

The Social Shaping of Wind Power in Australia

Integrating interpretive and contextual historical approaches

This article outlines the approach taken in my doctoral thesis, completed in 2003. The thesis draws on literature in the *Social Shaping of Technology* to explain the history of wind power in Australia, and argues that this should be explained using a synthesis of contextual historical and interpretive approaches.



Andrea Bunting

graduated with Bachelor of Engineering (Mechanical) at the University of Melbourne, Graduate Diploma in Adult Education at the University of South Australia, Master of Science in Society at the University of Melbourne, and Ph. D. in Science and Technology Studies at the University of Wollongong. Since 1992, she has been a lecturer in Mechanical Engineering at RMIT University, Melbourne, Australia. Teaching areas include renewable energy technology and policy. Research areas are wind energy policy and sustainability in engineering education. In 2004/05 she is a fellow at the Institute for Advanced Studies on Science, Technology and Society (IAS-STSS), Graz.

E-mail: andrea.bunting@rmit.edu.au

Renewable Energy in Australia

Renewable energy sources such as solar and wind have long been promoted as a solution to problems associated with conventional energy sources. Policy makers have usually dismissed them on the basis of cost, immaturity or unsuitable operating characteristics; however, at times, perceived problems with conventional energy supplies (such as shortages, cost hikes and environmental damage) have put renewable energy on the policy agenda. The most recent concern is the threat of climate change, to which fossil fuel use is a major contributor. This has led many countries to introduce measures to promote use of renewable energy, and wind power has been a significant winner.

Australia is a difficult case for renewable energy. With plentiful supplies of cheap energy – mainly coal but also hydro and natural gas – successive governments have used cheap energy to attract energy-intensive industries. Until recently, Australia had only a handful of small wind facilities, mostly in remote areas to displace diesel fuel. This virtual neglect of wind power changed after renewable energy support mechanisms were introduced from the late 1990s as part of Australia's greenhouse policies.

For my thesis, I analysed the history of wind activity in Australia, and explained this from the perspective of the *Social Shaping of Technology*. I developed an approach combining three themes. The

first was a contextual historical approach, focusing on the structure of and changes to the Australian electricity sector, and the evolution of renewable energy policy. The second and third themes were interpretative, focusing on the meaning of wind power for different social groups. The second theme dealt with the interpretation of wind power as an "environmental technology". Here I analysed advocacy of (and opposition to) wind power in the context of differing socio-technical meanings ascribed to environmental technologies. The third theme dealt with debates over the technical capability of wind power in the electricity grid. Wind power has quite different characteristics to many conventional electricity generators, but is required to fit into the existing electricity system. The question of how well wind power "works" in this system and thus its value to the system depends on a range of assumptions, practices and standards, as well as the characteristics of other elements in the electricity system. In the following, I elaborate on these three themes.

The Australian Electricity Sector and Renewable Energy Policies

Australia's electricity sector was until recently state-based, state-owned, and reliant on energy sources within state borders. Cheap energy has been vital to the Australian economy, and energy-intensive industries have had a large influence on government energy policy. There has been much effort to keep electricity prices very low to maintain the international competitiveness of these industries. Renewable energy policy in Australia has been targeted at areas where Australia has a competitive advantage – mainly solar heating, photovoltaics and remote area power supplies. Large-scale wind power has not been a priority. During the 1980s, several states undertook detailed studies into both grid-

connected and remote area wind power, but most were short-term studies driven by specific circumstances at the time. Negligible wind capacity was installed. In only one state, Western Australia (WA), has the electricity utility continually sought to exploit wind power; however, until very recently efforts were targeted at wind power for remote areas. WA is home to many remote communities that rely on diesel fuel for power generation, and the utility had a strong financial incentive to find cheaper alternatives. In Victoria, wind studies were a result of environmentalists' influence on the state government's renewable energy policy, but this lasted only a few years. In Tasmania, the state best suited to wind power, the electricity utility was unreceptive to wind power, but due to a protracted environmental battle over proposals for hydro plant it was obliged to undertake investigations into wind power. In South Australia, investigations into wind power were a result of uncertainties over the future price of fossil fuel resources; however, interest in wind power was abandoned once an alternative energy supply was secured.

The 1990s saw large changes to Australia's electricity sector, which had a significant effect on wind power. The electricity industry was restructured: the utilities were disaggregated and corporatised; and a National Electricity Market introduced with competition in generation and supply. Falling electricity prices made it more difficult for wind power to compete. However, there has been increasing pressure for electricity companies to reduce greenhouse gas emissions. From the late 1990s, green power schemes and a Mandatory Renewable Energy Target were introduced, providing a new market for wind power and other forms of renewable energy. Australia is now experiencing a "wind rush": the wind industry has grown enormously, and installed capacity is growing exponentially.

The idea of an Environmental Technology

This interpretative theme deals with the construction and evolution of the idea of an environmental technology. Since the 1970s, advocacy of wind power has been linked with concerns about environmental degradation. Here I use the label "environmental technology" to describe technologies that are promoted as a

means of ameliorating environmental problems. Such labels are used normatively – they evoke an image of desirability – and thus the labeling of a technology as "environmental" may be contested. This is certainly so for wind power.

Groups who oppose wind power facilities, because of their visual impact or danger to birds, have strongly contested the popular view of wind power as an environmental technology, instead portraying them as large industrial facilities. The wind industry has the advantage in that it can latch onto and reinforce a long-standing, popular interpretation of wind power as environmentally benign. Much of its current communication strategy is aimed at maintaining the robustness of this interpretation.

The environmental issues with which wind power has been linked, and the way in which wind power has been portrayed as a solution have differed significantly over time and among different groups. Such issues include resource depletion, wilderness loss from hydropower, nuclear power, and more recently climate change. Moreover, the social visions associated with environmental technologies have evolved over time. We can situate this representation of wind power as an environmental technology in the context of the evolution of the modern environment movement from the 1960s. While some early environmentalists were almost anti-technology, a more optimistic viewpoint soon emerged, advocating development of "alternative" technologies. The alternative technology (AT) movement went under a variety of names and incorporated a range of beliefs, but efforts to develop environmentally benign technologies were fundamental. Intertwined with this was the belief that alternative technologies were an integral part of a better way of life – some saw them as a way to achieve greater self-reliance, or as amenable to community control and public participation.

In the early 1970s, some environmentalists started raising concerns about resource scarcity. The 1970s oil shocks added weight to these fears, and focused concerns on energy depletion. Renewable energy came to be seen as the archetypal alternative technology. Some governments were planning a large increase in nuclear power capacity, leading to a burgeoning anti-nuclear movement.

Some anti-nuclear activists, keen to demonstrate renewable energy as an alternative to nuclear power, joined the ranks of the AT movement but diluted the original sociopolitical visions. Although nuclear power stations were unlikely for Australia, the local anti-nuclear movement was still strong, with a focus on stopping uranium mining. The Australian electricity utilities were also raising the ire of environmentalists with their quest for expansion and their disregard for environmental concerns. One of the key episodes in the history of Australia's environment movement involved a prolonged battle to save large wilderness areas from hydro power.

These issues were the main drivers for those who formed Australia's first wind power advocacy group: the Australasian Wind Energy Association. The leaders of this group were mainly engineers and scientists working on renewable energy, and were part of new generation of energy experts spawned by the environment movement who were keen to challenge the traditional expertise of the electricity utilities. Many of these wind advocates were turning away from the former visions associated with AT, particularly the emphasis on self-reliance, and looking at how wind power could be incorporated into the mainstream electricity system. In the mid 1980s, interest in renewable energy was waning, both in policy circles and the environment movement. This changed suddenly, after the emergence of the "greenhouse effect" as a public policy issue in late 1988. Now wind power had a new and certainly a more robust meaning. Portrayals of wind power as a renewable source, i. e. a solution to resource scarcity, or as an alternative to nuclear power carried little weight in Australia. However, Australia emits vast quantities of greenhouse gas emissions, and here wind power could be a viable alternative.

Views of the role of environmental technologies have also been shifting. The idea that environmental protection and economic growth are antithetical is slowly being replaced with the view that reducing environmental impact can enhance business competitiveness. Some companies are now seeing that environmental technologies offer new business opportunities. Australian business and policy makers have been slow to take on this new thinking, particularly in the

energy sector, due to the dominance of energy-intensive industries. However, due to the recent introduction of renewable energy support mechanisms, Australia now has a growing wind industry; thus the support basis for wind power has widened significantly. There are also more diverse views about the relative importance of environmental problems and what constitutes an appropriate solution to a given environmental problem.

“Green” businesses are keen to identify as critical the environmental problems which their product can address, and to portray their product as the solution to the identified problem. This is very apparent in debates over wind farms in scenic locations, with the wind industry portraying global warming as a much more pressing issue than preservation of landscapes or protection of birds.

The Technical Capability of Wind Power

Unlike most conventional generators, which are predictable, controllable and centralised, wind power is intermittent, relatively unpredictable and diffuse. Electricity supply and use patterns, and electricity industry practices have evolved around the characteristics of conventional generators. There has been much debate about how well wind power “works”, in particular how its technical characteristics impact on its value to the grid. Some debates may come to be settled with further investigation or with greater operating experience with wind power; but others depend on assumptions, practices and standards within the electricity industry, and its configuration. In my study I focused on these contested knowledge claims to analyse how negotiations over the interpretation of wind power shapes whether and how it is deployed, how the structural location of actors shapes their knowledge claims, and how this influences decision-making about wind power. Much of the debate over wind’s technical capability has focused on the significance of its intermittency. The power output of a wind facility fluctuates continually with wind speed. Large-scale electricity systems typically have little or no storage capacity; thus supply and demand must be continually balanced. The electricity utilities regarded wind power as non-firm, that is, wind requires other power stations as back-up. Thus they re-



garded the value of wind power as only the value of fuel savings, which was typically very low. Wind power advocates have long disputed this, and have carried out many studies to show that wind power had a higher value to the system. But such arguments have carried little weight, partly because they are not in accordance with actual operating practices in the electricity industry – where power stations are expected to be controllable, and available as required. Since the electricity industry was restructured, the need to continually balance supply and demand has been unbundled from electricity generation and treated as an ancillary service, which is procured separately. At high penetration levels, wind power is thought to substantially increase the need for this ancillary service. However, this requirement depends on the operating standards and practices of the industry, which have been developed around the characteristics of conventional generators.

Conclusion

In my thesis, I argued for a contextual historical approach integrated with in-

terpretive approaches to provide a more comprehensive account of the treatment of wind power. I concluded by asking what lessons wind power advocates can draw from this study. At present, the situation for wind power in Australia is quite favourable, but this may not last. History has shown how the fortunes of wind power have been crucially shaped by the institutional context, and how periods of flux have sometimes offered useful opportunities for intervention. Today, advocates of wind power are lobbying for extension of renewable energy support mechanisms; but such temporary support may not necessarily further the long-term fortunes of wind power in Australia unless institutional change can also be achieved. These support mechanisms are providing a short-term opportunity for wind power advocates to learn more about and address institutional barriers to wind power. This is now the topic of a subsequent research project being carried out at RMIT University, Melbourne. ■