Promises of the past: transformations, transitions and traditions

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Introduction

Forty years ago, the British government saw the end of coal as a promise of future control, an end to the rising power of labour and the possibility of prosperous future without challenge. We now live in what Beynon and Hudson (2021) call "the shadow of the mines", in an economic situation that still bears the scars of that period. The end of coal is now a global imperative for climate reasons, a threat with different causes, in the aim of a different promise. Coal mining for burning remains controversial across the world, not least for the question of how to end coal mining without destroying the livelihoods of coal communities, and I hope that the UK case might offer food for thought. Now a new promise is emerging around the closed mines. The water in the mines could promise clean, low-cost heating in poor communities. But what kind of a promise is it and what does it tell us about promises?

Recent Promises in Anthropology

I would like to highlight two edited anthropological volumes that have been published in the last decade that are based on the notion of the promise. The first was one that I co-edited with Gisa Weszkalnys, that came out of a workshop on planning co-organised with Åsa Boholm at Gothenburg University in 2008.[1] We focused specifically on plans of the bureaucratic place-based sort, urban or rural planning, city

1 Simone Abram/Gisa Weszkalnys: Elusive Promises.

plans, and so forth. At the workshop, A. F. Robertson[2] pointed us in the direction of the philosophy of the promise as a way to make sense of the bureaucratic procedures of planning that circumscribe the practices of citizenship. The core of this literature is found in the work of philosophers of linguistics[3] and law.[4]

The former, in very general terms, are primarily concerned with the consequences of utterances, the latter with differences between kinds of agreements, such as contracts. The former seemed to us very closely attuned to the anthropology of ritual and drama, in emphasising the effects of speech as embodied performance that always takes place in a context: a context that provides the material that gives significance to elements of the speech. Speech is always relational (even when speaking to oneself), shaping the relations between interlocutors. But written texts may share this trait. In our cases the production and circulation of bureaucratic texts could be seen to perform all sorts of effects when they are enacted, referred to, or registered. It was this performative effect that really spoke to us at the time, highlighting the ritualised performance of documentary and imaginative plans as they proceed through bureaucratic time from consultation to committee, from committee to council, and from council to court or, indeed, to the library or archive. Only a plan that is considered and confirmed by the appropriate committees will carry force when it comes to deciding a subsequent detailed specific planning application; plans that have not received the appropriate ritual or ceremonial acceptance are vulnerable to legal challenge. The formality of local government procedures, which to many people appear to be empty gestures and pompous time-wasting, reveal themselves as significant rituals: rituals that change the status of words from suggestions to laws, and rituals that convert a bunch of people in a hall with paper into a government with policies and authority, from general desires to specific promises.

Plans also follow on from historic forms of written promises, promissory notes, that were used as a kind of contract. English law requires a contract to have four dimensions to become a binding agreement: offer, acceptance, intention and consideration.[5] An offer tossed out as an aside, without consideration, does not constitute a contract, just as a promise to do something that would happen anyway, or that can never happen, is not considered a meaningful promise in the framework of Speech Acts.[6] For a contract to be binding, it must be considered in some way, even if relatively superficially. However, another branch of the law, known as the language of hope in equity offers another kind of promissory anticipation, through the notion of conscience. A promise, even one implied rather than stated, that leads someone to make significant changes in their life in expectation of that promised, can be binding if the consequences of going back on the promise are unconscionable. Legal recourse is available to someone who has devoted their life's work to a cause on the

2 See Robertson: People and the state.
3 Notably Austin: How to do Things with Words; Searle: Speech Acts.
4 For example Edwin Peel: The Law of Contract.
5 Peel: The Law of Contract.
6 Searle: Speech Acts

(possibly tacit but reasonable) understanding that they will one day be rewarded. Although legal recourse is an arduous route to resolving any dispute in practice, its existence can be a powerful form of social coercion to encourage all but the most intransigent to curb their behaviour. It also highlights that breaking a promise may bring consequences.

In summary, plans, like promises, like contracts, are subject to failure, but that failure may remain ambivalent. Plans become a kind of promise that is elusive on two fronts. First, plans may not be wholly fulfilled, in fact they rarely are. Even architectural blueprints have space for deviation to encompass the differences between imaginative designs and concrete material spaces. Plans are also elusive because they can be hard to evaluate (as they are always forward-looking), and difficult to pinpoint in practice (because often unspecific in their outcomes). Plans, like promises, are subject to no end of what the philosopher J. L. Austin called 'infelicities' – conditions that intervene to make the promise difficult to uphold.

The second volume I wish to highlight was published by Nikhil Anand, Akhil Gupta and Hannah Appel in 2018 from a seminar at the School for Advanced Research in Santa Fe and two American Anthropological Association panels in 2010 and 2013 (so, if anything, with an even longer gestation than the above collection) focusing primarily on the Anthropology of Infrastructure. In fact, several participants overlapped between the two projects, notably Laura Bear and Gisa Weszkalnys, but the philosophy of the promise was eclipsed in the second volume by a focus on the temporality of infrastructure and the vision of modernity that it offers, tied to the violent relations that often accompany its development and use. Here, the promise is elusive in hiding the conditions of its fulfilment and the violent relations entailed in the capture of land and resources. Infrastructure can also be understood to be elusive in its very ambiguity. When is a cable a piece of infrastructure rather than just a cable? When are the legal frameworks that make laying a cable possible, financially beneficial, and appropriate for its purpose understood not just as legal frameworks but as elements of infrastructure? How do landscapes become infrastructural through human interventions? And when do the physical extents of infrastructure become more or less than the symbolic visions that conjure them into being and justify their existence?

These are obviously not the kinds of questions that have answers, but they highlight the usefulness of the notion of promise, with its dubious and fluid temporality threaded through with uncertainty and subject to so many different kinds of infelicity. A promise is an imaginary made tangible through a desire to effect a particular future, and it is the passage of time between the making of a promise and its potential fulfilment that offers so many instances of disruption, from simple forgetfulness, to fraudulence, from failure of circumstance, to cosmological impossibilities. Yet the promise itself is a wonderful thing, an expression of human will and belief in that will. As Austin observes, a promise to do something that will happen any way is no promise at all. But a promise to do something that will otherwise not happen is a mighty endeavour. Visions of a better future – of the kind held out by notions that we call 'Modernity' or 'Development' are both mighty

and impossible, rightly summoning the more metaphorical idea of a promise, one which may or may not be fulfilled.

So it is not surprising that we talk of promises when we want to discuss grand transformations such as energy transitions or political ideologies. Promises, when made, are forward looking, futuristic, yet, once made, they become historical objects, markings passages and processes of time, accruing historicity. We can therefore talk about promises of the past, encompassing historically-made promises, as well as the ways in which pasts are used to generate actions in the present. I note, though, that a focus on promises is not necessarily tied to recent discussions on hope. Hope, as an emotion, is less concrete than a promise, even if it may accompany it. A promise may rely on a belief in continuity rather than a hope of improvement, and it may equally be based in fear or other emotional states.

In this paper, I want to consider the changing promise attached to a fossil fuel that has literally transformed the landscapes of so many areas of the world, from the origin of its rapid expansion in the North East of England, to the calamitous social consequences of its demise, and the new promises emerging in former Durham coalfield communities. Although my focus will remain on North East British coal practices, these were and remain intimately tied into colonial practices and global entanglements.[7]

Promises of coal, then and now.

In "Green Imperialism", while relating a deep history of environmentalism, Richard Groves argues that the expansion of European colonialism was driven by the search for timber.[8] Towns and cities had long relied on the exploitation of forest resources, and Groves refers to various historical reports of catastrophic forest destruction. The colonial drive for resources was itself accompanied by concerns about despoliation and the ruination of Edens around the world. The expansion of coal mining in Britain enabled diverse transformations of colonial resource extraction, while concentrating wealth creation in the colonial centres and enabling mass urbanisation. In "Energy and the English Industrial Revolution", E. A. Wrigley states that the new world created by the industrial revolution "held out the promise of releasing societies from the curse of poverty".[9] This promise developed on the back of coal, which had enabled a quadrupling of the per capita energy consumption of the British population between the 1560s and the 1850s. Wrigley is interested in the debates among economists and historians such as Smith, Ricardo, Jevons and Toynbee on the relations between coal and political economies, recognising that alongside the promise of massive benefits from the industrial revolution, there were 'balancing dangers', the power to destroy matching the power to produce.[10] Coal produced wealth and drove Empire, holding out both the promise and terror of economic and social development.

7 See for example Barak: Outsourcing.

8 Groves: Green Imperialism.
9 Wrigley: Energy, p. 52.
10 Wrigley: Energy.

Amidst these histories of industrialisation, coal always has a central role. But it would be a mistake to imagine that it has ever represented a purely hopeful promise. Coal, as a carrier of concentrated energy, represented both an opportunity for concentration of wealth and practices of oppression, linked and separated in shifting patterns of power and control over the centuries. For miners and their families, coal mining in Britain was always a struggle between labour and capital. The history of the coalfields of North East England is one of bonded labour, labour migration, violent campaigns for unionisation, ill-health and disaster, all of which contributed to striking inequalities in the enjoyment of warmth, power and wealth that were largely limited to a privileged section of the population. In what now looks like the brief flourishing of a post-war welfare state built on nationalised industries, miners belatedly began to enjoy degrees of job security, rights and rewards in the mid twentieth century. Even so, of the few early ethnographies of coal mining in Britain, Dennis, Henriques and Slaughter's 1956 monograph details the many ways in which the lives of mining communities remained insecure, dependent and harsh.[11] Solidarity among miners was crucial yet conditional, and the risk of ostracism ever-present. Still, for some decades, miners could earn a good living and gained some protection against exploitation through their own solidarity and the work of the unions.

Anyone familiar with the history of coal mining in Britain will know that this period of perceived stability (actually a gradual decline) ended in 1984–85 with a brutal national strike that saw the overwhelming majority of deep pits closed in a short period, and resulted in widespread hardship and economic depression across Britain's coalfields,[12] following as it did an economic project that caused a rapid decline of manufacturing industries.[13] I will not go into detail about that here, other than to reflect on the legacies of 20th century coal mining history in Britain. Although mines were always finite, and mines opened and closed across the coalfield, Dennis and colleagues' monograph made clear the degree to which the succession of generations of mining families was imagined as endless, such that the future could be conceived in generational terms. If one mine closed, another might offer employment. Less of a promise, perhaps, and more of an expectation. It is now clear that the government in the 1980s saw the end of coal mining as a promise of an entirely new political landscape in which labour could be subjugated to capital, the power of the unions crushed, and a new society that they imagined as prosperous and entrepreneurial.[14] It is equally obvious that the subsequent prosperity was not equally distributed, with capital concentrated in the South East of England, and the ruins of nationalised industries spread across the North, Midlands,

11 Dennis, Henriques and Slaughter: Coal Is Our Life.

12 Jones: Coal Was Our Life.

13 One of the jokes of the period stated that Margaret Thatcher was a champion of small businesses. Like British Steel, the British Coal Corporation, or British Shipbuilders.

14 Beynon/Ray Hudson: The Shadow. Timothy Mitchell's broader global analysis suggests that the subsequent shift from coal to oil was the basis for the assembling of something that became 'the economy', characterising post-war Keynesian economics as 'petroknowledge' (Mitchell: Carbon Democracy, p. 116).

South West, and pockets of mining and industry such as those in East Kent. Ten years later, many miners remained unemployed, or in low-paid, insecure work,[15] and the North East remains one of the poorest regions of the country some decades later. Even if workers might be happy not to have to work underground, the new situation was unsatisfactory in many ways.

Forty years after the strike, it is still possible, if increasingly rarely, to hear people from mining communities arguing for the re-opening of coal mines in the United Kingdom. A recent proposal to open a new deep pit in Cumbria, supposedly to supply coking coal to steelworks, was highly controversial.[16] Yet generational traditions continue. The annual Durham Miners' Gala continues even as fewer and fewer of those in the large crowds have ever touched the black stuff. Coal, meanwhile, has been transformed from a promise into a threat, the most culpable element in the process of climate change, an environmental threat beyond all others, as the most carbon-intense fossil fuel. Even a transition from coal to other fossil fuels, such as gas, represents a significant improvement, if not a long-term solution. Nowadays, energy promises are associated with the phase-out of coal for renewable energy, or appear in arguments about whether 'clean coal' is a myth or a possibility.[17]

A promise of coal's legacy

However, another possible future has been gradually emerging that aims to put redundant coal mines to a new purpose by extracting not coal but the heat held in the water that flooded redundant coalmines. It is not entirely a new idea. In 2005, the EU part-funded a Minewater project led by the city of Heerlen in the Netherlands.[18] In 2008, the first mine-water power station was opened, extracting the heat from flooded mines and diverting it to heat houses, shops, offices, a library and supermarket through a district heating network.[19]

Although unaware of the project at the time, British geological researchers also began to calculate the resource potential held in the water in underground coal mines across the United Kingdom. As well as presenting a source of heat that could displace significant energy derived from fossil fuel sources, minewater is redistributive in terms of economic geography. That is, minewater is found in abandoned mines, and abandoned mines are found in areas of deep economic disadvantage that remains since the closure of the mines in the 1970s, 1980s and 1990s.[20] Minewater heat appeared to the enthusiastic earth scientists to promise not only decarbonisation, but a kind of redemption. Low-cost heat would reward those communities that had suffered through the closure of the mining industries. Where the end of coal was experienced as a betrayal – of workers, communities,

15 Jones: Coal Was Our Life.
16 Harrabin: Cumbria Coal Mine.
17 Conniff: The Myth.
18 World's First Mine-Water Power Station; Inhabitat: Old Coal Mines.
19 Verhoeven et al: Minewater 2.0 project.
20 Beynon/Hudson: The Shadow.

and of the promise of continued traditions and prosperity – the repurposing of closed mines could be imagined as a reward, or at least, as a degree of compensation for the suffering endured in the coalfields.

Geothermal minewater heat holds out a promise in the broad sense that Anand and colleagues saw as the potential benefits that infrastructure seems to offer. Within this broad offering, there are more specific promises, such as the outputs specified from funded research projects, like the one that I am currently involved in, funded by the Engineering and Physical Sciences Research Council, "Geothermal Energy from Mines and Solar-Geothermal Heat (GEMS)".[21] To cite the project proposal, it will *critically assess all aspects of re-using our abandoned, flooded coal mines as source for sustainable heat extraction and storage for homes and businesses in the UK. This project will provide optimized solutions to the technical, social, and financial challenges of introducing mine geothermal energy as a green and sustainable heat source.*[22]

This is the formal promise, but a broader discourse around geothermal minewater heating has been developed over several years, suggesting that *there is enough heat within the UK's coalfields to meet the demands of all the buildings that lie over them. It could therefore particularly benefit economically disadvantaged former mining communities.*[23] This is a promise that faces many infelicities on the road to fulfilment. This is not unique to minewater heating, but is typical of the early phases of new types of infrastructure. Minewater heating relies on many other types and scales of infrastructure, and it heavily relies on political and financial interest, which, in turn, revolve around promises of future returns. So what kind of a promise is minewater heating, and what does it tell us about promises?

Three cases of minewater heat

1. Public buildings, public funding

For several years, university researchers have worked closely with Durham County Council on energy and environmental issues, in particular, in recent years, with the council's Low Carbon Energy Team, including a period of intensive online ethnographic fieldwork carried out by Chima Michael Anyadike Danes under the auspices of the Include Research Centre for Socially Inclusive Energy Transitions. The Council's engagement with the university's minewater researchers encouraged them to launch a project to retrofit a sports centre in a small ex-mining town with minewater heating as part of a renovation project. On paper, the proposal was persuasive. The sports centre was built on the site of a former coal depot, on top of mineworkings that offered abundant heat for the sport centre and its swimming pools.[24] The council was on a long term trajectory to reduce its carbon emissions, the majority of which come from space heating, primarily fuelled by natural

21 Geothermal Energy from Mines and Solar-Geothermal Heat (GEMS).

22 Geothermal Energy from Mines and Solar-Geothermal Heat (GEMS).

23 See North East Local Economic Partnership: The Case for Mine Energy.

24 An account is available at The Mining Institute: Louisa Centre.

gas. The sports centre, built in 1979 and added to over time, was a high-energy consumption building owned by the Council. The potential for significant Greenhouse gas reductions was appealing.

An initial evaluation of the heat demand showed extremely high demand from both space heating the swimming pools. The team were able to focus only on pool-heating, still a significant carbon benefit. With the assessments in place, the team prepared a bid for European Regional Development funding to develop detailed plans to make a full bid. Looking at the risk profile and returns on investment, the project began to look 'tight'. A key element of the plan was to work with the United Kingdom's Coal Authority[25] to develop estimates of the minewater resource. Their report suggested several borehole options, and offered estimates of the water temperature and flow rates, but, significantly, they were unable to evaluate the water level in the mine. This uncertainty led to differences between council officers over whether they could seek European Regional Development funding for two boreholes, or whether they should start with a test borehole. The project manager described this as a 'catch-22' situation, leading them to withdraw their funding applications while going ahead with a single borehole. Initial market enquiries suggested the cost would be £80–170 thousand, but once the work went out to tender, costs were double that, and degrees of risk varied widely between contractors. Inside the council, there were tensions over what was feasible and what could be prioritised for funding. It took concerted dynamism from the project leaders to ensure that the process continued. After several months, drilling began, but immediately they found unmapped coal seams, leading to adjustments in the drilling activities, resulting in a significantly narrower bore hole than planned. Test results showed problematically low water levels, meaning that the cost of pumping water up would be higher than anticipated. To complete the project, a second, deeper bore hole would be needed, at much higher cost, and funding would have to be found to pursue a very high risk project.

The economic argument relied on a government scheme called the Renewable Heat Incentive. With European Regional Development funding, the project payback period would be three years. With very little notice, the government then announced the withdrawal of the Renewable Heat Incentive scheme, and its funds would only be payable at the end of the project, without guarantee. Without Renewable Heat Incentive, the payback period leapt to 29 years based on current fuel prices. At this point, the risk became 'significant', as the payback period began to look longer than the expected lifetime of the building itself. By 2021, European Regional Development funding also became inaccessible because of Brexit. The project stalled. The initial borehole remains and could be brought into use. But the promise of low-carbon, low-cost heat has met a series of infelicities. If not precisely a broken promise, it is one that appears to hold little chance of being fulfilled at present.

25 The Coal Authority manages the United Kingdom's mining legacy on behalf of UK Government. This includes the protection of people and the environment through management of ground stability and the prevention of pollution from mine water.

2. Private buildings, private funding

The Low Carbon Energy team, determined to pursue the goal of minewater heating, with its promise of benefits for the poor, continued to seek further opportunities. The nearby district of Gateshead gained funding to sink a borehole to feed an existing heat network in its industrial zone, and Durham also wanted to bring clean heat to its citizens' homes. In contrast to many central European urban or industrial settlements, the majority of housing in coalfield communities take the form of streets of terraced housing. Each house was built with its own coal fireplaces, its own front door, and later its own electrical and/or gas supply. Miners, and their widows, were eligible for free coal, and many continued to heat their homes with coal as long as there was a supply available. However, even when houses had been fitted with central heating, this was individual to each house, although piped gas networks are extensive. Minewater heating instead requires a heat network. That is, each house must be linked to a piped hot water supply, whether or not a heat pump is installed in each house or each street to bring the water up to a useful temperature. In other words, significant, complex retrofitting projects would be needed to make minewater heating a reality in coalfield villages. The heat was there, undoubtedly, but the journey from minewater to warm homes was never going to be straightforward.

Instead, the council pushed for new-build housing estates to include minewater heating. Working with housing associations and private developers, they urged integration of heat networks into building plans, aided, to some extent, by a new ban on the installation of domestic gas boilers in new homes from 2025. Negotiations are ongoing, so I will not present a final analysis, but give an indication of the hurdles on the way. In February 2020, the Coal Authority formally announced that heat from its Dawdon minewater treatment scheme would supply a new 'garden village' development of 1500 homes, school, shops and a health centre.[26]

Head of Innovation at the authority laid out the benefits to be gained from the development, with its sustainable energy attracting investment and employment while offering residents low energy bills. Moreover, he commented that the new garden village 'has huge implications for the future of energy in the UK', as a demonstration of the viability of minewater heating across the country.[27] He had been influential in getting the project off the ground, determined and effective in bringing together private developers with the council, and establishing means for the coal authority to start to set out a framework for regulating and pricing heat. Tragically, he died suddenly in January 2021, leaving a reduced team grieving for his loss.

This loss also threw into question the commitment to the projects that he had championed, with the subsequent management being more risk averse. Although public promises about the new housing remain in place, a degree of doubt about the economics and practicalities of developing a radical new district heating scheme will remain until or if it is achieved. Although fitting a heating network to a new scheme is considerably less intrusive than retrofitting existing housing, it also shifts the benefit of the scheme away

26 Coal Authority: UK's first district heating scheme.
27 Coal Authority: UK's first district heating scheme.

from existing residents to those who can afford to purchase new housing, calling into question some of the moral claims made for minewater heating schemes.

3. Private buildings, private investment

Lanchester Wines is one of the largest bottling plants in the United Kingdom, importing new world wines and distributing them across the country. Based partly in County Durham, and partly over the county boundary in Gateshead, it is a family firm that chose some years ago to pursue a sustainability agenda. Temperature control is crucial to its processes, meaning that a reliable source of heating and cooling was a priority for them. Having already successfully installed solar and wind energy operations to power the bottling plant, they chose to establish a geothermal minewater heating system, since their 33,445 square meters of warehousing lay on top of old mine-workings.[28] The company entered into an agreement with a consultancy that appeared to understand the scheme, and did build a working mine-water heat network. It also qualified for the Renewable Heat Incentive scheme and applied for the scheme prior to its closure. Rather than withdrawing the scheme entirely, the departments responsible for it appear to have obfuscated, repeatedly presenting new bureaucratic requirements for progress. In brief, I will highlight that the company has a minewater heat scheme in operation, but the process of achieving it was painful, largely because the kind of regulatory framework required to finance and manage the scheme was not functional.

Mine-workings are officially managed by the Coal Authority, which is a government body that also owns most of the United Kingdom's coal and licenses coal mine operations. Whether or not the coal authority owns the heat in the water in the mines, and what the value of that heat is, are not questions with a simple answer. This immediately turns the prospect of extracting heat into a complex regulatory issue, layering delay and uncertainty onto the technical uncertainties of sinking boreholes. Heat is not yet recognised in the UK as a regulatable substance.

Summary

What these three cases underline is the contingency of any new technology project, which derives less, or at least no less, from the novelty of the infrastructural materiality, as from the lack of governmental technology to support the investment, regulation, safety and operation of new constellations of engineering projects. This is a known feature of infrastructure development, as Anand et al and others have documented.[29] The question here is to consider what adopting the perspective of promises and the infelicities that accompany them offers, in allowing us to register the diversity of obstacles that can be encountered, and the many opportunities for disruption between the hopeful future and the past future that becomes a present.

28 The Porto Protocol: Lanchester Wine.

29 Anand et al: The Promise.

Conclusions: what is a promise?

Gretchen Bakke has pointed out how extraordinarily difficult it is in English – and many other European languages – to think without nouns.[30] Because our languages revolve around nouns, it becomes extremely difficult to articulate ideas without materialising them in some way. Bakke was thinking in particular about the non-objectness of electricity, but the point has wider application. There is always an object in European thinking, a thingification that shapes thought in profound ways. Anthropology has been alert to the perspectival thinking of Amerindians,[31] but perhaps less critical of European slippage between materiality and metaphor. Thinking around the idea of a promise demonstrates this slippage well. While the philosophy of the promise is focused relatively narrowly on the performance of speech acts that literally promise a specific future, the notion of promise expands in a metaphorical and abstract sense to connote all types of desired futures and (at least selectively) desired improvements such as those associated with 'Modernity' and its infrastructures (with 'threat' as its shadow concept, denoting the feared future). That is, from the specific to the general, from a transaction to affect.

Anthropologies of promises have tended to favour the more nebulous emotion of hope, focusing on affective responses to uncertainty and unpredictability.[32] But a focus on the more concrete performative literature on the promise perhaps brings greater attention to agency, with uncertainties transmogrified into the infelicities that might thwart that agency. A promise is intrinsically tied to intention, and stated intention at that, even if one of the types of infelicity is associated with dishonest statements and hidden intentions. In this, it helps to consider a comparison with legal forms such as contract or equity, and the means by which agreements become legally binding through intent and consideration, and the recourses that can be appealed to when such promises fail.

Even so, whilst the promise might be useful as a heuristic for thinking about future-oriented temporalities, it would be a category mistake to apply the philosophy of the promise to this line of thought too closely, risking a science-wars style misappropriation of disciplinary theories. The broad notion of promise is nebulous, if generative to think with. We might have to decide, at some point, whether the analytical specificity of performative promissory contracts is more useful than the inspirational metaphorical appeal to promise as hope. Either way, the transition from coal to minewater heat must contend with the emotional ties of traditional practices, the historical echoes of a brutal industry, and the legacy of economic and social inequalities that coal's history buried under promises of riches and comfort. The mines may be transformed, but the transition is ongoing.

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30 Bakke: Electricity.
31 Viveiros de Castro: Cosmological deixis.
32 Kleist/Jansen: Introduction.

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