

The politics of energy: an introduction

Steve Vanderheiden^{a,b*}

^a*Political Science, University of Colorado at Boulder, CO, USA;* ^b*Centre for Applied Philosophy and Public Ethics, Canberra, ACT, Australia*

Just minutes after the magnitude 9.0 earthquake struck off Japan's northeast coast on the afternoon of 11 March 2011, waves from the 14-meter tsunami that it triggered crashed over the seawalls built to protect the six reactors at Fukushima Daiichi nuclear plant. Designed to withstand tsunami waves less than half that height, the seawalls were powerless to protect against the flooding that would ensue, cutting off electricity to the plant as power lines were downed by the earthquake and backup generators that had been stored below ground were rendered useless by the flood. Over the next several days, workers scrambled feverishly to cool overheating fuel rods in four of the reactors, then to restore power so that cooling systems could be brought back online, and authorities ordered a precautionary evacuation of those within a 20 km radius of the plant. Despite these efforts to avert a crisis, three of the plant's reactors experienced partial or full meltdown, rating a Level 7 'Major Accident' on the International Nuclear Events Scale (the most serious category of event, and the second in history) contaminating the site with plutonium and radioactive isotopes and releasing airborne radiation that would reach the United States at measurable levels a week later, and spreading renewed worries about nuclear power further and more quickly.

This, the world's second-worst nuclear accident (after Chernobyl), prompted concerns about the safety of nuclear plants elsewhere, leading state authorities to conduct emergency safety inventories of existing facilities, and casting a pall over plans to construct new ones. Switzerland and Germany both announced plans to completely cease nuclear energy production by 2034 and 2022, and Italian voters in June resoundingly rejected an ill-timed government proposal to revive the country's nuclear program. Although several political leaders defended the industry's safety record and the sector's role in their country's low-carbon future – most notably US President Obama, who

*Email: vanders@colorado.edu

reaffirmed his administration's support for the industry in the weeks following the accident – public opinion has once again turned against nuclear power, as it did following earlier accidents, with market capital options for financing planned expansions of nuclear capacity in the United States and elsewhere evaporating, throwing the industry's future into jeopardy. Even before Fukushima, the prospects of a revival of nuclear energy were already dubious. Whether or not the worldwide reaction to events at Fukushima will precipitate a long-term decline in support for nuclear energy – as Robert Duffy's contribution to this volume suggests it will – those galvanizing events forcefully remind those charting the world's energy future of an unfortunate fact of which few needed reminding. In a carbon-constrained future, and with forecasters predicting rapidly-growing demand for energy over the next half century, virtually all options for accommodating that demand look like bad ones, even if some appear to be worse than others. If anything turns public opinion in favor of revived nuclear programs, it is likely to be 'lesser evil' comparisons with other bad options.

The US Energy Information Administration estimates that world energy consumption will increase by 1.4% per year, and 49% by 2035 (2010, p. 1), driven largely by rapidly increasing demand from non-OECD countries, especially China. Even with substantial growth in renewable sources of energy and steady growth in nuclear power, and with continued growth in electrical generation from natural gas, the US Energy Information Administration forecasts continued reliance upon coal and oil as satisfying the bulk of that demand, with each contributing more than twice what combined renewables will be able to supply by 2035. When set against the forecasts of climate science, which call for cuts in greenhouse gas emissions in excess of 50% from 1990 levels over that same period if dangerous climate change is to be averted, meeting expected future energy demand while also preventing potentially catastrophic environmental change will be challenging. The phase-out of fossil fuels, or at least the development and widespread deployment of sequestration technologies designed to capture carbon emissions from coal and oil and capable of extending the viability of such fuels in a carbon-constrained future, raises challenges of its own (and, as we shall see in several upcoming articles, serious doubts), as does meeting those growing needs through some combination of rapidly expanded renewable energy sources and aggressive conservation efforts. Given this interrelated set of energy policy challenges, it is hardly surprising that the Obama White House, which has taken the threat of climate change more seriously than its predecessor but has yet to deliver effective climate policies in support of its concerns, has continued to insist that nuclear energy must remain 'in the mix' for the United States and the world into the foreseeable future, despite the industry's already-tenuous support compounded by the public relations disaster that accompanied the environmental and economic disaster at Fukushima.

Were it possible to set aside political obstacles, and to design a carbon-constrained global energy system capable of meeting the world's projected

future needs on the basis of available technologies, human and natural resources, and sincere concern about the failure to do so, or to design such systems through the idealized processes that Charles Lindblom (1959) terms 'rational-comprehensive' policy-making, significant challenges would remain. Economic and technological obstacles must still be surmounted before clean and renewable energy can be made widely available, and existing infrastructure must be maintained while new plants, facilities, and grids are brought online. However, these obstacles are relatively tractable in comparison with the political challenges that are the subjects of this volume. While Jacobsen and Delucchi (2009) demonstrate the technical and economic possibility of meeting global energy needs in 2030 with a significant expansion of wind, water-based, and solar power, eliminating the need for fossil fuels as well as nuclear energy in supplying future electrical generation and transport fuels, the magnitude of the changes they outline reveals the daunting political obstacles to their plan's realization. Aside from problems related to the early decommissioning of existing coal, oil, and natural gas plants, they propose bringing online 3.8 million large wind turbines and 89,000 large-scale photovoltaic and concentrated solar power plants worldwide over the next two decades, at a cost of approximately \$100 trillion, excluding necessary upgrades to transmission infrastructure (Jacobsen and Delucchi 2009, p. 64). As they note, such an ambitious plan would probably encounter technical obstacles such as shortages in the rare earth minerals needed for photovoltaic cells or storage batteries, but far and away its biggest obstacle is political will. More accurately, political rather than technical or technological challenges now pose the most difficult problems in the pursuit of a sustainable future, and only through a more thorough understanding and appreciation of the nature of these issues can a viable way forward be identified. This volume aims to contribute toward that aim.

The eight contributions to this volume investigate a variety of case studies and engage several related aspects of the politics of developing sustainable energy systems, but cannot by themselves offer a comprehensive picture of the policy or political landscape. Nonetheless, they together offer suggestive insights into the challenges and possibilities associated with developing energy systems for a sustainable future. No examination of the politics of energy can ignore the multifaceted problems associated with the world's continued reliance upon fossil fuels. As primary sources of greenhouse gases, especially the carbon dioxide released upon their combustion, coal-based and oil-based energy are leading contributors to anthropogenic climate change as well as a host of other forms of environmental degradation resulting from their extraction, refinement, and combustion. Given their status as non-renewable and 'dirty' energy sources, these fuels are often and aptly identified as anathema to future 'clean' and sustainable energy systems. But fossil fuels are cheap and relatively easily deployed sources of energy, largely due to market failures that fail to take account of their social and environmental externalities, giving them a significant market advantage over their renewable rivals. Coal is

relatively abundant and remains the cheapest fuel for electrical generation, despite its well known association with destructive mining practices and its profligate carbon footprint. In the absence of a concerted effort to replace its electrical generating capacity with more sustainable alternatives, or to control its effects on global climate through massive public investment in nascent and unproven carbon capture and storage technologies, coal poses an environmental and economic problem to be solved while also creating social and political obstacles to such solutions – as oil also does in the nearer term future, with its long-term pernicious effect constrained by its more limited supply.

If, as climate science suggests, the development of a sustainable energy system requires a dramatic reduction in the use of fossil fuels, the politics of this transition to a low-carbon economy must focus upon the harm associated with current reliance upon coal and oil and the various obstacles to speeding up the conversion to other fuels. Analyses of those obstacles could be institutional, examining the role of interested industry parties in maintaining high levels of fossil fuel use, or behavioral, examining the norms and attitudes that frustrate efforts to induce consumers to voluntarily switch to more sustainable energy sources or adequately support policy efforts to require this transition. Some of these are considered in this volume through studies of efforts to move away from fossil fuels. The social and environmental costs of oil and coal are widely known, and their dissemination has played a central role in efforts to move away from them. Aside from their role in climate change, in which fossil fuel combustion contributes 80–85% of anthropogenic carbon dioxide emissions (with land-use changes accounting for the remainder), the combustion of coal and oil has rightly been impugned for contributing to air and water pollution and their associated harm to human health and environmental integrity, their extraction linked to such galvanizing ecological impacts as mountaintop removal and catastrophic oil spills, and their international sale and transport to the finance of bad state and non-state actors as well as the social and economic costs of conflict and military intervention in oil-exporting regions. Critics point to such impacts in calculating the ‘social cost’ of coal and oil (for example, Tamminen 2006), noting that the majority of such costs are externalities imposed upon the most vulnerable, and that the inclusion of such costs in the price of coal and oil would significantly reduce if not negate the market advantage that fossil fuels currently enjoy over cleaner renewable sources of energy.

Such critical perspectives often underscore state policy efforts to regulate fossil fuels, whether through pollution control standards or market-based measures like carbon taxes or emissions trading schemes that price carbon. The critical claim that reliance upon fossil fuels contributes to a variety of harmful impacts often appears alongside discourses of ecological modernization that identify sources of opportunity in carbon pricing schemes, as with the 2011 debate over Australia’s adoption of a carbon tax, with climate change often the leading motivating consideration. The political resilience of the coal and oil industries to such calls for increasing regulation partly explains the

proliferation of analyses of harmful impacts of their continued role in energy production. Two other emerging critical discourses about the costs of fossil fuels appear in this issue, both specifically concerning international markets in mineral resources like coal and oil. Both suggest that the politics of energy can be usefully linked to other issue areas – of development and security, respectively – in order to build the case for accelerating the global transition away from fossil fuels, but both also sound important cautionary notes about the critical perspectives under scrutiny.

Sudhir Chella Rajan examines the so-called ‘resource curse’, in which natural resource wealth evidently sometimes serves as an obstacle to, rather than an instrument of, political development, as such wealth has in several cases fuelled corruption and violence rather than bringing about the social and political progress that development scholars have conventionally associated with the exploitation of national resource wealth. Using case studies of oil development in Mexico, Venezuela, and Angola, Rajan challenges prevailing accounts of the curse that attribute it to the effect of macroeconomic forces upon domestic political institutions, in which resource wealth crowds out development efforts by exposing resource-dependent economies to volatility in international markets and concentrating wealth within a privileged elite rather than employing it on behalf of development efforts. While accepting that conventional explanations provide part of the causal story, Rajan points also to the effect of neoliberal political economy and the legacy of colonialism, arguing that rent-seeking ‘extraversion’ accounts for the misuse of resource wealth in these three cases. In the context of energy politics, the domestic social and political consequences of oil extraction and export are often ignored in favor of consideration of its environmental effects, or the way that resource wealth can finance or otherwise drive violent conflict. Less well appreciated, and certainly less prominent in policy debates about the effects of fossil fuel dependence on the developing world, is this link between international oil flows and impaired development. Going beyond the sustainable development discourse that links imperatives of environmental sustainability and human development, Rajan’s study suggests a further link between the profligate demand for imported oil in affluent developed countries and the frustrated efforts at development in poor ones, reinforcing the importance of sustainable energy policy in the former by considering the consequences of its absence on vulnerable peoples in the latter.

Shane Mulligan considers whether ‘peak oil’ scenarios might justify the securitization of oil supplies, and if so what advantages and disadvantages this might confer upon efforts to forge more sustainable domestic energy strategies. Drawing on Critical Security Studies, Mulligan considers whether the ‘energy descent’ that would accompany post-peak oil prices and availability so long as the developed world continues to rely heavily upon oil for its energy needs, with oil scarcity’s ripple effect across economic sectors and throughout oil-dependent societies, fits well within existing security discourses, which seek to identify imminent threats to freedom, perilous forms of uncertainty, and risks

of death. As he notes, the acceptance by policy-makers of oil dependence and national security comes with discursive benefits as well as costs. Because security issues command the highest priority, mobilizing emergency powers if necessary, successfully securitizing oil dependence could potentially create momentum for weaning developed countries from their insatiable thirst for both domestic and imported oil, bolstering policy imperatives for sustainable energy with much more powerful and visceral security imperatives. Moreover, it concerns the role of oil in domestic energy portfolios rather than merely dependence upon imported oil. Post-9/11 campaigns attempted to link decreasingly salient sustainable energy issues with ascendant concerns about national security. Hence, it can only be addressed by diminishing reliance upon oil as an energy source, not through intensified development of domestic oil resources, as some 'energy security' and 'energy independence' campaigns have suggested. As Mulligan notes, however, 'securitization carries consequences', and he aptly cautions those considering invoking security discourses on behalf of the transition to low-carbon or sustainable energy sources to keep those in mind.

Concerns about security are not, however, limited to the socioeconomic insecurity of dependence upon imported oil. Indeed, nuclear energy is often suggested as an antidote to the kinds of security concerns that Mulligan discusses, as well as for the climate benefits inherent in a zero-carbon energy source that is capable of being deployed on a wide scale, but carries with it several unique security concerns related to the insidious potential to convert its fuel into weapons-grade plutonium. Steve Vanderheiden examines these and other risks associated with proposed expansions of nuclear energy capacity, which defy straightforward comparison with the risks associated with the climatic changes that conversion from coal-based to nuclear power could help to avoid. He argues that the ubiquity of risk should not obscure the ethical imperatives to minimize it, and to consider also the social justice aspects of its distribution across vulnerable peoples. While it may not be possible to definitively say whether or not the increased risks of expanded nuclear energy programs are warranted by the resulting declines in climate-related risk, despite analyses from decision theory that suggest otherwise, this need not be the problem that those positing a false dichotomy between these two alternatives suggest. Since the future impacts of both complicate the democratic resolution of these competing forms of risk, he suggests that it would be mistaken to view the tradeoff between the likely, moderate, and widely distributed risks of unmitigated climate change and the unlikely but concentrated and severe risks of nuclear accidents as posing a genuine dilemma, as some now advocating expansion of nuclear energy capacity maintain. Rather, he argues that that these two putatively competing forms of risk should draw our attention to the social justice aspects of imposing risks upon vulnerable others, whether through nuclear power or climate change, and motivate consideration of alternatives that diffuse the false choice between these two bad choices, including energy conservation efforts and development of less risky renewables.

Robert Duffy also considers various risks associated with expanded nuclear energy programs in the context of the decarbonizing imperatives of climate policy and as measures for securing energy independence, asking whether the 'nuclear renaissance' that some have recommended is politically plausible, particularly in the United States. While the March 2011 events in Japan may have drawn heightened public attention to the risks associated with nuclear power, and while worries about similar accidents have led Germany and Switzerland to announce plans to phase out nuclear energy production altogether, Fukushima merely added an additional obstacle in renewed concerns about accidents to an already-poor prospect for the industry's expansion in the United States, given the existing difficulties based in waste disposal issues, ongoing licensing, siting, and safety concerns, and the economics of start-up facilities given various uncertainties regarding state support for the industry and a history of cost overruns. Despite their clear climate benefits, their potential for advancing a prominent energy security imperative, new reactor designs, and promised new economic and regulatory support, Duffy concludes that the promises of expanded reliance upon nuclear energy in the United States cannot overcome such obstacles. Absent significant state subsidies of the industry, Duffy argues, nuclear energy cannot compete with fossil fuel-based energy sources. With such a subsidy, on the other hand, it must compete with renewable energy sources that are not accompanied by comparable risks or adverse public opinion. While nuclear energy may enjoy advantages over renewables in energy politics, given its organization and political influence, these are not likely to be enough to counteract the public fears that Fukushima mobilized, or to avert the unfavorable economic prospects that the industry faces in the absence of state backing.

Given the carbon constraints on future energy systems and the risks and other costs inherent in nuclear power, most view significantly expanded renewable sources of energy as essential to meeting projected future energy demand. Indeed, as suggested by Jacobsen and Delucchi, some combination of wind, water, and solar-based energy offers the best prospect for designing sustainable energy systems, given finite mineral stocks, limited sink capacity for absorbing carbon emissions, and the above-noted limitations on nuclear energy. But even if it is technologically and economically possible to supply the world with energy from these sources alone, political difficulties rooted in various value conflicts still remain. As four contributors to this issue well illustrate, sustainable energy systems are far more difficult to attain in practice than they are to construct in theory, in part due to entrenched social and political resistance to transition away from carbon-based energy sources, and in part because the alternatives that they represent still generate opposition or introduce challenges based on their status as lesser evils. As suggested above, the politics of energy involves selecting from among a set of imperfect options, as demonstrated by the examinations in this volume of large-scale solar energy development, appliance energy efficiency standards, electricity supergrid design, and energy-based climate change mitigation strategies.

Christian Hunold and Steven Leitner example the 'Grand Solar Plan' proposal to build several large-scale thermal solar plants in California's Mojave desert, which promise to deliver clean and renewable energy to one of the United States' largest and fastest growing urban centers. Although touted by some environmentalists for its ambitious effort to wean the state from dependence upon fossil fuels and for its role in advancing the state's climate change mitigation goals, others have opposed it, largely because of its projected impacts on the region's fragile desert ecosystems. Hunold and Leitner use discourse analysis to view the competing positions in the public debate over the plan, finding the dominant discourse to rely upon a construction of the desert as barren and useless, which, when joined to the ecological modernization discourse of engaging in grand technological projects, identifies few costs to consider alongside the plan's climate and sustainable energy benefits. While not overtly critical of the plan itself, Hunold and Leitner compare it with other high-modernist narratives of the past century – including those on behalf of massive hydroelectric and water reclamation projects in the western United States – suggesting that such discourses often conceal the environmental repercussions of the projects they advocate for environmental reasons. Against this powerful combination of discourses, desert conservationists stand little chance. Examining the politics of large-scale solar development through this lens, Hunold and Leitner reveal the difficulties associated with designing sustainable energy systems when this involves least-bad options, especially when these still contain objectionable elements and require for their public assent a process of obscuring their true environmental costs, and embedded in language and imagery designed to appeal to cultural or emotional associations rather than objective analysis.

Similarly, Rachael Shwom examines the political processes that eventually led to the United States' adoption of energy efficiency standards for appliances, which as purely informational and voluntary measures nonetheless have a significant impact on reducing household energy use. Because they mobilize consumer interests in saving money on their utility bills and encourage appliance manufacturers to develop and implement efficient technologies in their products to meet this mobilized demand for green products, such standards are, as Shwom notes, often regarded as among the 'low-hanging fruit' of sustainable energy and climate policy, achievable without coercive regulation or economic costs (and, indeed, resulting in a net benefit for consumers and society). Rejecting the oversimplistic view of social progress toward environmental sustainability as driven by consumer preferences alone, Shwom begins by observing that 'structural changes in our production systems' are needed to for a transition to a low-carbon energy economy, and that enlightened consumer preferences or individual behavioral change is not enough to restructure a market that is controlled by manufacturers. Drawing on insights from 'treadmill of production' and ecological modernization theories, Shwom illustrates through a case study of the evolution of appliance efficiency standards that each of these theories captures some of the sociological dynamics of this process, with the former working best in

accounting for resistance to the adoption of such standards during the Reagan years of the 1980s, and with the latter accounting for their eventual adoption during the Clinton administration in the 1990s. Shwom develops a 'middle range' approach that relaxes the assumptions of each and takes elements from both theories, explaining the social and political dynamics that often obstruct the design of sensible energy and environmental policies, and further illustrating the difficulties in bringing about what are often viewed as among the easiest and most effective sustainability policy strategies.

Anthony Patt, Nadejda Komendantova, Antonella Battaglini and Johan Lilliestam examine the technical and governance challenges associated with meeting the European Union's climate and renewable energy goals, focusing on the proposal to build an electricity 'Supergrid' that covers the European Union as well as North Africa. By including the vast solar capacity of North Africa within the grid, the system would take advantage of the best sites for renewable energy generation, and by covering a large population and wide geographic region, it could smooth supply and demand, enabling the least expensive and most efficient market penetration of clean and renewable power. But as the authors show through this incisive study of various political challenges to the Supergrid's construction and maintenance, the most rationally organized and efficiently designed system is not always the most politically feasible, and, indeed, political viability and ecological rationality are often at odds in large-scale projects like this. As Hunold and Leitner also note, decarbonization imperatives and ecological modernization discourses can lead policy-makers to think big, but big thinking that focuses only on a project's technical merits can often fail to take into account some its most pervasive obstacles and significant drawbacks. Relying upon model-based analysis and stakeholder interviews, Patt *et al.* offer a relatively optimistic assessment of the prospects for a European–North African Supergrid, but in highlighting the risks and security issues associated with the scale and international nature of the project, they call needed attention to the importance of considering political and governance challenges alongside technical ones. Even if those risks can be managed, doing so requires cultural awareness and political skill, casting sustainable energy as a social and political challenge as much as one for science and engineering, and effective governance plans as no less vital than infrastructural ones.

Finally, Karena Shaw examines recent energy and climate change politics in British Columbia, which has adopted a provincial carbon tax and in several respects has played an environmental leadership role within Canada, focusing on framing issues in debates over expanding renewable energy as a climate change mitigation measure. As other contributors also note, the way in which problems are framed carries significant consequences for the ways in which problems may be addressed, with any discursive focus highlighting some features and obscuring others. Shaw notes that, like many other efforts to develop effective climate policy, British Columbia environmentalists have focused upon reducing carbon emissions, which calls attention to end-of-pipe

rather than source-based issues, and which Shaw faults for closing off ‘much more diverse and robust’ sustainability strategies. The problem, Shaw argues, is not with expanding renewable energy generation itself, but rather lies in the neglect of potentially more effective options when the focus is placed on energy production rather than conservation, and when concerns about the integrity of larger ecosystems are reduced to a singular decarbonizing imperative. In a case study that reinforces some lessons also on display in Hunold and Leitner’s solar case, Shaw examines how the enthusiasm for expanded hydroelectric capacity can obscure more holistic concerns for energy sustainability and exclude stakeholders whose participation could benefit the initial support for and long-term viability of such projects. Because sustainability itself is a social, political, and economic concept in addition to an ecological one, her study suggests, the politics of defining and realizing its ideals must take account of more than simply the technical aspects or benchmarks of its achievement. Casting climate change as essentially an energy systems challenge makes it more inclusive of potentially useful strategies to address it, and viewing it as a social and political as well as technical and environmental challenge reveals the most daunting obstacles to as well as the most promising means to effective change.

Taken together, these eight studies of various aspects of contemporary energy politics provide a glimpse into the political challenges that complicate the design and construction of sustainable energy systems, yielding insights into the nature of ongoing resistance to change and highlighting several factors that frustrate ‘rational-comprehensive’ global planning and development of energy infrastructure and policy. Their collective lesson may be to dampen the naive optimism of those who believe that large-scale environmental problems can be solved by economists and engineers through equally large-scale engineering projects, as if all forms of resistance to them would evaporate once their technical superiority is publicly shown, and governance of those projects and the systems they create can be made immune to the pathologies of the flawed or outmoded systems they replace. But its lesson should not be pessimism, either, as these eight studies also inform more constructive analyses of energy politics than unguarded pessimism typically countenances, and point the way toward more viable means for choosing among least-bad options, mobilizing available mechanisms and constituencies of support, and navigating among various predictable or understandable forms of resistance to them.

References

- Jacobsen, M.Z. and Delucchi, M.A., 2009. A path to sustainable energy by 2030. *Scientific American*, 301 (5), 58–65.
- Lindblom, C.E., 1959. The ‘science’ of muddling through. *Public Administration Review*, 19, 79–88.
- Tamminen, T., 2006. *Lives per gallon: the true cost of our oil addiction*. Washington, DC: Island Press.
- US Energy Information Administration, 2010. *International energy outlook 2010*. Washington, DC: US Department of Energy.