Time, place and energy transition: green manufacturing in northeast England

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It's pouring with rain when I arrive in Sunderland in northeast England. Soon I'll be inside the city's conference centre, joining companies associated with the region's car industry at an automotive trade fair. There's likely to be much to discuss: the sector is grappling with the challenges of the energy transition, shifting its focus from manufacture of cars with internal combustion engines (ICEs) to electric vehicles (EVs).

As I approach the conference centre, I catch sight of an unusual metal structure that offers some shelter from the howling wind. Something akin to a steel hot-air balloon, it is bulbous, about 10 feet in height, and covered in a tight metal mesh. Closer inspection reveals various signs and warnings stamped with the logo of the Coal Authority, the statutory body charged with managing sites and infrastructures related to the coal mining industry. This peculiar structure guards a set of mine-gas ventilation pipes that here emerge from the ground. It signals that disused coal shafts run deep through the ground below.

Above ground, a meeting about the future of an industry (automotive). Below ground, the remnants of another (coal), now long gone. These industrial juxtapositions – where one finds contemporary industries alongside historic ones, or in this case, one literally atop the other - crop up time and time again in this region. Connected through place and time, these past and present industrial landscapes are more than simply discrete chronological layers where industrial ruins merely co-exist with new ventures. In this short piece we underline the importance of understanding how elements from previous waves of industrialisation are entangled in the present and often actively drawn upon in shaping economic futures. We draw from our ongoing research into 'green reindustrialisation' to explore how previous waves of industrialisation in northeast England are manifest in three of the region's new low-carbon industries – offshore wind, geothermal minewater heat, and electric vehicles.

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When we think of transition we often think about the appearance of new technologies, infrastructures and facilities: soaring wind farms and shiny new factories as markers of change in the landscape. Transition tends to draw our attention to the emergent and the new, and away from elements of continuity with the industrial past. Directing our focus towards elements of previous industrial eras which continue to assert themselves in the present allows us to understand how one period of industrial activity bleeds into the next. The end of an industrial era rarely takes the form of a clean break, but rather deindustrialisation leaves a series of 'ragged edges' - complex sets of continuities spanning from one era to the next.

Continuities can take different forms, from the re-use of former industrial sites, port facilities and electricity networks, to economic organisations, patterns of ownership and social structures. Anthropology, as a branch of knowledge, has been good at identifying the fine-grained ways in which elements and characteristics of past waves of industrial activity continue to shape economic relationships in the present. Even when we imagine deindustrialisation to have taken place, the underlying social relations that supported industrial life often continue into the future. For example, informal labour practices centred around the household may outlive the closure of large industrial institutions. Or affective and cultural ties to a particular form of work may continue to inform the approach of communities to newly emerging industries.

These ragged edges - elements of industrial pasts present in the here and now – are not merely a passive backdrop to new industries. They instead can become actively incorporated - by industry, labour organisations and government - in efforts to shape new industrial futures. Claims about historical industrial capability and legacies of expertise, for example, are often mobilised to portray regions as ideal places to situate new industry. Ubiquitous statements about a region's 'proud industrial heritage,' history of 'engineering expertise' or aspirations for 'industrial renaissance' are meant to signal its continuing value as a location for industrial activity. cHere we see how a region's industrial past can become actively entangled with its present and future.

Theories of 'industrial temporalities' have been widely discussed in academia in recent years. This way of thinking recognises that time is an important and active element in processes of industrial change and transition. Importantly, it also acknowledges that time doesn't follow a simple straight line, but is prone to repetition, pause, acceleration and overlap. Temporality, in other words, is more than a steady arrow crossing the years.

Complex industrial temporalities – the rhythms of economic boom and bust, the bursts and hiatuses of economic policy, social concerns that wax and wane – are at play as we enter the manufacturing-intense phase of the energy transition. The need to manufacture batteries, EVs and wind turbines, and to build-out clean energy infrastructures at scale and pace, are opportunities for regions like the northeast, although the lack of a nationwide industrial strategy in the UK until very recently has made this process difficult and uncertain. Temporality goes to the heart of whether clean energy manufacturing in the northeast should be understood as *reindustrialisation* (an industrial renaissance driven, for the most part, by external investment) or as an organic evolution of existing industrial assets.

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In an effort to understand how ideas of industrial temporalities relate to the energy transition in the northeast of England, we are holding conversations with regional policymakers, industrialists, and researchers about a wide range of sectors. As our work is ongoing, we briefly explore here the different temporalities associated with three aspects of green reindustrialisation in the northeast - offshore wind, electric vehicles, and geothermal minewater heat.

Offshore wind

The northeast of England is fast becoming a key centre for offshore wind development in the UK with important manufacture, servicing, and research sites distributed along the coastline. The Port of Blyth, for example, is home to the Offshore Renewable Energy Catapult (OREC), a government-backed research centre and the Energy Central Campus training site. Here investments in wind take place alongside older port-based industries which continue to operate – offshore oil and gas operations and cargo transportation are still significant activities at Blyth. The growing wind sector also draws together already existing and newly founded SMEs, government-backed R&D/commercialisation ventures, and training centres. Although wind is emblematic of the novel technologies associated with energy transition, the northeast's development of offshore wind assets has an organic connection to the region's industrial legacies: it makes use of the deep water port of Blyth (in combination with Tyne and Sunderland) and quayside access to industrial sites, plus the experience and skill-base developed over years of working with the oil and gas sector. From this perspective, offshore wind represents a gradual model of green industrial development - a concentration of diverse and overlapping business relationships with a centre of gravity shifting increasingly towards offshore wind, incorporating and transforming already existing industrial assets.

EVs –A small number of large multinationals anchor electric vehicle production in the northeast. Elements of the region's EV sector are akin to a branch-plant model of economic development – significant investment of capital and technology paired with a high degree of external decision-making centred on boardrooms well beyond the UK. While there are multiple companies in the region's automotive sector (and not all of them are connected to EVs) the bridging between large companies, SMEs, and R&D activity seen in wind is less present here – large battery and vehicle assembly plants tend to rely on established global supply chains for materials and services, and research and design work generally takes place elsewhere. The automotive sector has an interesting relationship to industrial temporalities in that the establishment of this industry in the northeast in the mid-1980s was seen as a potential solution to waning shipyards and coalmines which had previously dominated the area. And the ongoing regional presence of the automotive industry for nearly two generations means that it has shed its 'newcomer' status and is now often included in narratives about the industrial heritage of the region, the need for a green transition, and the sector's capacity to draw in new industries. While the early car plants drew in part on skilled labour emanating from the shipyards and engineering firms of the area, new generations of workers are trained specifically as automotive workers – this combines retention of more 'traditional' skills such as assembly-line manufacturing, welding, and paintwork with emerging skills in areas such as robotics, data analysis, and advanced electronics. The automotive industry initially drew on knowledge and skills present in the region, then honed and developed these skills and technologies in response to sectoral changes, becoming, in turn, the foundation for new waves of industrial development.

Geothermal minewater heat - This technology utilises the residual heat present in flood water from disused mines. The heat contained in this water can be used to warm homes, large institutions, or industrial sites. Because most major conurbations in the UK emerged alongside coalfields, the supply of heat via geothermal minewater is co-located with core centres of heat demand. The northeast of England is emerging as an important region for the development of geothermal minewater systems, with projects at a range of stages around the region – in Gateshead, Sunderland, South Tyneside, and around the county of Durham. It has an obvious connection to region's geoheritage and industrial legacies through its direct use of disused mines, but also via expertise and knowledge amassed during the region's long relationship with coal. Geothermal minewater heat gives new meaning to materials, infrastructures, and skills which were effectively latent for long periods, their potential utility and value hibernating in the region. While this technology may provide less scope for developing rich supply-chains than the other two sectors, it once more connects the productive capacity of the underground to social life on the surface.

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Industrial pasts do not simply flow forward into the present. The past encounters the present as a series of ragged edges - it offers certain 'affordances' for new waves of economic activity but also challenges to be overcome. Inherited infrastructures, residual skills, and durable industrial places are regional assets; but the past also presents difficulties that require remedy, in the form of enduring social inequalities arising from earlier experiences with industry, land remediation issues, and underemployed populations.

While in some cases the role of industrial pasts in new economic ventures is very clear, for example the use of abandoned mines to produce heat, often the role of industrial legacies in new economies can be elusive and difficult to define. How, for example, can residual skills be maintained over generations, particularly when in the intervening years industrial work has been scarce or non-existent. What does it mean when local government and business speak of a 'culture of industrial skill'? These questions are increasingly important in the northeast (and elsewhere) in the context of a new wave of industrial development associated with manufacturing and deploying the components and infrastructures for a low-carbon energy transition. In the northeast, these developments are not happening on a blank canvas – something that work on industrial temporalities is well-placed to understand. For the region, the prospect of an industrial renewal linked to the low-carbon economy holds the promise of being able to remedy a whole host of problems associated with post-industrial decline. As our brief case studies above show, however, low carbon industry comes with different models of industrial development and not all offer the same breadth of transformative power. Indeed, often the offer of industrial renewal, couched in language emphasising the re-emergence of an industrial ecosystem serves to mask new patterns of ownership and unequal labour relations.

Engaging with the idea that industrial legacies shape futures (often in a conscious, pointed way) means understanding how best to design and structure these developments in order to achieve the potential they implicitly promise. From this perspective, industrial pasts are about more than the memorialisation of past industrial activity and/or the veneration of industrial heritage. The idea of an 'active' industrial legacy draws our attention to where and when past and present intersect, and how pasts are called upon to instigate action in the present. Our research on these complex questions of industrial legacies in the northeast is continuing, and suggests the value of spending time unpacking invocations of the industrial past.