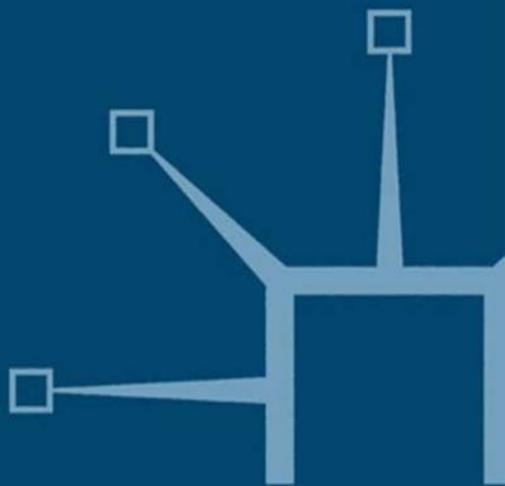


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David Toke



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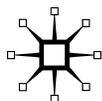
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Ecological Modernisation and Renewable Energy

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Abbreviations

ACF	Australian Conservation Foundation
APPA	Asociación de Productores de Energías Renovables
AWEA	American Wind Energy Association
BWE	Bundesverband WindEnergie eV
CAFÉ	Corporate Average Fuel Economy
CCS	Carbon Capture and Storage
CEC	California Energy Commission also Clean Energy Council
CREIA	Chinese Renewable Energy Industry Association
EDF	Environmental Defense Fund also Electricité de France
FERC	Federal Energy Regulatory Commission
FPL	Florida Power and Light
GW	gigawatt
GWe	gigawatt of electricity
IDAE	Instituto para la Diversificación y Ahorro de la Energía
kWh	Kilowatt hour
MRET	Mandatory Renewable Energy Target
MTOE	Million Tonnes of Oil Equivalent
MW	megawatt
NDRC	National Development and Reform Commission
NFFO	Non-Fossil Fuel Obligation
OAT	Office of Appropriate Technology
PPA	Power Purchase Agreement
PTC	Production Tax Credit
PUC	Public Utilities Commission
PURPA	Public Utility Regulatory Policies Act
Pv	photovoltaics
RO	Renewables Obligation
ROC	Renewables Obligation Certificate
RPS	Renewable Portfolio Standard
TREIA	Texas Renewable Energy Industry Association
TWh	terawatt hour

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Series Editor's Preface

Concerns about the potential environmental, social and economic impacts of climate change have led to a major international debate over what could and should be done to reduce emissions of greenhouse gases, which are claimed to be the main cause. There is still a scientific debate over the likely scale of climate change, and the complex interactions between human activities and climate systems, but, in the words of no less than the Governor of California, Arnold Schwarzenegger, *"I say the debate is over. We know the science, we see the threat, and the time for action is now."*

Whatever we do now, there will have to be a lot of social and economic adaptation to climate change—preparing for increased flooding and other climate related problems. However, the more fundamental response is to try to reduce or avoid the human activities that are seen as causing climate change. That means, primarily, trying to reduce or eliminate emission of greenhouse gases from the combustion of fossil fuels in vehicles and power stations. Given that around 80 per cent of the energy used in the world at present comes from these sources, this will be a major technological, economic and political undertaking. It will involve reducing demand for energy (via lifestyle choice changes), producing and using whatever energy we still need more efficiently (getting more from less), and supplying the reduced amount of energy from non-fossil sources (basically switching over to renewables and/or nuclear power).

Each of these options opens up a range of social, economic and environmental issues. Industrial society and modern consumer cultures have been based on the ever-expanding use of fossil fuels, so the changes required will inevitably be challenging. Perhaps equally inevitable are disagreements and conflicts over the merits and demerits of the various options and in relation to strategies and policies for pursuing them. These conflicts and associated debates sometimes concern technical issues, but there are usually also underlying political and ideological commitments and agendas which shape, or at least colour, the ostensibly technical debates. In particular, at times, technical assertions can be used to buttress specific policy frameworks in ways which subsequently prove to be flawed

The aim of this series is to provide texts which lay out the technical, environmental and political issues relating to the various proposed

policies for responding to climate change. The focus is not primarily on the science of climate change, or on the technological detail, although there will be accounts of the state of the art, to aid assessment of the viability of the various options. However, the main focus is the policy conflicts over which strategy to pursue. The series adopts a critical approach and attempts to identify flaws in emerging policies, propositions and assertions. In particular, it seeks to illuminate counter-intuitive assessments, conclusions and new perspectives. The aim is not simply to map the debates, but to explore their structure, their underlying assumptions and their limitations. Texts are incisive and authoritative sources of critical analysis and commentary, indicating clearly the divergent views that have emerged and also identifying the shortcomings of these views.

The present volume is very much in the latter category. It attempts to both challenge and develop the theory of ecological modernisation that has emerged in recent years. Ecological modernisation has often so far been seen as a prescription for making relatively minor adjustments to how energy policy was developed and energy projects carried out, often in a 'top-down' way. Toke, however, suggests that, not only has the modernisation that has occurred, for example, in relation to the adoption of wind power, involved in its earlier development the essential element of social movements, but that the comprehensive industrialisation of renewable technologies involves the development of a separate 'eco identity' as well. Toke says that this identity, with which the public and environmental NGOs sympathise, means that, in reality, ecological modernisation (EM) proceeds differently to that of conventional ecological modernisation theory. In conventional EM, mainstream industry (such as the electricity industry) makes the key technological choices. In Toke's notion of 'identity EM', technological choices are prompted by 'bottom-up' pressures for specific technologies with a sustainable energy identity. This distinct technological identity persists even now that renewables are becoming major actors in the world energy industries. Moreover the renewable industries act as competitors with conventional fossil fuel and nuclear energy sources seeking to replace them in part or whole. Toke sees this 'identity EM' process as central to the future continued success of renewable energy technologies.

Dave Elliott

1

Introduction

The primary aim of this book is to develop political analysis of environmental policy issues using the case of renewable energy. The two central questions are: a) how have new renewable energy sources, led by wind power, developed and expanded in recent decades? b) how can we deploy, and also modify, ecological modernisation theory to help answer this previous question?

Although the prime focus of the development of theory is ecological modernisation (EM) theory, other modes of political analysis also need to be discussed in order to supplement the analysis. This theoretical development is important if we are to grapple with one of the key sustainability issues of our time, that is, how renewable energy has been developed through different policy frameworks and contexts, and what and how different outcomes have occurred in different states and countries.

There will be an extended discussion of 'ecological modernisation' in Chapter 2. However, essentially, the idea of EM is that it combines economic development and environmental protection as a way of conducting good business: 'in short, business can profit by protecting the environment' (Carter 2001, 226). EM's central theme is that consumers demand higher-quality, environmentally sustainable goods and services and business responds to this pressure, so increasing economic development. This produces a 'positive sum' solution whereby economic development is increased rather than decreased by environmental protection, and where policy 'conceptualises environmental pollution as a matter of inefficiency, while operating within the boundaries of cost-effectiveness and administrative efficiency' (Hajer 1995, 33).

EM demands a holistic response by industry to environmental problems; that is, policies must be considered for their total environmental

impact, rather than environmental policy being limited to one-off 'end of pipe' responses (Weale 1992). EM can be said to be a theory that underpins a lot of the 'precautionary' legislation that businesses need to implement, and in doing so business is regulated by bodies such as the Environmental Protection Agency and the European Union through its directives. As will be discussed, existing interpretations of EM are unsuitable for the renewable energy case study, and my purpose in this regard is to revitalise EM by introducing a new notion of 'identity EM'.

Deploying an EM framework can help us understand our policy options for the future. As we shall see, the 'modern' spur for renewable energy came from the oil crises of the 1970s. This book is written in the aftermath of a further oil crisis (2008), one that may be succeeded by another oil crisis before the global energy economy is restructured away from depleting conventional oil supplies. Just as in the 1970s, we face choices about paths, sharpened in today's world by climate change considerations as a policy driver. Theoretical frameworks may help understand how we can navigate the politics of these paths. Ecological modernisation occupies a pivotal role in ecological transformation, although 'the jury is still out on whether or not ecological modernisation offers a practical programme for achieving sustainability' (Carter 2001, 222). This book contributes to this debate through a reappraisal of the theory of EM in the context of the case study of renewable energy.

I argue, in the case of renewable energy, that it is public support for renewable energy as a new set of technologies that is the key political driver for its development. In another work (Toke 2011) I criticise mainstream EM for a failure to place sufficient emphasis on the involvement of social movements in the development and deployment of renewable energy. In this work EM theory is developed into what I call 'identity' ecological modernisation. This includes the notion that it is positive public identification with specific (renewable energy) technologies that has allowed the emergence and growth of the renewable energy industries as an alternative sector to that of conventional energy industries such as fossil fuels and nuclear power. This new set of (renewable energy) industries is often in competition with major energy corporations, and certainly in competition with 'conventional' fossil fuel and nuclear power industries.

This phenomenon of public identification with an industry with perceived ecological benefits has more significance than just being an advantage for renewables – public support is essential for renewable development, since without the public support the incentives needed for the current scale of development would not materialise. Hence,

if EM is to be used as an analytical framework to discuss renewable energy development, EM has to have a clear means of conceptualising and analysing technological identity. This argument is articulated, in Chapter 2, in the context of a critique of major works in the existing literature on EM.

A means of measuring the extent of 'identity EM' in different country-case studies is drawn up and a relevant use of discourse, interest group and institutional analytical tools is discussed. The theoretical approach is then applied to several case studies.

An outline of later chapters

As I have already mentioned, Chapter 2 deals with the central theoretical topic of this book, ecological modernisation (EM), and also other relevant analytical tools. Chapter 3 charts the genesis of renewable energy technologies, focusing mainly, although not exclusively, on the most implemented renewable technology so far, wind power. The nature of renewable technological identity is discussed and changes in perceptions of identity are studied. How wind power in particular was transformed from being a failed technology into a 'new' energy source, and the associated emergence of this new energy identity in the aftermath of the 1973 oil crisis, is carefully analysed. This transition is closely associated with being an alternative to nuclear power. Wind power in its modern form grew up in Denmark, and its emergence here is explained by reference to Danish traditions of rural self-sufficiency and community cooperation and the mobilisation of 'non-material' influences.

Since the 1970s and 1980s renewable energy has been accepted into the mainstream energy agenda in an increasing number of countries, and hence its identity has changed from being so much associated with the anti-nuclear movement. Even ecologists' support for renewables has shifted in that, for example, the notion of building interconnectors to shift variable energy supplies across continents is being accepted. However, there is still argument about how far renewables can be absorbed into the conventional energy system without fundamentally changing that system.

Arguments about renewable energy at a local level can be conceptualised as being about conflicts between different identities, for example between public identification with wind farms as clean energy sources and, alternatively, as being in conflict with idealised notions of local place identity. Deliberation is found to have limits in acting as a solution to such identity conflicts.

Chapter 4 concentrates on the development of the first big industrial market for wind power in California. There is a discussion of how an anti-nuclear movement emerged in the aftermath of a vigorous anti-nuclear movement which itself emerged in the context of a strong environmental tradition. The election to Governor of a liberal Democrat, anxious to please liberal activists, led to administrative changes which induced the utilities to give contracts to independent renewable energy companies. This allowed the small wind industry that had emerged in Denmark to grow with a much bigger market. The characteristics of identity EM are much in evidence in the Californian drive for renewable energy in the 1970s and 1980s.

Although the 'wind rush' petered out in the late 1980s, it left a legacy in the form of an example of a new renewable presence. The main elements of 'identity' EM can be seen in the case of California, including the influence of 'non-material' factors. However, since the 1980s the growth in renewable energy has, until very recently, been disappointing. In the 1990s attention shifted towards seeing the introduction of competition in energy provision as the priority.

Chapter 5 examines the factors associated with the development of renewable energy in states with the largest installed wind power capacities. Two key ingredients for success are identified: the Federal-based production tax credit system and RPS measures. While the RPS systems have been billed as 'market-based' instruments, their main utility has been in providing a means of altering the regulatory structure so that the utilities feel they have to invest in renewables or fail to achieve other regulatory objectives which they prefer. Trading in renewable electricity certificates makes little or no difference to the practical operation of RPS systems that are studied in Texas, California, Iowa and Minnesota. California has a highly complex RPS, which is likely to fail to live up to its targets, as the utilities appear to attach different tests to whether to give contracts for wind power projects compared with solar power. By contrast, Texas has a much more rapidly expanding demand for electricity and much fewer administrative constraints on wind power expansion. However, there are few incentives for renewables other than wind power. There is clear evidence of several of the characteristics of 'identity EM' in the cases of the four states covered. These include dedicated incentive structures for renewable energy, independent renewable lobbies, coalitions between renewable trade lobbies and NGOs opposing utility interests and, to a varying extent, development being done by independent companies.

Chapter 6 analyses five further countries, again using 'identity EM' as a framework. These are Spain, Germany, the UK, Australia and China. These countries are selected in order to provide a contrast between countries that all lay claim to having significant renewable energy programmes. Spain and Germany are acknowledged to have advanced renewable energy programmes; the UK programme has taken longer to accelerate, Australia still longer and China is emerging as a major world player in the renewables industries. Germany's renewable expansion, like that of Spain, was begun in the context of strong anti-nuclear sentiments. An important reason for the inclusion of China is not just the importance of that country, but also because it presents us with an opportunity to deploy the 'identity EM' framework in a non-Western, still developing, country. In some respects the results of the analysis are surprising, in others perhaps less so. China it seems, fulfils some of the characteristics of 'identity EM' in ways that are comparable to other cases and to a greater extent than is the case with Australia.

Indeed, there are, in some ways, greater similarities between, say, the cases of Spain and China than between Spain and Australia, including rapidly increasing energy demand and demand for 'clean energy' sources. Key institutional factors that underpin the different outcomes involve perceptions of energy security and the strength of social movements for green energy. A social movement has promoted renewable energy in Germany, and in the 1980s in Spain, although energy security drives a consensus for renewable energy in Spain today, and also, increasingly, in the UK. Australia has less of an impulse to act on energy security concerns because of its perceived identity as a coal exporter.

The concluding Chapter 7 reflects on the results of the use of the theoretical tools, first 'identity EM', and then institutionalism and traditions. The existence of characteristics of 'identity EM' in particular country-case studies is found to be highly associated with the extent of the renewable energy programmes. The debate about 'market-based' or 'command and control' policy instruments is dismissed as a diversion, to the extent to which the discussion needs to be about the most suitable institutions for the promotion of renewable energy. 'Identity EM' is associated with feed-in tariffs as a policy instrument to promote renewable energy, since it involves public identification with, and support for, specific renewable energy technologies.

In discussing these issues I want, in this volume, to focus on the interpretative side of the debates about the emergence, role and importance of renewable energy. I include numbers where appropriate to explain understandings or how positions are justified. However, there is a surfeit

of number-crunching technical analyses of renewable energy. Many of them are highly enlightening and important, such as that produced by Boyle (2004). I have no need to repeat this type of exercise. Renewable energy has not emerged and grown in its modern industrial form simply because technicians have crunched numbers, as important as this sometimes may be to justify value positions. Indeed, the conventional energy industry, which was originally rather indifferent to renewable energy, has always claimed a monopoly of technical wisdom. So how is it that renewable energy has grown? The answer is a political one, and one that requires analysis of history.

Conclusion – research questions

We need to unpack the basic theoretical and empirical aims of the book that were stated at the start of this chapter, perhaps by pointing out a few bullet points. Research questions, therefore, include:

- How suitable are existing versions of ecological modernisation (EM) theory in providing a framework for understanding the renewable energy case? What problems arise when existing versions of EM are applied to the renewable energy case?
- What is the nature of the ‘identity’ EM that is proposed to ameliorate these problems with EM; what are some characteristics of identity EM that can be used to measure the extent of identity EM in case studies?
- What other tools of analysis can be applied to this renewable energy case study?
- How has the ‘identity’ of renewable energy been constructed and how has it changed?
- In the light of this, in what circumstances has renewable energy developed most effectively? What lessons might this have for the future?

2

Revising Ecological Modernisation Theory

At the end of March 2009 the UK's Energy Minister, Mike O'Brien, opened a Conference on the possibilities for UK Ports businesses offered by the prospect of 25 per cent of the UK's electricity supply being met by the Government's programme of offshore wind power. He said:

We need to bring about a revolution in the way energy is produced... Imagine you are pin-striped revolutionaries in the spirit of Che Guevara on the Sierra Madre. (O'Brien 2009)

Less than a month later, the Chairman of the Federal Energy Regulatory Commission declared that the USA could in future substitute renewable energy for nuclear and coal-fired sources of electricity. 'We may not need any [new nuclear or coal plants] ever,' said the FERC Chairman Jon Wellinghoff (Johnson 2009).

All of this may be dismissed as (partly) public relations bravado, but the contrast with the position of the nascent wind power and new renewable energy movement thirty years previously is striking in the sense that times have moved on. Then the grass roots were calling for an energy revolution from below, but now renewable energy is being promoted by policies from above. As we shall see in later chapters, many anti-nuclear radicals of the 1970s saw renewable energy as a decentralised alternative to the centrally inspired notions of large power stations. Yet here are government ministers and CEOs of key energy regulators trying to inspire representatives of corporate capitalism to invest in technologies, particularly wind power, that have now become very large-scale. Moreover, they are inciting such activity in pursuit of a Government strategy that has an avowedly environmental objective, that of tackling global warming as one of its supreme objectives. This

chapter aims to answer the question: to what extent can existing, or possibly adapted, versions of ecological modernisation (EM) help us understand the emergence and development of renewable energy as a policy and political phenomenon?

As was suggested in the Introductory Chapter, EM may be succinctly defined as one involving an approach, by business, to environmental protection through technological development, which improves both economic development and environmental protection to be a sum than is greater than its parts. It has come to encapsulate EU strategy (Murphy and Gouldson 2000). Toke (2002a, 147) lists six points as being central to EM:

First is the idea that economic and environmental objectives can be simultaneously achieved with a positive sum outcome. Second, economic development and ecological protection are both desirable objectives for the welfare of both present and future generations. Third, is the 'polluter pays' principle. Fourth is the notion of a 'holistic' approach to problem-solving that dismisses any idea that environmental problems can be dealt with individually. Fifth, environmental protection policies need to be dealt with in a market context, but accompanied by government intervention. Finally, nations need to adopt ecologically sustainable policies in order for them to compete effectively with other countries.

As Barry and Paterson (2004) have pointed out, the EM discourse has proved to be attractive to avowedly 'modernising' governments such as New Labour. Following on from Mol (2001), they argue that globalisation tendencies have both enabled and limited the possibilities for New Labour's environmental reforms.

EM may apply most to richer industrial economies, but it may also apply to an increasing extent to developing economies that are attempting, through market pressures and also governmental design, to incorporate environmental objectives into their development paths.

Ecological modernisation is clearly distinguished from so-called 'dark green' approaches by having a positive attitude to economic development, provided it can combine this with an ecological rationality. Ecological modernisation also has a positive view of the use of technology to deal with environmental problems, although that is far from saying that this is the only significant aspect of ecological modernisation (Mol 2006). However, in this it is sharply distinguished from dark green views. According to Dobson (1995, 96): 'What can be said, it seems to

me, is that wholehearted acceptance of any form of technology disqualifies one from membership of the dark-green canon.' However, as we shall see, taking the side of ecological modernisation in this dispute leaves various questions of emphasis unanswered: in particular, who defines the relative priorities given to ecological and developmental objectives, and, connected with this, which technologies are chosen and who exercises the technological choices.

The importance of finding answers to this question lies both in helping to understand renewable energy policy outcomes and also in improving understanding of ecological modernisation theory. In doing so, we can reflect on the utility of different versions of EM. As will be discussed, I focus on analysis on two existing variants of EM in particular – a so-called 'mainstream' version and a so-called radical version – and I outline a third notion of 'identity' EM, which may be used as a template for analysis of the development of the renewable energy industry.

EM theory is used here in the form of a way of analysing how environmental change is (or is not) incorporated in business and the economy. According to Carter (2001, 213): 'Perhaps the most distinctive feature of ecological modernisation is that it directly addresses the business sector, whose support... is vital for any transition towards a more sustainable society.' It is to be distinguished, at least in what is here called the 'mainstream' form, from sustainable development by its Western focus and its relative lack of focus on equity issues (Langhelle 2000).

I attempt to set out an account of how ecological modernisation is played out in the case of renewable energy. In doing so I relate my approach to what Buttell (2000) calls a) the 'objectivist' and b) the 'social constructionist' approaches to EM. He identifies the mainstream variant of EM as being identified with authors such as Huber (1991; 2004), Janicke (2008), Mol (1995; 1996) and Mol and Spaargaren (2000). Buttell describes this approach as 'objectivist' in the sense that EM is used to analyse how ecological change occurs as, most basically, a process whereby conventional industry adapts its technologies and practices as a response to social pressures to achieve environmental objectives. The 'social constructionist' (or what I call 'radical') approach, on the other hand, analyses EM as discourses about environmental policy that are objects of critique and can only result in sustainable outcomes if 'bottom-up' patterns of deliberation are involved. The discourse-deliberation approach is articulated by Hajer (1995). Christoff (1996) introduces a distinction between 'strong' and 'weak' ecological modernisation. This normative approach in many ways extends and clarifies points made by Hajer (1995) and is thus also labeled as being in