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Converging agendas? Energy and climate change policies in the UK

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Abstract

In the UK, climate change and energy have converged on the policy agenda. We discuss the implications for theories of policy change based on well-defined networks located within single, discrete policy domains. We suggest that such approaches struggle to account for the dynamics of change in conditions of policy convergence. The issue of climate change has opened up and destabilised the UK energy policy sector, but this process has been surprisingly free of conflict, despite radical policy shifts. To date, convergence of the energy and climate change sectors has largely occurred at a discursive level, and we focus our attention on a number of different, but largely complementary, storylines about solutions to climate change. We draw on ideas about socio-technical regime transitions to explore first why the storylines are not in obvious conflict, and second to identify small-scale niches where tensions in storylines do emerge as discourse is translated into material reality.

Keywords

Introduction

The early years of the twenty-first century have seen energy policy become a subject of sustained public and political attention in the UK. The plethora of policy reviews and White Papers since the turn of the century is indicative of this revival (DTI, 2003, 2006a, 2007; PIU, 2002; RCEP, 2000; Stern, 2006), while problems such as security of supply, rising energy prices, fuel poverty and climate change compete for attention on the policy agenda (DTI,

2003). At the same time, climate change has risen to prominence as an emblematic issue: one

that functions 'as a "metaphor" for the environmental problematique at large' (Hajer 1995:

5). The most radical changes in energy and climate change policy have taken place at the

level of policy discourse (see for example DTI, 2003, 2007): for many commentators,

translation into effective policy action has been frustratingly slow. For example, the

Sustainable Development Commission (SDC), the UK Government's sustainability advisor,

has criticised poor progress towards climate change targets, claiming that "…current methods

of dealing with climate change are incompatible with the task at hand" (SDC, 2006a: 6). We

concentrate our analysis here on the level of policy discourse, focusing on the energy and

climate change storylines that have emerged in the UK energy sector, and their implications

for understanding the processes of policy change and implementation.

We suggest that as the issues of energy and climate change have gained policy prominence,

in the past two decades they have converged.[i]   In the early 1990s, energy and climate change

were relatively discrete policy arenas. While the new issue of climate change intersected with

a number of existing policy areas (e.g. transport, energy, housing, overseas development),

during this period it was closely tied to one government department – the Department of the

Environment - and associated interests, while remaining peripheral to the agendas of other

policy sectors. We propose that it has primarily been in the energy policy arena that policy

convergence has taken place and we focus our analysis on this process. We argue that this

process should be considered in terms of *convergence* because energy policy has become a

key arena within which policy actors seek solutions to climate change, while the climate

change policy agenda has become integral to energy policy. Further, the integration of energy

and climate change ideas, goals and policy mechanisms discussed below suggests that this is

more than the rise of an 'external' issue on the policy agenda of a defined sub-domain. In this

paper, we suggest that convergence of this kind poses critical challenges for theories of policy change that are based on discrete sectors responding to abrupt, short-lived problems, typically in a conflictual way (Dudley, 2003; Hajer, 1995; Ham and Hall, 1993; Sabatier, 1999). New insights are required to account for policy dynamics that are more consensual and that take place beyond the confines of one particular policy sector.

Drawing on theories of policy and technological change, we expand our assessment of the dynamics of policy convergence as follows. First, we introduce a number of theories of policy change, concentrating our analysis on those that try to conceptualise the messiness of change, and those that pay attention to discourse. Second, we explore in detail how energy and climate change policies in the UK have converged in the period 1990 to 2007. The process of convergence has not been marked by conflict: indeed, despite the radical nature of some developments (for example, agreement on a 60% cut in carbon emissions), it has been surprisingly consensual. This calls into questions the assumption that rival storylines drive policy change through conflict (Hajer, 1995; Szarka, 2004). Third, we identify four important storylines which we suggest have been influential in driving the convergent policy process, and make two key observations which raise questions about innovation in situations of policy convergence: first, that these storylines do not have distinct networks of actors – or discourse coalitions – associated with them, and, second, that the storylines do not appear to be in conflict, but happily co-exist. These dynamics – convergence, radical but consensual change, and storylines without associated coalitions – suggest that we need to rethink crucial aspects of policy analysis. To this end, in the fourth section of the paper we introduce ideas from science and technology studies about socio-technical regime transitions. We argue that the low level of conflict between our storylines stems in part from all four of them having been shaped by the incumbent energy regime. In other words, climate change has been

framed as a problem that can be solved by existing energy technologies and practices, for example nuclear power and energy efficiency. It is only when climate change discourse is implemented that underlying tensions in storylines emerge. Socio-technical regime theory is helpful in drawing attention to these small-scale arenas or 'innovation niches' where translation of discourse into material realities is occurring. In conclusion, we review the implications of policy convergence for existing theories of policy change.

Theorising policy change

The policy agenda has been defined as "the list of subjects or problems to which governmental officials, and people outside of government closely associated with those officials, are paying some serious attention at any given time." (Kingdon, 1995: 3). How issues come to dominate this agenda has long been a subject of interest among policy theorists (Baumgartner and Jones, 1993; Hannigan, 1995; Jacobs et al., 2003; Kingdon, 1993, 1995). The seemingly chaotic aspects of agenda setting, the initial 'framing' of policy problems, and the ability of certain issues to catalyse radical policy change have all been scrutinised (Dudley and Richardson, 1998; Jordan and Greenaway, 1998; Richardson, 2000; Sabatier, 1999; Smith, 1997; van der Knaap, 1995). Kingdon (1995) suggests there are three largely independent process 'streams' of problems, policies and politics in a state of constant flux, and it is when these streams merge that an issue commands attention and can rise rapidly on the policy agenda. His model nicely captures the unpredictability of policy change and the role of chance in the policy process. One widely-shared idea is that radical change is catalysed by drivers external to the policy domain or subsystem[ii] under study (Jordan and Greenaway, 1998; Sabatier, 1998, 1999). These external drivers are typically relatively abrupt, short-lived problems that are resolved in a conflictual way through challenging and

destabilising existing interests (Jordan and Greenaway, 1998; Marsh and Rhodes, 1992a; Rydin, 1999; True et al., 1999). Policy change is alternatively conceived of as taking place more gradually through internal shifts within a policy domain, through the diffusion of new ideas or the uptake of new policy instruments within a dominant policy coalition, again as the result of conflict between particular policy networks or coalitions (Bulkeley, 2000; Daugbjerg, 1998; Hajer, 1995; Jordan and Greenaway, 1998; Sabatier, 1999; Smith, 1997).

Policy network approaches offer a promising starting point for considering the dynamics of convergence. The concept of a policy network is, of course, a broad one: there are many different kinds of networks, some tightly defined and exclusive (e.g. the policy communities identified in 1970s Britain by Richardson and Jordan (1979)) and some much looser (e.g. Heclo's issue networks, Sabatier's advocacy and Hajer's discourse coalitions (Hajer, 1995; Heclo, 1974; Sabatier and Jenkins Smith, 1993)). Further, the various policy networks are linked by different types of 'glue', including resource dependencies, values and beliefs, storylines, and knowledge (Haas, 1992; Hajer, 1995; Marsh and Rhodes, 1992b; Sabatier and Jenkins Smith, 1993). However, despite the potential for network members to be dispersed across multiple policy sectors, even the more flexible, open networks are still seen as operating within the boundaries of particular policy domains (see, for further discussion, Marsh and Rhodes, 1992b; also Richardson, 2000; Richardson and Jordan, 1979), as Richardson (2000, emphasis added: 1008) describes:

'… policy communities and networks may become linked in a rather messy and unpredictable chain of actors, who do not know each other well and who do not speak the same "language". …Such large and diverse collections of stakeholders may be a

"network" only in the very loosest of senses. *They inhabit the same policy arena or domain* but only minimal interaction occurs'.

As Richardson hints, different types of policy network can co-exist at any one time. It has also been suggested that the type of network in operation in a policy domain evolves over time, in particular that the trend from government to governance has been associated with the emergence of wider, looser networks (see Hajer and Wagenaar, 2003).

A number of policy theories based on the fluidity of policy change and loose policy networks are therefore helpful in furthering our understanding of the ability of environmental issues to destabilise and open up traditional policy sectors. However, they fail adequately to capture the dynamics of policy convergence, based as they are on the notion of change taking place within relatively bounded policy arenas and in response to short-lived solvable policy problems. The concept of a discourse coalition, brought into familiar use by Maarten Hajer (1995), is probably most relevant for our analysis because of its dual emphasis on understanding how fluid networks respond rapidly to policy shifts, and the role of narratives or storylines in creating opportunities for change. In UK energy and climate change policies it is at a discursive level – with the emergence of key storylines – that convergence is most evident, as we detail below. For Hajer, discourse coalitions unite around "shared terms and concepts through which meaning is assigned to social and physical processes and the nature of the policy problem under consideration is constructed" (Hajer 1996: 247). These 'shared terms and concepts', or 'storylines' provide a way of uniting different elements of physical and social realities into specific, closed problems and giving them meaning (Hajer 1995a: 56). In this way, storylines structure the overall terms of debate, and set limits on what practices and solutions are deemed to be suitable and reasonable. Most significantly for our

argument, new storylines can stimulate policy change through the re-ordering of meaning (Hajer 1995a: 56; see also Thompson and Rayner 1998: 325), enabling new definitions of the problem at hand and its concomitant solutions (Bulkeley 2000).

The discourse coalition approach, with its focus on the emergence and hegemony of particular storylines, overcomes some of the weaknesses of traditional policy network accounts in opening up the dynamic of policy processes. Discourses may be shared across looser networks where there is little evidence of shared interests. At the same time, discourses are multiple, allowing for flexibility in network alliances. However, despite the potential for multiplicity and loose ties, analysts of discourse coalitions have primarily focused on cases where there are two (rather tightly defined) coalitions in opposition within a single policy domain (Bulkeley, 2000; Hajer, 1995; Mander, 2007; Szarka, 2004). It is the conflict between storylines that is seen as driving the policy process, what Hajer terms an 'argumentative approach', which "… conceives of politics as *a struggle* for discursive hegemony in which actors try to secure support for their definition of reality." (Hajer, 1995, emphasis added: 59). Hajer distinguishes between discourse structuration and discourse institutionalisation: the former has occurred when policy actors feel obliged to use a certain storyline in order to appear credible, and the latter when discourse becomes reflected in policies and institutional arrangements. If both processes are successful then a discourse becomes hegemonic.

In relation to energy and climate change, we suggest that the focus on discourse as the key structuring force of policy problems underplays the material realities within which policy operates. As Hajer himself admits in his analysis of discourse and policy change in relation to the problem of acid rain, "As it stands the acid rain case reveals a paradox. While acid rain

was in the end generally accepted as a programmatic issue that called for a change of policy strategies, *the selected remedial measures failed to give a material form to the new reality.* " (Hajer, 1995, emphasis added: 267). It is this moment of policy change - the translation of discourse into material reality - that we are particularly interested in in relation to UK energy and climate change policy, for it is at this point in the policy process that progress in mitigating climate change appears to have stalled. We suggest there may be a limit to the role of discourse as an agent of change. What is lacking from policy theories centred on discourse is consideration of how policy making takes place in the context of an existing material or physical infrastructure, which can exert significant influence on policy, structuring how problems are conceived and addressed. The materiality of policy change is particularly important for analysis of policy issues such as energy, which is dominated by a geographically-widespread, capital intensive, durable infrastructure, comprising a complex system of energy generation, transmission and distribution (Graham and Marvin, 2001; Lovell, 2007a; Smith et al., 2005). The existing physical infrastructure including, for example, power stations, distribution systems, buildings and meters, shapes the range of possible options for policy implementation. We need, then, to consider both the discursive and material dimensions of policy convergence, policy change and implementation. The concept of socio-technical regimes is relevant because of its emphasis on the interplay between human actors and technologies,[iii] and because of the notion that regimes become 'locked-in' to a particular technological trajectory over time, which shapes, and is shaped by, policy discourse (Smith et al., 2005). We discuss in more detail below the ways in which materials and technologies also influence discourse because interests within the existing energy regime are able to structure the overall terms of policy debate.

In summary, we find that many existing concepts of the policy process focus on conflictual change within policy sectors or domains, driven by a mixture of 'internal' and 'external' dynamics and orchestrated through networks located within these domains. Such approaches have not considered the dynamics of policy convergence. Concepts of discourse coalitions provide much needed flexibility in terms of how networks are constituted and operate, but neglect the role that material infrastructures play in influencing discourse. Discourse coalition theory also remains centred on the idea of policy change taking place through power struggles between different networks in a sector, whereas energy and climate change policy convergence in the UK has been relatively harmonious and consensual, as we show in the following section.

Energy and climate change: a policy convergence

In the 1990s the primary focus of UK energy policy, under successive administrations, was the shifting of ownership and management of the energy network from the public to the private sector, in keeping with a neoliberalist political agenda. The 1989 *Electricity Act* set out the framework for privatisation of the electricity industry (UK Government, 1989), with the key objectives of reducing prices and increasing consumer choice. This process also laid the foundation for the UK's approach to climate change. In the wake of electricity privatisation, the government found itself in a strong position to argue for greenhouse gas emissions reductions, largely because of fuel switching in electricity production – the so-called 'dash for gas'. The UK actively supported the United Nations Framework Convention on Climate Change signed in Rio de Janeiro in 1992, and has continued to be assertive in the international arena (see for example UK Government, 2005). Domestically, debate centred initially on the potential introduction of a carbon tax (which met significant opposition), on encouraging energy efficiency in households and businesses, and on renewable energy

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support mechanisms, in the form of the non-fossil fuel obligation (Collier, 1997; O'Riordan and Rowbotham, 1996).[iv]

In 1994, climate change policy was formalised with the publication of the government's first Climate Change Programme (Department of the Environment, 1994), which outlined policies designed to achieve a reduction in greenhouse gas emissions to 1990 levels by the year 2000. The policy measures forming the backbone of the Programme were the imposition of Value Added Tax (VAT) on domestic fuel and the establishment of the Energy Saving Trust (Collier, 1997; O'Riordan and Rowbotham, 1996). Ironically, the very 'dash for gas' that led the UK to provide international leadership on the issue of climate change provided little impetus for domestic action. With emissions of greenhouse gases falling relative to 1990 levels, there was limited appetite for engaging in additional policies and measures. While some new initiatives were introduced following the 1997 election of the Labour administration, notably a higher rate fuel duty escalator (which was short-lived) and the climate change levy on large energy users, climate change remained marginal to the energy policy agenda. Indeed, in the absence of new external drivers – often seen as crucial in the process of policy change (Kingdon 2003, Sabatier 1987) – energy itself faded as an issue on the government's agenda (RCEP, 2000).[v]

By the turn of the century, however, conditions had changed in both the climate change and energy policy arenas. In the former, disquiet began to be voiced about the lack of action being undertaken domestically by the UK, particularly given its strong international stance.[vi] A raft of detailed scientific studies also showed increasing evidence of the problem of climate change (see IPCC, 2001): the messages from the scientific community were becoming more urgent and persuasive. In response to these pressures, the government published a revised

Climate Change Programme in 2000 (DETR 2000). Shortly afterwards, an influential report by the UK Royal Commission on Environmental Pollution (RCEP, 2000) catalysed reinvigoration of the climate change debate, and brought this issue squarely onto the agenda of energy policy. The RCEP proposed that the UK adopt an ambitious, long-term target of a 60 per cent reduction in greenhouse gas emissions from 1998 levels by 2050. It was also important in focusing attention on the need for the state to re-engage with the energy sector, after the 'hands off' approach of the 1990s. With (re-)emergent concerns about security of energy supply and the future of nuclear power, as well as climate change, it is perhaps not surprising that the government response to the RCEP report was also located within energy policy. Its initial reaction was to set up a Performance and Innovation Unit (PIU) Review, which was significant as the first 'internal' analysis to position climate change as a critical problem for the energy sector (PIU 2002; see also UK Government 2003). The Review stated clearly that:

"Climate change objectives must be achieved through the energy system."
(PIU, 2002: 5);

and in a foreword by Prime Minister Tony Blair it was acknowledged that:

"Alongside low prices and secure supplies, climate change has become a central aspect of energy policy."
(PIU, 2002: 3).

The PIU review paved the way for a new White Paper on energy, the first comprehensive energy White Paper since 1967 (see Wade and Leach, 2003). It was in the White Paper that

the government first committed to a goal of reducing carbon dioxide emissions by 60 per cent

by 2050, as recommended by the RCEP (DTI, 2003; RCEP, 2000). The 2003 White Paper

had a strong focus on both energy efficiency and renewable energy as solutions to climate

change, operating within an international market framework. It was criticised, however, for

being strong on rhetoric about climate change but lacking in substance and detailed policies

(see for example HoC Environmental Audit Committee, 2003).

Despite the new position of climate change as a central issue on the energy agenda, the

debate about the nature of the UK's energy policy remained wide open. In particular,

concerns about energy security and the resulting impact on fuel prices continued to be voiced.

Fossil fuel prices rose sharply in 2004 and the reliability of gas exports from Russia to

Europe came under scrutiny (DTI, 2006b). The Ukrainian gas pipeline conflict early in 2006

represented a policy 'focusing event' (Kingdon, 2003), strengthening concerns about the

UK's security of supply (DTI, 2006b). Further, the UK's North Sea oil and gas reserves

appeared to have peaked: the UK was a net importer of gas for the first time in 2004 (ibid.

2006b). The 2003 Energy White Paper appeared to some insufficient as a response to these

issues (see for example CBI, 2007).

In parallel, it became clear as early as 2004 that the Climate Change Programme of 2000

(intended to cover ten years) would not deliver its target reductions in greenhouse gas

emissions, and a policy review was launched (see DEFRA, 2007b). Although emissions fell

overall by 14.6% between 1990 and 2004 (DTI, 2006b), carbon dioxide emissions were

increasing by approximately 2% per annum from 2002 (DEFRA, 2005). The government

admitted that it was unlikely to meet its goal of a 20% reduction by 2010, initially estimating

a 10MtC shortfall, but subsequently revising this upwards to 15 MtC (ibid. 2006a).[vii] In

2006, a revised Climate Change Programme was published, emphasising in particular the international role of the UK in tackling climate change (DEFRA, 2006a). Subsequently, the government brought its draft Climate Change Bill to Parliament. Although resisting pressure to pledge annual targets for emission reductions (see Friends of the Earth, 2006), the draft Bill, under consultation since March 2007, seeks to make legally binding the government's long-term target of a 60 per cent reduction in carbon emissions by 2050. It also proposes to establish an independent Carbon Committee to help ensure progress towards the 2050 target (DEFRA, 2007a). Such was the level of activity on climate change in the UK and across the globe that an article in the Guardian newspaper described 2006 as:

> "The year the world woke up… to the vast economic, political and social
> implications of climate change… [and] politicians scrambled to beef up their green
> policies and credentials…"
> (Vidal, 2006: 2).

A key element of this awakening was the publication, in October 2006, of the Treasury-commissioned Stern Review, focusing on the detrimental economic impacts of failing to mitigate climate change (Stern, 2006). Stern estimated that unabated climate change could cost the world economy up to 10% of global GDP, with a possible reduction in average global individual consumption of 20%. Written by the former chief economist and senior vice-president of the World Bank, Sir Nicholas Stern, this report prompted an extraordinary volume of coverage and comment (see for example BBC, 2006).

Even with this renewed policy vigour, concerns were still raised. The 2006 Climate Change Programme was criticised for not developing enough new policies to make substantial cuts in

UK carbon emissions (SDC, 2006a). Concerns were also raised about lack of coordination with yet another review of energy policy (Environmental Audit Committee, 2006); illustrating how, despite the convergence of energy and climate change issues, there remained longstanding departmental tensions with the Department for Trade and Industry co-ordinating the Energy Review and the Department for Environment, Food and Rural Affairs leading the Climate Change Programme. Coming so soon after the 2003 Energy White Paper, the 2006 Energy Review aroused suspicion that pressure was being placed on the government by the nuclear industry to make a decision on the future of nuclear power generation, an issue left open by the 2003 Energy White Paper (FoE, 2006a; Green Alliance, 2006). In the 2006 Review the government finally gave its support for construction of a new generation of nuclear power plants, although questions remained about the likelihood of the private sector committing to such a financially risky venture (see Marks, 2006). The government's support for nuclear power was strengthened by the publication of another Energy White Paper in May 2007 (DTI, 2007), and the simultaneous launch of a public consultation on nuclear energy . The 2007 Energy White Paper was widely interpreted as being solely about the future of nuclear power (see for example Adams, 2007; FoE, 2007),[viii] an energy generation technology presented as a solution to the two main problems facing the energy sector: climate change and energy security. So, despite the renewed interest in issues of energy supply and security, climate change remained squarely within the energy policy frame.

Out of this period of intense policy flux the energy policy sector emerged as a key terrain within which climate change ambitions would be pursued. Equally, climate change became a central factor in the determination of energy policy. This emblematic environmental issue had effectively merged with and reorientated UK energy policy, in a process surprisingly free of visible conflict. Disputes were limited to specific debates (e.g. over the introduction of

carbon tax or the contribution of nuclear power) rather than about the broader integration of energy and climate change policy. In what follows, we consider the storylines that have arisen from this convergence, before examining the resulting policy dynamics and their implications.

The energy-climate change storylines

As noted above, convergence between the UK's climate change and energy policies has largely taken place at a discursive level. That is why we turn our attention now to the particular narratives or storylines that have emerged from this convergence. Across a range of actors involved in the two policy domains, we can identify a number of distinctive, though to some extent interrelated, narratives about how best to tackle climate change, of which four – 'energy supply', 'energy demand', 'market mechanisms' and 'international solutions' – are the most prominent (see Figure One). We have identified these narratives through a process of policy literature review and qualitative discourse analysis, concentrating in particular on key government documents in the period from the late 1990s to 2007, such as the 2003 Energy White Paper and the 2006 Energy Review (DTI, 2003, 2006b). We used qualitative analysis software (ATLAS) to code policy documents and other relevant literature from corporations and non-governmental organisations; the four narratives emerged from this coding. We view the narratives as storylines, defined by Hajer as "narratives on social reality … that provide actors with a set of symbolic references that suggest a common understanding" (Hajer, 1995: 62). The storyline concept is particularly apt because storylines are seen as a critical way of enabling policy change in situations of policy flux through developing common understanding of new problems and possible solutions (Hajer 1995). Conceptualising the narratives as storylines is therefore more appropriate than, for example,

as discursive 'frames' because the idea of a frame has been used primarily to explain situations of policy stability, rather than uncertainty and change (Laws and Rein, 2003; Rein and Schon, 1993).

Here we concentrate on two unusual findings; first, that these storylines seem happily to co-exist, and not to be in conflict as some of the literature on policy change would suggest; and, second, that the storylines do not appear to have distinct groups of actors – discourse coalitions – uniquely associated with them.

Figure One – Principal climate change storylines

Climate change as a problem of energy supply
The problem of climate change requires a shift away from carbon-intensive energy generation in the UK. This is a technology-dominated storyline, focusing on the supply mix rather than on a reduction in energy demand. Key aspects of the storyline are the need for a diversity of energy generation technologies and an emphasis on technological innovation. As much of the UK's energy infrastructure is reaching the end of its technical life-time, the energy supply storyline fits with other policy goals such as maintaining the reliability and diversity of the UK's energy supply (DTI, 2006a). Although it is an influential, well-established storyline, it is also a fractured one. There are deep fault lines within it, for instance between pro- and anti-nuclear groups, between opposing views about on-shore wind power, and, increasingly, between centralised versus distributed generation.[ix] Nonetheless, the central claim that new forms of energy supply are needed for addressing climate change remains a core discursive position.

Climate change as a problem of energy demand
The energy demand storyline sees climate change largely as a problem of increasing energy consumption. Individual behaviours – driving large polluting cars, using an excessive number of electrical appliances, leaving appliances on standby, and taking frequent short haul flights – are targeted as the root cause (see for example Greenpeace, 2006). In short, climate change has emerged as a symptom of a wasteful society. Demand reduction has been framed in terms of technical efficiency; even where reduction is advocated, it is seen to be a matter of personal responsibility and choice in the main, in line with the market efficiency storyline. Policy solutions in keeping with the energy demand storyline include increases taxes to discourage carbon-intensive consumption patterns (e.g. on air fuel), and the idea of Personal Carbon Allowances (DEFRA, 2006b).

Climate change as a market efficiency problem
In this storyline the market itself would provide a solution to climate change if it took into account the societal and environmental cost of carbon emissions. In other words, the problem is the absence of a price for carbon. The objective is not to change fundamentally the way in which energy markets operate in the UK, but to re-orientate decision making so that market actors can take into account the cost to society of carbon emissions.

Climate change as an international problem
The narrative about climate change being an international problem positions the UK as a relatively minor contributor to the global problem of climate change, with responsibility for only 2 per cent of global emissions (DEFRA, 2006a). Climate change is an international problem that needs global solutions. UK government policies and initiatives compatible with the international storyline include: the G8 Gleneagles agreement (UK Government, 2005), the Stern Report (Stern, 2006), and the UK-California agreement (UK Government, 2006). It is perhaps no coincidence that this storyline emerged at the same time as the evidence mounted for rising domestic carbon emissions – it has found favour in part because it deflects attention away from domestic climate change policies.

Type of actor	Examples of climate change storylines			
	Market efficiency	**Energy supply**	**Energy demand**	**International problem**
Government	" we need to prepare for an energy system that is likely to be quite different from today. It will be for the market to develop and invest in this." (DTI, 2003). "The market framework must ensure that companies make investments in the UK in a way that reflects our public policy goals, particularly for the reduction of carbon." (DTI, 2006b).	"The best way of maintaining energy reliability will be through energy diversity. We need many sources of energy, many suppliers and many supply routes." (DTI, 2003). "Just as science and technology has given us the evidence to measure the danger of climate change, so it can help us find safety from it."(Blair, 2004).	"Improvements in energy efficiency… represent potentially the most cost-effective way of delivering our energy policy objectives." (DTI, 2006b).	"national action can only be part of a much bigger strategy. The UK is responsible for 2 per cent of global emissions… Climate change is a global problem that requires a global solution." (DEFRA, 2006a, foreword of the 2006 Climate Change Programme by Tony Blair). "UK emissions are only about 2% of total global emissions. Tackling climate change, to be successful, therefore has to be an international effort."(DTI, 2006b).
Non-governmental organisation - Friends of the Earth (FoE)	describes the EU emissions trading scheme, which came into force on January 1st 2005, as "the most important piece of climate change legislation anywhere in the world to date." (FoE, 2004).	"The world urgently needs to move to cleaner, safer energy sources if we are to tackle climate change" (FoE, 2006c) "A major part of the solution to tackling climate change would be for households - and businesses - to generate their own low-carbon power." (FoE, 2006d).	"Reducing demand for energy is the first priority." (FoE, 2006b) "… to avoid the worst impacts of climate change we must reduce carbon dioxide emissions substantially" (FoE, 2006b).	"We call upon world leaders to demonstrate the urgently required leadership to build a stronger, improved and expanded Kyoto.." (FoE, 2006e).
Corporate actor– British Petroleum (BP)	"… deriving a cost - or a price - for carbon is so important– whether through emissions trading schemes or other policy instruments – so that we can encourage the best outcomes in both carbon and economic terms." (Cox, 2006).	"We need to find ways of expanding the supply of energy which offer substitutes rather than relying on ever greater volumes of oil." (Browne, 2006).	"But these emission reductions can come about in different ways. Some will be from incremental improvements…gradually implementing energy efficiency and operational improvements…." (Cox, 2006).	"we need…solutions which are inclusive, and which work through cooperation across national and industry boundaries." (Browne, 1997).
Government advisory body – the UK Sustainable Development Commission (SDC)	"… the SDC has recommended that economy-wide emissions trading should be the policy framework within which action on climate change takes place." (SDC, 2006a).	"Having examined a broad range of studies that offer different scenarios of our energy future, it is clear that there is more than enough renewable resource in the UK to provide a diverse, low carbon electricity supply." (SDC, 2006b)	"Significant improvements in energy efficiency, leading to overall reductions in demand, is a priority for action" (SDC, 2006b). "We must close the so-called 'energy gap' before trying to fill it… the Government should.. do more to promote energy saving." (SDC, 2006b)	"…UK action on climate change must be part of a much greater international effort" (SDC, 2006a) "The SDC recognises that reductions in UK carbon emissions will have only a small effect … in the longer term an international effort of momentous proportions is required." (SDC, 2006a)

Table One – Four climate change storylines

Table One shows how all four storylines have been used by different types of actor, including government, non-governmental organisations, business and policy advisory bodies. The documentary evidence in Table One is far from exhaustive; rather it is intended to provide a basis for further discussion and research. One preliminary observation is that all types of organisation appear to be using all of the storylines, without apparent conflict. For example, Friends of the Earth (FoE) uses the market efficiency storyline in describing the EU emissions trading scheme as "the most important piece of climate change legislation anywhere in the world to date." (FoE, 2004), but it also draws on the energy demand storyline in its statement that "Reducing demand for energy is the first priority." (FoE, 2006b). Similarly, British Petroleum (BP) invokes the energy supply storyline, as one might expect, stating that "We need to find ways of expanding the supply of energy which offer substitutes rather than relying on ever greater volumes of oil" (Browne, 2006); but it simultaneously makes use of the energy demand storyline, explaining, for example, how "… emission reductions can come about in different ways. Some will be from relatively incremental improvements… gradually implementing energy efficiency …" (Cox, 2006).

Our second, related observation is that we found little evidence that the storylines have clearly-defined groups of actors – discourse coalitions – associated with them. Hajer describes storylines as: "… the essential discursive cement that creates communicative networks among actors with different or at best overlapping perceptions and understandings." (Hajer, 1995: 63). But in our analysis there were few identifiable signs of the emergence of distinct networks or coalitions tied to particular storylines (with the exception perhaps of the demand reduction storyline being associated with environmental groups (see for example CAT, 1995; FoE, 2006b, though even this is not an exclusive association). Rather, multiple groups of actors are voicing a set of plural and complementary storylines. Thus in the absence

of specific coalitions promoting them, the storylines about energy and climate change are not obviously in conflict at the broad level of national policy, though each has a different emphasis. Moreover, there is no clear sign of progression towards any one storyline, or a narrower definition of the problem, becoming dominant. This is not what we might expect from discourse coalition theory, in which the process of policy change involves a struggle for hegemony, and over time a policy problem gradually becomes more narrowly defined as one coalition and its storyline comes to dominate the policy process (Dryzek, 1997; Hajer, 1995). Indeed, this narrowing of problem definition is seen as an essential step to effective policy making (Hajer, 1995). The multiplicity of actors using the climate change storylines suggests that storylines are independent of – or at least can become detached from – particular coalitions, and raises interesting questions about how such storylines emerge and are maintained. There are significant implications for ways in which policy change can be conceived. If conflict and fractious debate is relatively scarce within the newly-converged energy and climate change policy sector, does this suggest that significant change is now taking place in different arenas or sites? In response to these two issues –the origin of storylines, and the location of radical policy change – we propose an alternative framework intended to capture the nature of policy dynamics in situations of convergence. For this we look to theories from outside the conventional policy literature.

Understanding the socio-technical dimensions of policy convergence

The dynamics of energy and climate change policy convergence suggest we need to rethink some aspects of policy change. Here, we suggest concepts from science and technology studies about socio-technical regime transitions can be instructive, in particular concerning

the relationship between socio-technical networks and discourse, and the different scales at which innovation occurs.

First, a number of authors have examined the relationship between policy discourse and material infrastructures in the dynamics of change within socio-technical regimes (Lovell, 2007a; Rohracher, 2001; Smith and Stirling, 2006; Smith et al., 2005; Weber, 2003). There are four types of response of socio-technical regimes to critical problems such as climate change: endogenous renewal, re-orientation of trajectories, emergent transformation and purposive transitions (Smith et al., 2005). A crucial step in determining a regime's response is how problems are articulated, or translated into discourse. With a socio-technical regime such as energy, where there is a capital-intensive, durable, geographically-widespread infrastructure and associated institutionalised networks, a typical reaction to a significant problem such as climate change is endogenous renewal, defined as a coordinated process of internal regime adaptation, whereby solutions to particular problems are found within the existing regime, and "decisions over future technological choices [are] guided by past experience" (Smith et al., 2005: 1500). From this perspective, the four climate change storylines can be viewed as the product of an overall strategy of *endogenous renewal*: they have all been influenced by the existing socio-technical energy regime to fit with a 'business as usual' trajectory of growth for the energy sector. Endogenous renewal thus offers some explanation as to why it might be that the four storylines associated with the convergence of the British energy and climate change sectors appear to coexist – because they have all been heavily influenced by the existing energy regime. Conflict levels remain low because of the close association between discourse and existing practices, technologies, institutions and interests.

What we wish to emphasis here is how the material aspects of policy making – the substance of policy – can play a critical role in setting the overall boundaries of policy discourse. This is not to imply technical determinism or simple causality – that discourse has arisen directly out of the physical energy infrastructure. The concept of endogenous renewal is *socio*-technical, demonstrating how powerful interests embedded within regimes devote resources to presenting significant problems as solvable within the existing regime (Hughes, 1983; Kemp, 1994; Smith et al., 2005; Tarr, 1999). Further, the relationship between discourse and materials within socio-technical regimes is, of course, two-way. It is not just that the physical infrastructure of incumbent regimes has an influence on discourse, but that discourse in turn shapes decision making about technologies, and opens up opportunities for change as new understandings of a problem emerge.

The domains of energy efficiency and nuclear power illustrate how existing practices, institutions, interests and technologies have been reframed as being 'low carbon' in response to climate change. Toke (2000), for example, describes how climate change is the latest of a long list of policy problems to which energy efficiency measures such as insulation and window glazing have been attached. Similarly, Bickerstaff et. al. (2007) describe the way in which nuclear power has been reframed as a solution to climate change. There are strong parallels here with Kingdon's framework, in which policy solutions become attached to problems in unpredictable and non-linear ways (Kingdon, 2003).

The second aspect of socio-technical regime theory that is helpful in thinking about the dynamics of policy convergence is its attention to the different scales at which change can occur. Although the notion of a socio-technical regime, as with most policy analysis, is based on the idea of single regimes operating within policy sectors (for example energy, water,

telecommunications see Chatzis, 1999; Davies, 1996; Hughes, 1983)), it does highlight

possible alternative locations of significant policy change on the fringes of regimes, notably

'innovation niches'. Innovation niches are defined as a small scale learning spaces for new

technologies, which comprises either a single experiment or project, or a cluster of several

experiments (Kemp et al., 1998; Rip and Kemp, 1998; Rohracher, 2001; Schot et al., 1994;

Smith, 2003; Weber, 2003; Wiskerke, 2003). Niches emerge in response to the momentum

or inertia of well-established socio-technical regimes, which makes radical change difficult to

effect. The idea of an innovation niche is particularly relevant to instances of policy

convergence because niches are typically driven by entrepreneurial actors who are relatively

independent of the incumbent regime (see for example Seyfang and Smith's (2006)

discussion of grassroots community action as innovation niches). Niches have the potential

to act as crucial sites of policy change, not just technological innovation, because they

provide a nucleus around which inconsistencies in multiple storylines emerge, and alternative

visions are able to be voiced. Although the regime definition of a niche is technology-

focused, it is recognised that the ultimate purpose of a niche is to improve knowledge and

promote learning on a broader scale (Kemp et al., 1998; Rip and Kemp, 1998). We therefore

suggest that policy innovation is an important aspect of niches – niches are not just about the

demonstration of specific technologies and prototypes (Rip and Kemp, 1998; Schot et al.,

1994; Szejnwald Brown et al., 2003) – for it is within niches that new policies and practices

are implemented and conflicts within storylines can be voiced; conditions that are amenable

to policy learning and change.

There is some uncertainty about whether innovation niches are sites of conflict or consensus.

Despite the radical changes that take place within niches, in the socio-technical regime

literature they are seen as curiously harmonious and 'protected' sites, relatively free from

conflict (Rip and Kemp, 1998; Schot et al., 1994). A policy analysis approach, in contrast, would suggest that radical change necessitates a degree of conflict. Drawing on two brief examples, we suggest that niches can act as sites of both conflict and consensus.

Environmental planning or siting disputes can be viewed as a type of niche where radical change stems from conflict. Frequently, conflicts about the siting of new developments such as power plants are viewed "essentially as a problem of policy implementation; universal goods have somehow to be reconciled with the particularities of individual locations" (Owens 2004: 105). However, as Owens (2004) goes on to argue, what is often voiced in such local disputes are "divergent conceptions of what that public good should entail" (2004: 110). These planning disputes thus act as a forum for national debate, knowledge transfer and learning (Owens, 2004; Owens and Cowell, 2002). They are situations where policies are translated into their material form, and are hence critical niches that can catalyse wider change and learning, primarily through discourse, because: 'At root [siting] conflicts concern the legitimacy of dominant paradigms, and provide crucial arenas for challenging their monopoly.' (Owens, 2004: 111).

In contrast, research examining the response of the UK housing sector to climate change identifies low energy housing niches as more consensual sites of innovation and learning (Lovell, 2007a; 2007b; Smith, 2004). In low energy housing niches dramatic decreases in energy consumption have been achieved, and a number of new low carbon technologies and construction methods have been experimented with (BRECSU, 1996; 2003). Low energy housing niches in the UK have largely been developed by entrepreneurial individuals with strong green values working in non-governmental organisations (Lovell, 2004). It is suggested that it is the location of these niches outside mainstream government policy and

operations – beyond the typical boundaries of a policy domain - that accounts for their relatively harmonious development; they have been initiated by new actors (green architects, community groups, self-builders) operating relatively independently of the incumbent energy regime (see also Seyfang and Smith, 2006). But whilst these niches are not a product of government policy, a number of them are now intimately bound up with low-energy housing policy in the UK. For example, niches such as the BedZed development in south London and the Hockerton housing development in the East Midlands have become a key part of government policy discourse about mitigating climate change, and as such have had an influence on government policy (Lovell, 2007b). The example of low energy housing suggests there is potential for niches to act as sites of radical policy and technology learning in the absence of a high degree of conflict.

Whilst a more detailed examination of the characteristics of niches is beyond the scope of our discussion here, we suggest that more attention needs to be focused on the multiple *sites* or complex geographies of innovation and learning in situations of policy convergence. In keeping with ideas about socio-technical transitions, it may be that these relatively overlooked spaces or niches that are the prime sites of change, rather than the intersection of storylines. In cases of policy convergence where policy discourse is relatively harmonious, significant learning and innovation is more likely to emerge, perhaps, not from the 'clash of coalitions' at the grand narrative scale, but rather through political and technical niches.

Summary and Conclusions

The case of climate change and energy policy demonstrates an arena in which policy sectors are not competing for attention on the agenda, but are converging. Traditional models of the policy process are based on the assumption that policy change takes place within a single

sector or policy domain. Although these ideas have been useful for analysis of sectors facing abrupt, short-lived problems, even theories based on fluid, adaptable issue networks such as discourse coalitions struggle when faced with the convergence of sectors. We suggest that the assumption that policy networks operate within domains, and that policy change takes place within these domains, is problematic when policies converge. Equally, locating policy change somewhere 'outside' the subsystem, or through the clash of beliefs, knowledge or discourses, is limited for explaining the dynamics of the energy-climate change arena.

We have identified a number of different, and to some extent interrelated storylines about climate change, of which the four most prominent ones are about market efficiency, energy supply, energy demand and international solutions. We have noted that the storylines operate relatively independently, almost as a resource to be exploited as the various coalitions see fit – in other words that there is not an exclusive link between any one of the storylines and a specific network of policy actors. We have observed that these storylines appear to co-exist at the level of policy discourse. Both these observations require more detailed empirical investigation. However, they are important because they appear to contradict key aspects of discourse coalition theory, which firstly posits a strong link between storylines and discourse coalitions, and, second, argues that it is the conflict between storylines that drives the process of policy change.

We have drawn on science and technology studies and the idea of a socio-technical regime to explore why climate change storylines are not in conflict, and why significant policy and technology innovation and learning may be located within small-scale niches, where new climate change policies and practices are implemented, and not between policy networks operating at a broader, discursive level. The existence of multiple compatible storylines can

be explained through the socio-technical regime concept of endogenous renewal. None of the four major storylines about climate change in the energy sector currently represent a fundamental challenge to the existing energy regime. Thus the convergence of the climate change and energy sectors has involved climate change being incorporated and subsumed by well-established energy sector interests embedded within the existing energy infrastructure.

Socio-technical regime theory also directs our attention towards alternative sites or innovation niches where significant innovation and learning might be taking place as new discourses and ideas about climate change are implemented. The idea of an innovation niche is particularly relevant to situations of sectoral convergence because it focuses attention on potential new sites of innovation arising out of the convergence, involving actors, interests and technologies not central to the existing regime. We have illustrated that niches can be sites of either conflict or consensus, and technological experimentation as well as policy learning. In an increasingly open, fragmented energy sector, the location of policy learning and innovation has shifted. Policy change is no longer emerging exclusively from the collision of storylines at the level policy discourse through a process of discourse institutionalisation within government (Hajer, 1995), but is also taking place through multiple, dispersed niches. Convergence is an ongoing process, with an extended period of flux as existing interests, knowledges, practices and technologies are reframed, and new ones emerge. It has a different set of dynamics to those of discrete policy sectors experiencing abrupt conflictual change emanating from short-lived, external problems, that warrants, as we have demonstrated in this paper, an engagement between policy analysis and the study of socio-technical regimes.

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Wiskerke J S C, 2003, "On promising niches and constraining sociotechnical regimes: the case of Dutch wheat and bread" *Environment and Planning A* **35** 429-448

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[i] We note that there is an established literature on the concept of 'policy convergence' (see Knill 2005 for an overview). However, this literature examines the processes through and extent to which cross-national

convergence in policy takes place. Here, our concern is with the convergence of policy agendas within the national system. To this end, we draw on the literatures on policy systems and policy change.

[ii] A policy subsystem is defined as "… actors from a variety of public and private organisations who are actively concerned with a policy problem or issue, such as agriculture, and who regularly seek to influence public policy in that domain." Sabatier P A, 1998, "The advocacy coalition framework: revisions and relevance for Europe" *Journal of European Public Policy* **5** 98-130.

[iii] More specifically, socio-technical regimes are defined as relatively stable configurations of institutions, techniques and artefacts, as well as rules, practices and networks that determine the 'normal' development and use of technologies (Rip and Kemp, 1998).

[iv] The non-fossil fuel obligation (NFFO) was originally devised as a means of ensuring that expensive nuclear generated electricity would still be purchased by electricity companies within the privatised market; it was introduced in 1989 as part of the UK's electricity privatisation HMSO, 1989 *The Electricity Act* The Stationary Office, London. However, NFFO gave considerable support to renewable energy between 1989 and the year 2000, when it was replaced by the Renewables Obligation HMSO, 2002 *The Renewables Obligation Order 2002* The Stationary Office, London. From 1998 there has been no further support for nuclear energy under NFFO; the scheme continues and is used to pay for projects with renewable contracts still running BWEA, 2007, "History of NFFO", British Wind Energy Association, http://www.britishwindenergy.co.uk/ref/nffo.html.

[v] The RCEP 22nd report 'Energy – the Changing Climate' noted, for example, that "Governments have ceased to see it as their responsibility to plan how the demand for energy will be met" (para 5.16), and "...government expenditure on energy research and development has plummeted" (page 83).

[vi] The precarious state of the international climate change negotiations during this period forced the UK to take an active leadership role in order to maintain momentum Grubb M J, 2002, "Britannia waives the rules: The United Kingdom, the European Union and climate change" *New Economy* **9** 139-142, Ott H, 2001, "Climate change: an important foreign policy issue" *International Affairs* **77** 277-296.

[vii] Several explanations have been proposed for the UK's rise in emissions, including: a greater proportion of electricity generated by coal because of a significant increase in gas prices since 2004; the energy efficiency 'rebound effect' (where energy reductions from the adoption of energy efficiency measures are cancelled out by increases in energy consumption Dimitropoulos J, Sorrell S, 2006, "The Rebound Effect: microeconomic definitions, extensions and limitations", SPRU Working Paper, http://www.sussex.ac.uk/spru/documents/dimitropoulos-paper.pdf); significant increases in emissions from the transport sector; and slow progress with implementing renewable energy projects DTI, 2006b, "Our Energy Challenge: Securing clean, affordable energy for the long-term", Department of Trade and Industry, www.berr.gov.uk/files/file25079.pdf.

[viii] Nonetheless it contained a complex raft of new policy measures to mitigate climate change in response to the 2006 Energy Review, including investment in carbon capture and storage, a 3 month deadline on planning decisions on large scale energy projects, mandatory 'real time' electricity meters for households, and a domestic carbon trading scheme for the service sector and large local authorities DTI, 2007, "Meeting the Energy Challenge - a White Paper on Energy", Department of Trade and Industry, www.berr.gov.uk/files/file39564.pdf.

[ix] In some senses, therefore it struggles to meet the definitional requirements of a coherent 'storyline'. However, we include it, despite its fractures, because of its pervasive influence on the energy policy process.