank, 1989).

Workers and managers in atomic energy and power stations also often had military experience. The structure and operation of workplace hierarchies were shaped by these mentalities. Joe Bell perceived this as deliberate. Military imperatives determined work at Sellafield. Joe worked blending plutonium at during the 1970s and 1980s, underlining that "as far as I know there's only one use for A grade plutonium."[39] He highlighted the national security importance of reprocessing, emphasizing that it was integral to making nuclear weapons:

> A lot of people think that Sellafield was built for nuclear electricity, but it wasn't built for that. All the shit we've got over there. It doesn't belong to West Cumbria. It belongs to all four nations. Scotland wanted the bomb. England, Ireland, Wales wanted the bomb so we could sit at the big table and that's what Sellafield were built for.[40]

By contrast, interviewees who began working in nuclear later stressed their purely civilian experiences. Stuart, a systems engineer at the Hunterston power station in Ayrshire, south-west Scotland, insisted he has performed no military tasks since he began working for the French multinational EDF in 2016. However, Stuart did note continuity in the industry's regimented character. Employees from armed forces backgrounds were sought after in nuclear due to their reputation for meticulously following instructions. Moreover, Stuart spent the first year of his apprenticeship living on a naval based in Portsmouth on the south coast of England, where he was inducted in nuclear techniques by naval engineers as part of an all-male cohort. As he has

been incrementally promoted, Stuart has developed a sense of security and fraternity through his occupation. Regular contact between engineers from power stations in the UK owned by EDF has embedded "a nuclear community."[41]

Both Joe and Stuart followed their fathers into nuclear work, demonstrating that it progressed from a novel to familiar feature of the Cumbrian and Ayrshire economy over the second half of the twentieth century. Ken found familiarity in his work at the CEGB due to prior connections to coal. In 1954, Ken's family had moved to Rugeley from Northumberland so that his father could start work at Lea Hall colliery which was dug to supply the new Rugeley A power station. Ken first became an engineer due to his father's insistence that he should not follow him into the dirty and dangerous coal industry.[42]

Conventional power generation, nuclear and oil and gas all provided compensatory employment as British coal mining came to an end. Mark Wilson was born in 1969 and grew up in Fife on the east coast of Scotland. His labor market aspirations were shaped by family connections to industry. Originally, Mark thought he would follow his father into mining, but those expectations were dashed by the acceleration of pit closures after the 1984–5 miners' strike ended in defeat for the National Union of Mineworkers. Mark "didnae really stick in at school like a lot of us didnae because I was meant to be an apprentice at the pit that my dad worked at. When you leave high school that's what you thought the whole time you're at high school. Then low and behold we've got a wee strike on and there's no place to go and get a job."[43] Mark's father, John Wilson, is a former colliery official. He interjected into this discussion which took place during an interview recorded in 2022. John emphasized, in terms redolent of Ken Rochester's father's insistence that he find work in engineering rather than mining, that despite it seeming "a natural progression" for Mark to follow his father and both grandfathers into mining, "he wasn't going to the pit. That was a decision I made early doors."[44]

John and Mark agreed that John's brother may have been able to secure work for him at Longannet power station.[45] For John, working above ground burning coal was an advance upon working below ground mining it when it came to his son's employment. These interactions underline the ambiguity miners felt towards their occupation as well. Miners navigated between personal pride on the one hand and a strong wish for their sons to find jobs in other industries on the other. Transition was eased where it made available skilled manual employment in environments perceived as safer and cleaner than collieries, but in cases such as Rugeley and Longannet newer forms of energy employment also continued to depend upon coal.

After Mark qualified as an electrician having served his time with the contracting firm, James Scott, he worked at Longannet alongside other industrial sites in the

vicinity of the Firth of Forth, including Grangemouth oil refinery. Mark began working at Shell's Natural Gas Liquid plant section of the Mossmorran petrochemical complex in 2009. When he remembered the building of Mossmorran, which is supplied by gas extracted from the North Sea, Mark drew attention to the value of new jobs whilst mines closed during the 1980s:

> Oh excellent, a big thing like that being built on my door. You've got to mind, the pits got goosed. Cowdenbeath was the workshops fir aw the pits. And this thing's getting built right on their doorstep. I think for long enough, the good thing about that getting built is that there was that many pipefitters, electricians, laggers, steel erectors, that many actually working in there that the likes of Grangemouth. When they wanted stuff getting done they had tae up the wages. Ken, supply and demand, with all the boys in there.[46]

Mark views his relationship to the oil and gas industry in parochial terms which disavow links to the offshore industry: "I dinnae feel connected. The stuff comes that far, you actually forget that it comes all the way doon via St Fergus [Gas Plant in Aberdeenshire]. To me, it's the old classic, you're working in there, it could be chocolate going through they pipes."[47] The testimonies reveal a slippage in how workers understand energy transition, including a crossover in skills and status. Rather than investment in a particular fuel or production process, industrial skills – especially for time-served tradesmen such as Mark – become a key marker of continuity across employment in energy sectors.

Nuclear narratives exhibit a similar arc. Roger Denwood is the convener of the GMB trade union at Sellafield and a miner's son. GMB are the largest union on the site and primarily represent manual workers. During a focus group of union officials, Roger explained that he saw West Cumbria's shift from coal to nuclear since the middle of the twentieth century as "natural progression."[48] Unlike John Wilson, Roger saw changing between energy sectors as preserving continuities rather than delivering welcome changes. Roger emphasized that working at Sellafield produced "a collectiveness because of the work that you do," which was exemplified by groups of colleagues sharing carpools for twenty years.[49] Anti-social shift patterns mean work across weekends and evenings, leading Sellafield employees to bond with each other in their spare time, consolidating work-based friendships.

These connections, along with the large size of the Sellafield workforce, of approximately 10,000 people, imbue a link between work and leisure in West Cumbria. In the same conversation, Oli Slack, a GMB full-time official responsible for Sellafield, stated the union "are an integral part of the community through Sellafield, through

what we are able to put back" in charitable donations and sponsoring sports teams.[50] Graham, who works in a white-collar role, is a second-generation Sellafield worker having followed in the footsteps ofhis mother and father who oth worked in manual jobs at Sellafield.[51] He mentioned the activities of the Sellafield Sports and Recreation Association which provides facilities that can be used by employees and their families. The Association, which has an atom themed logo to commemorate its nuclear heritage, claims to have 7,500 members and operates clubs in Egremont and Windscale, not far from Sellafield.[52] There are continuities between the SSRA and the facilities the Coal Industry Social Welfare Organisation (CISWO) provided across the British coalfields, as well as parallels between the Sellafield GMB and colliery union branches who often funded local causes such as brass bands through contributions from their members.[53] These connections demonstrate how Sellafield has been socially embedded, with the encouragement of the workforce and their organizations.

Whilst Joe Bell emphasized the site's national importance, many workers primarily underlined its local economic significance. Arthur explained working at Sellafield "makes a huge difference" to his life through providing far greater economic security and a level of income than he had enjoyed as "a jobbing plasterer" before finding work at the nuclear site during the mid-2000s.[54] Since then, Arthur has achieved promotion to control room operator whilst his shift pattern allows him to continue his hobby of racing pigeons along with "old colliers" in the village of Cleator Moor, indicating that for some Sellafield workers, the plant facilitates continuities with forms of life typical of West Cumbria's coal economy past.[55] Arthur's testimony underlined a localized view of the benefits of nuclear employment. Sellafield sustains well-paid work for men and women such as himself and his niece, notably demonstrating a more inclusive set of opportunities than the energy economy historically tended to provide. Contrastingly, when discussing the merits of privatization or public ownership of British nuclear facilities, Arthur underlined his disinterest: "As long as I go to work. As long as I've got a job. I don't care."[56] Arthur's comments highlighted the attachment he had to employment that was integrated with his locality. Sellafield enabled him to secure high wages for his trade skills and to accrue new related ones. He was not ideologically invested in the nuclear project but shared a link with others who were through aligned commitments to craft identities.

As discussed above, Stuart and other nuclear interviewees had a stronger sense of sectoral identity. Rory Trappe is a control room engineer at Trawsfynydd nuclear power station in Gwynedd, North West Wales. He undertook an apprenticeship with the CEGB in the late 1970s which involved training at Agecroft in Lancashire where he met engineers from power stations across the CEGB's North West region. Rory "could have worked on

any site: coal, nuclear. That was the beauty of the training."[57] His narrative combined a sense of belonging to an occupational community with a particular commitment to Trawsfynydd. The power station brought his family to Gwynedd during the construction phase before it was defueled in 1993 after concerns were raised over the ductility of Magnox plants. When reflecting mournfully on the sense of hierarchical regimentation and loss imbued by this decision, Rory referred to "the sacrificial lamb" treatment of Trawsfynydd which kept the rest of the Magnox fleet alive.[58] He was subsequently offered but declined a job at Heysham 2 nuclear power station in Lancashire, preferring to maintain his family in Wales. Since then, Rory has led extensive efforts to lobby for investment in a small modular reactor at Trawsfynydd to preserve nuclear employment in the area.

Rory's story encapsulates the multiple overlapping but sometimes competing identities of energy workers which operate at both a localized and national level. They identified with an occupational fraternity, building on attachments to energetic locales where electricity generation, nuclear reprocessing and storage and oil and gas productions are sources of economic security and community. The space between the overlap and tensions has been navigated through the slippages that allowed the energy worker structure of feeling to endure through transition. Local geographically bound communities experienced the shift between energy sources as maintaining valuable employment for engineers and tradesmen. There were important overlaps between the local and national energy economy, but the gap between them was also crucial to the transmission of the structure of feeling. Whilst some energy workers defined their employment in terms of national affiliations and industrial structures, others retained an ambivalence, viewing their employment primarily on local terms, but nevertheless exhibiting a commitment to trade skills.

Danger and Conflict

Narratives from across sectors exhibited affects related to danger and safety as well as workplace tension and pride. Experiences of physically demanding and dangerous labor processes anchored the place attachment of workplaces within the energy worker structure of feeling whilst reinforcing its class-conscious dimensions. These were interrelated, with danger and arduous conditions feeding into recollections of conflict and positionality in relation to differences in outlook and interest with superiors. Both these affective pairings demonstrate the importance of human labor within increasingly mechanized and capital-intensive energy sectors, which is exemplified through the dangers of work in large, mechanized power stations. John Harvey recalled the scale of the 200-foot boilers which he installed at Didcot A power station in Oxfordshire, south-west England, during the 1960s. They were served by 600 feet chimneys and had

capacity to produce over 2,000 megawatts of electricity per hour, burning up to 12,000 tonnes of coal per day. Intricate maintenance work was essential to keeping Didcot running. Short twenty-minute windows between trainloads of coal left little time for repairs and "a hold up on one train had a big knock on effect on other trains coming to the station."[59] The CEGB was liable to pay financial charges for trains delays, further pressurizing workers.

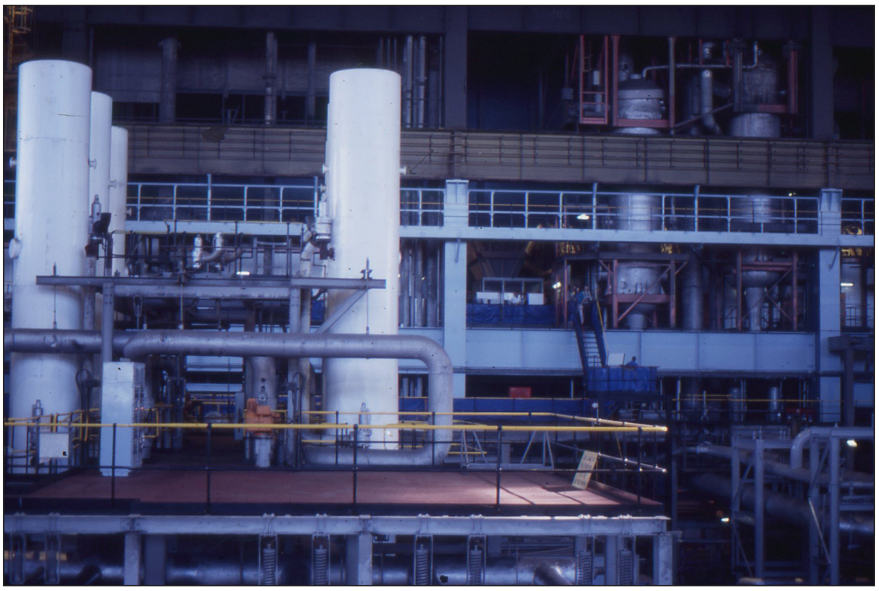

Figure 3: Inside Didcot Power Station, 12 July 1988. Christopher Hilton (1988).

Ken Rochester described "ashing out the boiler" at Rugeley B as a dangerous task in the early 1970s:

> The ash would build up inside. You'd end up with scaffold poles up the little door at the bottom. Manual work. Bang bang bang. And just occasionally as it happened a whole mountain of ash would break and fall down. We're talking molten ash, okay. And it would come out of the door that you were standing in front of. You used to throw everything and leap to the side. And you could get a couple of tonnes of red hot ash just come rushing past you.[60]

On one occasion, Ken was hit by a colleague's scaffold pole as they avoided an onslaught of ash, summarizing that "it knocked me out."[61] Rather than being sent home, Ken was left limping through the rest of his shift after he was revived. Ken's memories demonstrate how a sense of danger characterized his work through sensory perception of sight and sound along with prior personal experience of the job. The scattering of workers demonstrates the affective power of falling ash in creating fear and panic, but

this was also a routinised occurrence. In Ken's memory, this normalization of dangers is closely associated with the management of conflict. Ken earned "rubber boot money" due to a union agreement over jobs that required workmen to wear wellingtons. Similar allowances were paid for other unpleasant conditions.[62]

Danger increased offshore, where oil and gas platforms became an entirely new and deadly industrial environment in which deaths were alarmingly common. The British Medical Association reported in 1975 that rig workers were fifty times more at risk of lethal accident than factory workers and ten times more than coal miners. Divers faced a death rate of one in a hundred. Aside from this extreme, the research uncovered a "large and measured incident of psychological disorders, often exacerbated by violence and alcoholism. Venereal disease was also a problem."[63] In the offshore environment, high wages were traded in return for the acceptance of dangers. Almost entirely male workforces responded to monotony and boredom by behaving recklessly, whilst managers sought to impose their will on workforces who were subject to their authority twenty-four hours a day over spells of a fortnight or three weeks.

Oil worker testimonies demonstrated sharp differences between the CEGB and BNFL's comparatively consensual workplace governance with both onshore and offshore oil and gas settings. The need for large multinationals and smaller contractors to ensure profitable production on the back of major investments created huge pressure on workers to speed up. David Hutchison began working on subsea modules as a senior engineer for FMC in Dunfermline, Fife, during the mid-1980s. He described American management as "really kind of pushy."[64] Former miners were forcibly encouraged to take shortcuts to finish work at the fabrication yard. These pressures got worse as oil prices fell in the late 1980s and more recently as the majors have exited the North Sea, being replaced by smaller independents and private equity firms. Offshore, David encountered a sentiment of "ultra low cost, kick ass, take names, bully people into doing the minimum." Managers were driven by the "imperative to keep production going. As soon as you've got extraction, when it stops the money stops."[65] The prioritization of production and profit above safety was laid bare whilst managers exported a style of cajoling and aggression across the Atlantic. There are strong overlaps between David's memories and Alex Beasley's scholarship examining the Texan persona of American oil managers in the North Sea, including its rough and ready intolerance of workforce insubordination, union activism and hold ups to completing profitable work.[66]

The rig environment magnified these conflicts and incentivizing the deployment of by employers against Do Not Return orders against malcontents. Neil Rothnie, who later became a mud engineer, first began working in the North Sea in 1971. He recollected that during the early 1970s, American assistant drillers were tasked with "putting us onto rigs as roughnecks."[67] They were young men in their twenties, not

much older than himself. Neil recalled that these occurrences instilled tension between managers and workers. A manager passed around a newspaper purportedly from the American South which reported on the murder of a black man who had been thrown in a delta wrapped in chains. Workers responded to physical as well as mental provocations: "You were cajoled and sometimes, not battered, but you know."[68] On occasion, tension overwhelmed any fears that oil workers had in confronting their superiors. Neil's memories underlined the frustration and anger which grew through the mistreatment of oil workers. He recalled attending a Christmas party for oil workers hosted by Serco in Aberdeen that included a free bar. Proceedings "broke down and there was violence, guys getting pulled up for how they had behaved on the rig. So you had American guys there getting the old 'see if you ever fucking speak to me' and that sort of stuff it would break intae. In that sense, in a sense drink does uncover the truth despite the fact it's a huge distortion."[69] These recollections demonstrate that on North Sea rigs, just as in other late twentieth century industrial workplaces, interpersonal male "violence was used to enforce prevailing norms or to contest relations of power."[70]

Danny Carrigan briefly worked as an electrician on the Brent Bravo platform around seven years after Neil began his oil career.[71] The Brent field is around 115 miles north east of the nearest landmass, the Shetland Islands. Danny sharply contrasted his prior experience of work in Glasgow's shipyards with the all-encompassing nature of working, sleeping and relaxing onboard a rig and an adjacent accommodation ship, which he had to be transported to and from by helicopter. Demonstrating a symbiosis of fear and tension, Danny recalled bored helicopter pilots growing frustrated and "playing games" to pass the time. These centered on collectively punishing passengers for the misdemeanors of a minority of workers who refused to wear seatbelts. On one such occasion, a helicopter Danny was travelling in "just went right down sideways and everybody was screaming."[72] Danny also remembered a far more frightening experience of a fire that took place whilst he was servicing the rig's utility leg as part of an overhaul of the flaring system:

> I was working down the bottom of the utility leg. I don't know how high up it was. About 200 feet? There was me and my mate Joe and about two other guys on the very bottom and there was different levels. Imagine a ship engine room. So, there was this steel stairway going up. There was a lift, but you weren't allowed to use it if there was a fire. So, there was a fire at the bottom. Some kinda oil rags or whatever went on fire. Set the sprinklers off, the alarm off. And I panicked. I had to climb these ladders, rungs, up. And there was this older guy maybe three stages up. He was trying to move, and I just pushed him out the way I have to say. By the time I got out it was so frightening it was unbelievable. But anyway, it was put out. It was a dangerous environment working about a rig.[73]

Figure 4: The Brent Beryl (Left) and Brent Alpha (Right), Arne List (2008).

Danny's memory elucidates the terror that offshore conditions can instill. These accidents were not routine like the falling ash at Rugeley B. In both cases, the urgency of escape, led workers to scatter and even push one another aside. Recollections of oil rig dangers though demonstrate the extremity of conditions which overwhelmed masculine pride as well as workers' tolerance of dangers and poor conditions. On the Bravo, fear was instigated by perception of the sheer scale of the platform – Danny was fleeing from the bottom of a 200-foot-high utility leg – as well as the nature of working at great distance from the safety of land and sources of assistance. Other offshore workers remember being unable to fully acclimatize to the conditions. Gary worked as a fiscal measurement inspector, measuring tax obligations offshore during the 1990s. The rig environment made him feel uneasy:

> When I went offshore, I never ever relaxed. It was always there in the back of your mind that you were somewhere that was potentially quite dangerous, and you couldn't go home until the helicopter came and took you home.[74]

Gary was working in the context where major fatal accidents had shaped the consciousness of North Sea oil and gas workers. Eight years after Danny worked on the Brent Bravo, forty-three workers and two crew members died when a helicopter crashed into the sea whilst transporting workers from the Brent field to Sumburgh airport on Shetland.[75] Less than two years later, 167 men were killed in the Piper Alpha disaster following an explosion and major fire on the platform. The operator, the Texan company, Occidental, was deemed by an official inquiry to have prioritized production

over safety, having shown a 'cursory' attitude towards safety through 'a superficial attitude to the assessment of the risk of major hazard'.[76] In the aftermath of the disaster, the Offshore Industrial Liaison Committee launched a major campaign of organization and industrial action offshore campaigning for union recognition and improvements in health and safety provision.[77]

Nuclear workers were contrastingly reticent in discussions of health and safety, and rarely referred to dangerous practices. Joe Bell mentioned former soldiers at Sellafield processing plutonium without taking suitable precautions: "They were working on top of normal tables where we were working with glove boxes." Overall, though, he insisted that although "we bent the rules a little, we weren't putting anyone in any danger. We got the job done and we got it done safely."[78] Joe's memories underlined the prerogatives of trade union-conscious workers and their refusal to be cowed by management, whilst fulfilling the need to present nuclear workers as competent. His narrative lent towards emphasizing that Sellafield felt a safe place to work. Roger Denwood exemplified these sentiments by describing Sellafield's workforce as "nuclear professionals. The best in the world."[79]

Figure 5: Process worker W. Malkinson at Sellafield inspecting a fuel element, c.1956. (US Department of Energy, 2014).

Other reflections addressed the dangers of nuclear work. Graham left his manual role at Sellafield to become a risk manager during the early 1990s after being "involved with two incidents. I got off lightly. There were inquiries. ... I ended up ill. I ended up having a nervous breakdown."[80] He was reluctant to discuss these incidents further, but like Joe presented them within a narrative of improvement in health and safety practices, including the monitoring and reporting systems that he had been involved in developing. Graham's testimony differs from Roger and Joe's through by reflecting on the fears and real injuries he suffered as a nuclear worker. Both recollections of fear but also of pride in the nuclear industry allowed Graham to preserve a narrative that still centered on the expertise of the workforce and their commitment to improving health and safety, which is evidenced by his own career. These sentiments reinforced a technically proficient as opposed to heroic masculinity. Nevertheless, Graham revealed an important ambiguity towards the nuclear industry and its future:

> The site's basically getting rundown. It's getting decommissioned. There's massive amounts of waste there that's going to be treated and what not in what they call retrievals. I'm chuffed to be taking a part in that. I'm taking great delight from it getting shutdown to be honest with you given what I've known in the past.[81]

Graham felt ambiguous over what he saw as the eventual closure of Sellafield, which connected with the nuclear industry's importance to the West Cumbrian economy. He noted that the final closure of local coal mines was accompanied by investment in the Thermal Oxide Reprocessing Plant (THORP) which created more work at Sellafield. Graham was involved in campaigning for THORP with the GMB, which was justified within government by the need for jobs in Cumbria.[82] These imperatives revealed that government "realized it [Sellafield] was all there is round here … the government realized you're going to have to give them special treatment. Keep them happy with wages and what like."[83] Reflecting on his own life, Graham explained "I took the easy option which was down in Sellafield," but that "I told our son, if you end up at Sellafield I'll class you as being a failure."[84] Graham's narrative demonstrates the centrality of transition to British energy worker lifestory narratives. The nuclear industry has provided him with economic stability and upward social mobility, but also caused him unhappiness and discontent which Graham was determined not to pass onto the next generation. His narrative confirms the residual nature of the energy worker structure of feeling. Although still part of collective understanding in West Cumbria, its roots lie in an earlier era of prestige and longevity that nuclear workers are now far less certain of.

Conclusion

Worker testimonies reveal a distinctive perspective on energy transitions which have formative cultural, political and economic consequences. Reflections from workplaces and settlements at the forefront of these changes indicate how transitions have shaped relationships between work and residency in energetic locales, molding hierarchies of power and economic reward as well as perceptions of danger and risk. They demonstrate the mediating role of culture and historical memory. British energy workers understand transitions through a structure of feeling that has been shaped by skilled male manual laborers. It originated in the immediate postwar environment when the expansion of electricity production was a national project. Engineers and tradesmen were men in demand within large power stations and the nascent nuclear sector whilst others found work in the new North Sea oil and gas industry. Workers have rationalized these earlier experiences by finding continuities that stretch into the present. Men who had been trained in now closing coal mines and shipyards found work in power stations and on rigs. The tasks they performed, and most importantly, the skills which they depended

upon, were inherited from older sectors. These continuities have become central tenets of how workers recalled their own experiences of transitions. In Fife, West Cumbria and other former coalfields, nuclear and oil and gas have provided a form of continuity in male industrial employment, encouraging workers to draw connections with family and locality which have origins in coal mining.

These emphases were apparent in the testimonies and were given a highly explicit reference by Arthur, a union representative at Sellafield, who recalled that upon leaving, a senior manager "On his parting shot said the West Cumbria workers need to get out of the mining mentality! ... It upset people who are from mining families as well. He upset the whole area."[85] Perceived continuities in workforce culture, whether viewed positively or negatively, are a challenge but also an opportunity to proponents of an environmentally and economically "just transition." Workers who narrate their careers and struggles for workplace justice in terms of continuities with older forms of fossil fuel production cannot be expected to endorse perspectives centered on denigrating these achievements. There is, however, also an inherent pragmatism to those commitments in the face of transition. Attachment to skill and occupation rather than fuel source can provide forms of continuity in the areas that workers prioritize within projections for a green energy economy.

Studying the narratives of energy workers helps in achieving a finer grained perspective on what transition feels like. It demonstrates the important weight of history, both within a workers' own career and in the longer collective memory of their workmates and locality. The affects studied in this paper demonstrate continuities in working-class experience across and within sectors despite the huge changes in the organization and technology of the energy economy. Dichotomies of security and regimentation and safety and danger exemplify the retained power of workplace hierarchies as well as the risks that manual workers have endured in electricity generation, nuclear reprocessing and oil and gas production. These were present when production methods blended familiarity, including reliance on coal technologies, with novel features – especially the huge scale of power stations and the conditions of offshore work. Both conflict and solidarities shaped those working environments, with important distinctions between the interpersonal animosities of workers and managers and the systemic dangers and economic disruption workers faced. Nevertheless, both were conjoined by the political economy of energy sectors. The structure of feeling allowed workers to make sense of b[redacted], but it is far from prescriptive. Whilst residual in a contemporary context, it remains in evolution, allowing carbon and nuclear workers to understand the present and future of their sectors, including anticipating their ultimate end just as coal mining came to a stuttering halt before them.

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