

Coal, climate and development: Comparative perspectives

In this Special Issue we seek to explain why coal production has expanded in the context of climate change. In doing so, we highlight the social pressures and obstacles involved in the production of a world ‘beyond coal’. The current emergence of attempts at global climate policy have coincided with a forty-year boom in coal consumption. The extraction and burning of coal has now overtaken oil as the main fuel-based source of greenhouse gasses. Coal is especially rich in carbon: when black coal is burnt, it can produce more than twice its weight in carbon dioxide (Hong and Slatick, 1994). Reflecting this, Crutzen dates the ‘Anthropocene’, a geological era marked by human influence, from the invention of the coal-fired steam traction engine (Crutzen, 2002). Coal’s recent renaissance, and its continuance, poses a key challenge to global climate policy.

Coal laid the foundations for the industrial revolution, and current industrialising economies rely on it for their growing power needs. The growth in coal mining and exploration reflects both the increasing energy requirements of emerging, or ‘developing’, economies and the on-going reliance on coal in most established industrialised contexts. Reflecting this, total world production of coal increased by more than sixty percent in the decade 2003–2013, and in 2013 the International Energy Agency in some scenarios, predicted a further rise of 17 per cent between 2015 and 2020 (IEA, 2013). This prediction could be affected by the current decrease in Chinese demand, although the IEA expresses caution as the data is not fully in, while India is continuing to expand consumption, being likely to soon become the second largest coal consumer in the world (IEA, 2015b). Unlike oil, coal remains plentiful and accessible, and coal now rivals oil as the world’s main source of energy. In 1971 coal provided twenty four per cent of world energy supplies, rising to twenty-nine per cent in 2012 (comparing with oil at thirty-one per cent; IEA, 2014). Despite supplying less energy than oil, coal contributes considerably more to global emissions. In 2012 oil contributed thirty-five per cent of fuel-based emissions while the proportion of emissions from coal rose from thirty-five per cent in 1973 to forty-four per cent in 2012 (IEA, 2014).

This forty-year coal boom positions coal as the greatest single threat to climate stability. In 2014, the Intergovernmental Panel on Climate Change stated with “high confidence” that “the increased use of coal has reversed the long-standing trend of gradual decarbonisation (i.e., reducing the carbon intensity of energy) of the world’s energy supply” (IPCC, 2014: 5).

With global greenhouse gas emissions rising by forty-six per cent between 1990 and 2013, coal burning has become the major source of increased emissions.

The paradox of coal is that it both enables contemporary patterns of development and yet, by producing climate change, threatens that development. Reflecting this enigma there is growing recognition of the need for a transition out of coal dependence in both the high-income 'North' and the industrialising 'South'. In 2011 the International Energy Agency stated that climate stability "requires coal consumption to peak well before 2020 and then decline" (IEA, 2011: 5). The following year the IEA stated that to keep global warming below two degrees Celsius, "no more than one third of proven reserves of fossil fuels can be burnt" (IEA, 2012). By 2014 the IEA stated that meeting the IPCC's two degrees target requires a full phase-out of "fossil fuel power generation" by 2100 (excepting power plants with full-scale and working carbon capture) (IPCC, 2014: 19).

Despite widespread agreement on the need for a rapid phase-out of fossil fuels, coal remains the fuel-of-choice for most industrial and industrialising countries. Reflecting the on-going world economic downturn, especially the downturn in China, the rise of renewable energy and climate policy, the global coal boom has slowed since 2013. After the Paris Accord, the IEA predicted a "sea change for the coal market", with extraction stabilizing and coal-fired power falling (Alvarez, 2015). The non-fossil fuel sector, accounting for about half of newly-installed power generation in 2015, was predicted to generate a quarter of global electricity by 2040 (up from nineteen per cent). The predicted 'sea-change' is significant but insufficient – current global commitments will deliver emissions reductions consistent with a disastrous 2.6–3.5 °C temperature rise (IEA, 2015a: 12). Without a much more extensive phase-out of coal together with effective policy and law to underpin this shift, there is zero prospect of achieving the Paris goals. The challenge that we address in this special issue therefore could not be starker, nor more urgent.

The Approach

In this Special Issue we address the question of coal through the lens of global developmentalism, and through in-depth social studies of the effects of coal mining and consumption, with the local contexts of coal extraction often linked to the global dynamics of development. For many industrialised countries coal consumption appears to have peaked, although it remains the mainstay for energy supply. Late industrialisers have followed much

the same energy pathway as early industrialisers and likewise largely rely on coal, and possibly on increasing amounts of coal. Coal production is intimately associated with development divides. Yet, with climate change policy debates and the growing awareness of other impacts of coal production, there are new pressures that re-position coal reliance as a threat to development rather than as a strength. In response, some state and corporate actors have defended coal on the grounds that it remains essential for development and poverty reduction. In this strategy, the coal paradox is both denied and repressed. Meanwhile, local conflicts over coal in the North and South open up questions about environmental destruction and social loss that both states and coal corporations increasingly struggle to manage. Looking at these contestations, the authors of the papers in this special issue, aim to illuminate the contradiction between coal reliance and established modes of development. In light of this situation, the contributors address the following broad questions:

- How is coal reliance manifested across development divides?
- How has coal production expanded in both the face of climate change and its other related impacts on water, health and livelihood?
- What are the social, economic, ideological, political and policy barriers to achieving a future beyond coal, and what factors may support a transition from coal?

We focus particularly on cases from India, Australia and Germany. This comparison is made because India is an industrialising country; Germany is a post-industrial society; and Australia has a resource-dependent economy. In each context we find that dominant development ideologies are closely tied to social conflicts centred on coal production. Authors consider the international and national contexts for specific mine sites, so as to develop a grounded and global understanding of coal dependence and possibilities for change.

Much of the analysis here centres on socio-political and cultural contestations over coal reliance in the context of climate change. Given their formal democratic status, contestations in India, Germany and Australia are relatively public and accessible, and open to research. We recognise this is necessarily selective and in particular excludes China, which extracts and burns about half of the world's coal supply. Clearly, the dynamics of coal reliance in China may be quite different, given the importance of the Chinese state in containing contestation, and directing the energy sector. Certainly, China has undergone its own 'coal rush' in recent years. Fergus Green and Nicholas Stern (2016) point out that China's emissions became a serious problem after 2000, as is consistent with the 'coal rush'

hypothesis. Between 2000 and 2013 there was large-scale investment in heavy industry requiring high levels of energy. The Shenhua group, active in the Liverpool Plains (Connor this issue) became the world's largest producer of coal. In that period 'China's coal consumption nearly trebled... by the end of this period, half of the coal consumed globally was being consumed in China' (2016: 3).

Yet, in contrast with India, the Chinese Government has set a firm target for emissions reduction, namely to 'achieve the peaking of carbon dioxide emissions around 2030 and mak[e] best efforts to peak early' (PRC 2015: 5). With China becoming the world's leading manufacturer of wind and solar power technology, Green and Stern suggest China's emissions peak could come as early as 2025 (2016: 13). Yet, as they note, China does not escape the coal paradox, with a simultaneous boost to coal-fired power generation creating excess capacity and 'curtailment' in the use of renewables (2016: 11; see also Myllyvirta and Shen, 2016). The editors of this Special Issue hope to explore this paradox through a series of papers focused on China's energy policy in the context of climate change in a forthcoming issue of Energy Policy.

Certainly, we find the cultural value of coal to be heavily influenced by the differing forms of national-level developmentalisms. Through national cases and comparisons the Special Issue highlights these differing historical associations and meanings of coal production. At the same time, several contributors debate the extent to which coal acquires new meanings under climate change that overlay existing narratives around social, health and environmental impacts, and resource dependence. We address the changing meanings embedded in the coal commodity that may emerge, for instance, through corporate arrangements, or local community mobilisations, or through government policy (most notably climate and energy policy). As coal is increasingly recast as a liability rather than an asset, contributors assess factors bearing on whether a transition 'beyond coal' may be in the offering.

In framing these questions we start from two basic premises. Our first is that the world is interconnected when it comes to both climate change and emissions reduction. Individual countries, their coal and energy industries, and the localities where coal is mined and consumed, are enmeshed in transnational divides, rivalries and connections. Reflecting this, contributors focus especially on links between early and late industrialisers and between coal consumers and producers. Our second premise is that ending coal dependence is not simply a

technological or policy question, it is also a socio-political question. As the environmental sociologist Ortwin Renn (an author in this Special Issue) writes, “a better understanding of the human drivers for initiating, promoting, or hindering political change in this arena is as crucial to effective decision-making as are the findings of the natural and climate sciences” (Renn, 2011: 154).

Further, our approach extends the social and political analysis of fossil fuel dependence, where it has been found wanting or rare (Sovacool, 2014). Hulme (2010) has noted the weakness of responses to climate change debates from the social sciences and interpretative humanities. Discussion of emissions mitigation in the social sciences tends to be policy-centred at either national or international levels, or focused on general societal responses, rather than on the specific challenges of transition (for example see Giddens, 2009; Urry, 2013). Studies that do address fossil fuels, such as Urry's (2013) *Societies Beyond Oil* and Andreas Malm's (2016) *Fossil Capital*, generally provide abstract analysis of the social organisation of fossil fuel dependence and clarify the political economic challenges involved in decarbonisation, but rarely do these works engage directly in social research with people living with the consequences, or engaged in political contestation. Likewise, coal consumption and the mechanisms to promote it, or supposedly mitigate its effects, is rarely analysed as a social problem of success.

For this Special Issue contributors have been asked to bridge the gap between policy and social context. We aim to thereby extend the literature on energy and climate change, and deal with questions of transition and action at a local, national and transnational level. This issue emphasises the importance for energy policy makers of qualitative social research into coal reliance, and investigation into the political economy of coal and climate change. Indeed, the multilevel and comparative scope of this special issue and its inter-disciplinary approach to climate and energy politics mark it out as breaking new ground.

The Papers

To address the global coal question the Special Issue draws on experiences in India, Australia and Germany. India has embarked on a rapid increase in coal-fired power; Australia positions itself as a global energy export platform, especially for coal; and Germany, in contrast, has been implementing a major shift to renewable energy. Comparison between these cases,

across global development divides, offers the possibility of a truly global apprehension of the social challenges posed by the imperative for a post-coal future.

The Special Issue is organised into three main sections. First it analyses the relationship between coal and established assumptions about development, and explores how that relationship is coming under pressure; second it offers a series of ethnographic investigations into the dynamics of contestation in coal-affected regions and localities; and third it offers a series of explorations of proposed remedies for coal dependence – technological, economic and social.

The first grouping comprises four papers that address different aspects of the ‘coal-development nexus’, focusing on the historical trajectory and legacy of coal dependence. James Goodman, one of the Special Issue editors, develops the concept of a ‘climate dialectic’ between energy and climate policy, in comparing recent changes in energy policy and coal mining in Germany and India. An analysis of coal in Australia, by Hans Baer, exposes the increasing state-corporate nexus underpinning the use and mining of fossil fuels. Kuntala Lahiri-Dutt analyses the role of coal in Indian industrialism and finds at least four diverse and overlapping coal economies: small-scale ‘Illegal’ mining, informal mining, nationalised coal production, and private coal mines ‘captive’ to particular industries. Also discussing India and Australia, Stuart Rosewarne highlights the crossnational context for coal developmentalism, where Indian multinational conglomerates are now seeking to open coal mines in Australia to both secure and meet the power needs of their industrial facilities. The article demonstrates that an abstract ‘market’ is not the final arbiter of coal production. Finally, Ortwin Renn and Jonathan Marshall, Special Issue Co-editor, discuss the German ‘Energy Transformation’, and the problems of the pragmatic, context-dependent and contested persistence of coal in the context of Germany's nuclear power phase-out.

The second section comprises six local-level ethnographic studies into of coal and its futures. Linda Connor tracks community-level, land owner based, contestation over proposed large-scale coal mines in the already mined Hunter Valley and in the Liverpool Plains (an area currently dominated by highly-productive intensive agriculture), in NSW Australia. Heidi Norman documents how, for the first time, negotiations over new coal mines and coal seam gas have placed Aboriginal peoples as key protagonists in shaping developmental futures, in terms of fossil fuels and their alternatives. Devleena Ghosh focuses on the responses of a

community of adivasis in Chhattisgarh, Central India, to the imminent takeover of their land for new coal mines, and in doing so charts social challenges to, and costs of, India's industrialisation program. Duncan McDuié-Ra and Dolly Kikon investigate the case of local support for coal mining in India's North-East, outlining its foundations in issues of regional autonomy. Kanchi Kohli and Manju Menon outline a parallel process of contestation in India at a major Gujarat coal port, showing how the different players constitute the debate differently and how local people extract leverage from those players. Tom Morton and Katja Muller take the analysis to Eastern Germany where several new lignite mines are proposed, and finds a local populace caught between the development dreams of an energy 'transformation', and the stark realities of newly proposed coal mining and possible displacement.

The third section moves from the status quo to explore some of the 'solutions' emerging to transform the coal-development nexus. Jonathan Marshall, a Special Issue Co-editor, demonstrates how the idea of Carbon Capture and Storage, is mobilised in Australia as the symbolic saviour of fossil fuels, while enabling business as usual. Jillian Goldfarb, Douglas Kriner and Maric Buessing discuss the direct effects of living near coalburning power plants as a factor underpinning support for renewable energy in the United States. Gareth Bryant analyses the European Emissions Trading System as a solution that favours the very few large emitters, but which points to both the possibility and necessity for more effective alternatives. Rebecca Pearse, a Special Issue Co-editor, investigates emissions trading law and policy in Australia, highlighting the failures of coal governance which cannot be addressed with carbon prices at the margin. Finally, Geoff Evans and Liam Phelan outline the political process of forging a constituency for 'transition' in a heavily coal-dependent region, by putting questions of justice at the centre of climate policy.

There are a number of cross-cutting themes. Several papers in the issue consider coal in relation to histories of colonialism and commodification, and their continuing effects. In these histories, coal assets are persistently positioned as a source of prosperity and saviour from economic crisis, despite coal's role in generating climate crisis, or even local economic crisis (Baer; Ghosh; Goodman; Kohli and Menon; Lahiri-Dutt). In response to this sharpening contradiction, social movements have developed at many levels to challenge the dominance of coal. Here they often engage in an experimental process of translating climate change

(often defined as a crisis in-abstract, posited for the future), into a crisis with a concrete felt and present reality (Goodman; Pearse; Evans and Phelan).

Coal mining and burning certainly has concrete effects on communities, including on livelihood and health (Goldfarb, Kriner and Buessing). Material dependency on relatively cheap and accessible fossil carbon is deeply structured into the economic and political system. Yet the impact of using coal to fuel coal power stations is rising dramatically. In a number of major countries, renewable energy production is growing; electricity demand is falling, and the retirement of old coal plants has been accelerating (Goodman; Renn and Marshall). In this context, some argue that coal could become economically less viable, and more of a political liability than an economic asset.

Reflecting this paradox, coal mining is both a major force in developmentalism and in contestations over it (Kohli and Menon; Morton; Norman). As revealed in the ethnographic studies in this Special Issue, coal often has different and incompatible meanings for different sectors of the community. Locally-affected groups respond in different ways: some seek to exercise a popular veto against mines, others seek leverage to realise old and unsatisfied development aspirations, with resource exploitation presented as a means to realise self-determination, and some are concerned principally with the local effects of coal mining, rather than its implications for climate change (Connor; McDuie-Ra and Kikon; Norman; Morton and Muller). Understanding such reactions is vital and several papers examine the ways in which social movements engage with affected communities to transform the political agenda.

The tensions produce deep political paradoxes, with policy in some contexts inadvertently intensifying coal addiction, as when attempts to move away from nuclear power in Germany have promoted some increased coal use (Morton; Renn and Marshall). Similarly, with technological innovations we find claims for clean coal have the effect of legitimising and prolonging coal production, throttling alternate energy while allaying political discomfort and anxiety (Marshall). Issues such as these pose sharply the difficulties of transition from coal, and their critical consideration is vital for climate and energy policy.

An important theme of this issue, especially in the more ethnographic section, is that energy policy is not just about energy. Energy cannot be isolated from wider social relations,

including cultural and community life, livelihood, land, the lived environment, and the ecosystems on which ultimately we all depend. Coal mining is often directly linked to the destruction of environment, land and livelihood. Energy policy which promotes coal, sacrifices these social and ecological contexts, prioritising other more established and relatively powerful social interests. In the process, whole regions can become ‘sacrifice zones’, in the name of the presumed necessity and benefit of coal-fired power.

Overall, the special issue addresses the persistence of coal consumption in the face of climate change. This is critically important as global climate policy enters a new phase with a new comprehensive UN agreement under the 2015 Paris Accords, ‘applicable to all parties’, including emerging economies such as India. Post-2015 the key challenge is to achieve the targets agreed at Paris, most notably the ‘headline’ target of ‘net zero carbon’ by 2050. Given the centrality of coal to greenhouse gas emissions, the question of how to overcome the ‘coal rush’ in both emerging and extractive economies, and how to politically entrench such priorities, has become of paramount importance across North and South. We aim to contribute to this political debate, injecting grounded analysis of the challenges and possibilities.

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