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# **The Role of the Demand for Environmental Quality in Driving Transitions to Low-Polluting Energy Sources**

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# **The Role of the Demand for Environmental Quality in Driving Transitions to Low-Polluting Energy Sources**

Roger Fouquet<sup>12</sup>

*This policy briefing reports on research into historical examples where the public demanded environmental improvements, government may have responded to this demand and legislation introduced may help lead to transitions towards low-polluting energy sources, as might occur in a transition to a low carbon economy. The research focussed on the demand for improvements in air quality in Britain over the last 350 years. In particular, it showed that while environmental campaigners may manage to get draft legislation introduced, industrialists may manage to weaken the Parliamentary bill's effectiveness and its enforcement. Nevertheless, each time demands for environmental improvements are made, they send signals both to government (to introduce effective legislation) and to polluters (that they should seek low pollution solutions and, if they find sufficiently cheap alternatives, to introduce them rather than lobby against the bill and its enforcement). Thus, the development of effective and sustained environmental legislation is not a one-off 'game', but rather an iterative series of demands (and opposition) that can take decades or centuries to unfold, eventually leading to a sufficiently low-cost solution for polluters to stop opposing the demands (or possibly the disappearance of the problem, because of the decline of the polluting industries). The demand for climate stabilisation and the development of successful climate policies are likely to follow a similarly protracted course.*

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<sup>2</sup> This policy briefing summarises the work published in Fouquet (2012) accessible at <http://dx.doi.org/10.1016/j.enpol.2012.04.068>.

## 1. Introduction

Society and individuals appear to value reductions in carbon dioxide emissions and a transition to low carbon energy sources (Brouwer et al 2008, Lee and Cameron 2008, Mackerron et al 2009, Löschel 2010, Diedrich and Goeschl 2011). However, most of the benefits of a consumer buying low carbon energy sources and technologies will be passed on to society as a whole, rather than generating large private gains. So, voluntary efforts to reduce emissions by using low polluting (i.e. higher value) but more expensive energy sources are likely to be hampered by the tendency for many consumers to free-ride (i.e., not buying the socially-desirable, but more expensive option). Given this demand for climate stability and a social benefit from a transition to low carbon energy sources, yet a tendency to free-ride, it is important to improve our understanding of how this demand for climate stability might be met and such a transition might be achieved.

To provide some insight into this question, this note summarises the analysis associated with an article published in *Energy Policy* (Fouquet 2012a) – and, for further details, the reader is recommended to consult the article, accessible at <http://dx.doi.org/10.1016/j.enpol.2012.04.068>. This article focussed on past experiences to identify the factors that enabled the demand for environmental quality to become eventually translated into environmental legislation, and the factors that led a transition to a low polluting energy source to become a key part of the legislation to meet this demand. To do so, it reviews five episodes (seventeenth century, nineteenth century, and early-, mid- and late-twentieth century) from British history of the demand for energy-related environmental quality and whether it could be or was met by low polluting energy sources.

## 2. Demand for Environmental Quality

It has been proposed that the basis for climate policy lies in a domestic demand for climate policy rather than in a multilateral agreement or a supranational command (Tol 2013). There is evidence that some people in certain countries value climate stabilisation and are willing to pay to reduce greenhouse gas emissions (Li et al. 2004, Cameron 2005, Berrens et al. 2006, Lee and Cameron 2008, Brouwer et al 2008, Mackerron et al 2009, Cai et al. 2010, Löschel 2010, Diedrich and Goeschl 2011). However, there is still little evidence of strong support for major and costly abatement on the scale that occurred in the 1950s Britain, following the Big Smog of 1952 which may have killed as many as 12,000 people (Bell et al 2004).

Despite the growing literature on the relationships between the demand for climate stability and key variables, such as cultural factors, income, or potential damages, the exact causal mechanisms are not clearly understood (Kahn 2002). The evidence in Fouquet (2012a) that focuses on concerns about air pollution suggests that, while rising income does appear to be associated with greater concern, demand is likely to be greatest in periods of economic prosperity, rather than in the depths of a recession. The episodes discussed in this article, when there were heightened calls for improvements in air quality, tended to coincide with periods of economic growth. This implies, first, that the damage increased due to greater energy consumption and pollution. Second, affluence enabled Britain's citizens to be concerned with more than their basic economic needs. Whether John Evelyn (1661) in the seventeenth century, the Smoke Abatement Societies in the nineteenth century or an outraged public in the mid-twentieth century, demand has put pressure on governments to introduce legislation (Brimblecombe 1987, Thorsheim 2006).

**Table 1. Summary of Historical Demand, Legislation and Substitution to Low Polluting Energy Sources**

	Demand/ Lobbying	Governmental Support	Legislation Introduced	Legislation Effective Enforced and Sustained	Legislation on Energy	Substitution to Low Polluting Energy
1660s	Weak/ Influential	Yes Not Priority	No	No	No	No
1840s- 1890s	Medium/ Modest	Reluctantly Not Priority	Yes	No	No	No
1890s- 1930s	Medium/ Modest	Reluctantly	Yes	No	No	Some
1950s- 1960s	Strong/ Influential	Reluctantly Priority	Yes	Yes	Yes	Yes
1980s- 1990s	Weak/ Influential	Reluctantly Not Priority	No	No	No	Yes
2000s- 2010s	Medium/ Influential	Yes	Yes	?	Yes	Some

Note: This table summarises the experiences discussed above, with the first five rows reflecting the five sections 3-7 of Fouquet (2012a), respectively. The classifications are based on the authors interpretation of the experiences.

In addition, concurring with Lee and Cameron (2008), demand grows as the perceived damages rise. Despite it having been a general period of low air pollution by historical (though not today's) standards, the episode with the strongest demand for improvements (see Table 1) was after the Big Smog of 1952, when the death toll in London was particularly shocking and scientists could attribute these deaths to poor air quality, and a growing range of substitute fuels and heating technologies was available. Based on these historical experiences, the demand for climate stability will probably increase as a result of extreme and

shocking events that (most will agree) can be attributed (with a high degree of confidence) to climate change (Kingdon 1995, Kahn 2007).

### **3. Introducing Effective and Sustained Environmental Legislation**

However, even with a major demand for improvements, it is far from certain legislation will be introduced. The smoke abatement movement in the Victorian era faced a clear example of government failure because of politicians' belief that legislation would harm business and industry. However, estimates of the value of health damages indicate that the benefits of reductions in air pollution would have significantly outweighed the costs during the second half of the nineteenth century (Fouquet 2011a). By comparing the average external costs with the average benefits of consumption (using price as a proxy), certainly by 1850, British coal consumption was socially sub-optimal (i.e., too high). Despite the availability of solutions to reduce emissions and concentrations in the second-half of the nineteenth century, suggesting that more stringent (enforced) environmental legislation would have generated significant social net benefits, demands to regulate were met with weak legislation and limited enforcement. This lack of effective and enforceable legislation was a clear example of government failure, and it took around one hundred years, and the introduction of the Clean Air Act of 1956, to introduce the necessary legislation.

Clearly, pressure groups for and against climate action are seeking to sway the public and, particularly, politicians (Boyer and Laffont 1999). The strongest argument against abatement is still the fear of the economic costs of abatement, either direct or associated with an economy's competitiveness. Thus,

overcoming the perceived economic damage from legislations is still the most likely way to sway politicians (Shogren 1998).

Furthermore, just like in Victorian Britain, although legislation is being introduced, it is failing to address household behaviour, and their emissions associated with residential and transport energy consumption. In democracies, the politician's fear of angering voters weakens the effectiveness of most climate policies. It also implies that politicians believe the public's demand for climate stability to be especially fragile.

So, even with effective legislation introduced, for it to be sustained (i.e., enforced and not revoked by future governments), it must be of limited cost to polluters, and pro-legislation pressure groups must continue to maintain their pressures on politicians. For demand to be sustained, it seems likely to either require a series of shocking events, or a wide scale change in value systems that can support (and in lifestyles that can accommodate) long term political pressure. Indeed, the opposite seems more likely – those that are suffering from the legislation are willing to pay for the legislation to not be enforced or to be rejected by successive governments. Also, the lags involved in markets adjusting to new incentives imply that if governments introduce legislation, those seeking improvements may have to wait a decade or more to assess the success of these policies.

Although not directly about energy-related air pollution, the Alkali Act of 1863 (as does the Montreal Protocol) shows that environmental legislation can be effective if the victims are sufficiently influential, the polluters are a clearly defined and observable group, relatively cheap solutions are available and



equipment exists for monitoring pollution levels. Under such circumstances, manufacturers can be open to reducing emissions and government willing to introduce legislation. This also suggests that legislation targeted at specific groups may be more effective and sustainable than when covering a heterogeneous array of polluters.

#### **4. Reducing Pollution**

Another lesson is how the demand for environmental improvements is being met. In a number of instances, the reaction was first containment of the problem, then dispersion of (or exporting) the problem. Although countries today are exporting their home production of carbon dioxide emissions, such as through the importing of goods now produced elsewhere, this is even less of a solution for a global pollutant. Similarly, but without a clear historical precedent, carbon sequestration, in its various guises, offers another approach to dealing with emissions without actually reducing them. This approach is, therefore, potentially attractive to many consumers as it does not directly affect lifestyles or work; although, at present, the costs of carbon capture are expensive (and little is known about its public acceptability).

A further solution was and is to promote energy efficiency improvements. Markets have an incentive to seek efficiency improvements in order to provide energy services at lower prices, and have been especially successful over the last two hundred years (Fouquet 2011b). Thus, governments can aid markets to work towards further energy efficiency improvements. Unfortunately, especially in developing countries, rebound effects may eat-up some of the savings and, in the longer run, rising income levels are

likely to lead to more demand for energy services and energy (Fouquet and Pearson 2012, Fouquet 2012b). So, efficiency measures cannot solve the problem on their own.

Transitions to low polluting energy sources have been and are clear solutions to specific environmental problems. Independently of governments, markets can seek the energy transition option (Fouquet 2010). In the case of low-polluting energy transitions, there are definitely fewer examples, but the past switches to gas and electric cookers in the early 1900s hint at the possibility that markets might take the lead in certain sectors and services. This is particularly of interest when the niche demand leads to declining prices through a process of economies of scale and learning by doing. As section 5.1 of Fouquet (2012a) showed, a niche non-free-riding demand can exist for low carbon energy sources and technologies. This demand will be greater if the sources and technologies have desirable characteristics that fossil fuels and their related equipment do not have. One powerful driver of demand in the past, as seen in the demands for gas and electric cookers, has been social status. Thus, if low carbon sources and technologies can be seen as status-enhancing, they may achieve an important niche demand. If this niche demand develops, and producers can achieve economies of scale, then the prices might become competitive with fossil fuels. In this case, markets could drive part of the transition to a low carbon economy.

More probably, though, government will need to help create the demand for these energy sources, especially when the price of the low-carbon option is more expensive. Transitions often require the discovery of new solutions for many different sectors and services, the transformation of energy systems (which are complex), and the decline of energy industries and technologies that are represented by powerful pressure groups (Fouquet 2010). Thus, given the scale of the change and the time they take to unfold, governments tend to be reluctant to push for energy transitions in the first instance. Furthermore,

transitions have and may create new environmental problems (such as coke and town gas, petroleum products, nuclear power or even certain renewable energy sources). Nevertheless, the experience of the Clean Air Act of 1956 shows that, with sufficient pressure and resolve, governments can initiate transitions to low polluting energy sources.

Inevitably, the direction taken to meet the demand for environmental improvement reflects a tension between political and economic forces, and not always the most socially beneficial course of action is followed. The direction chosen to achieve climate stability will reflect the costs of abatement associated with low energy sources and technologies, efficiency improvements, carbon sequestration and geo-engineering, and the influence of the pressure groups representing the various options.

## **5. Meeting the Demand through Markets and Government Action**

Ultimately, the broader lessons are more subtle than the standard textbook view proposing that markets fail and governments have to intervene, or even that both tend to fail. These experiences suggest that both markets and government (perhaps together) can eventually play a role in meeting environmental concerns. First, governments tend not to prioritise environmental legislation. They only introduce effective, enforced and sustained legislation when the conditions are ideal or the pressure is unavoidable. The Alkali Act of 1863 and the Clean Air Act of 1956 show that broader legislation can be effective – but, as in the latter case, it may come one hundred years later than was probably socially optimal (Fouquet 2011a).

Second, viewed over a century or more, markets may also ‘adapt’ to environmental demands (such as the shift to suburbia at the end of the nineteenth century, the demand for gas and electric cookers in the early

twentieth century, and the dash for gas). However, apart for the latter case, they tend to do so very slowly and not necessarily in a socially optimal way – after all, they seek the cheapest or most profitable solution. Thus, it would seem unwise to wait for markets on their own to solve environmental problems.

Finally, crucial to the outcome of the episodes reviewed was the evolution of ideology, of government attitudes towards intervention and of the relationship between the market and the state. It would be difficult to identify trends in the forces over the next century. Nevertheless, they will evolve, such as perhaps new beliefs about our relationship with nature or the potential globalisation of markets and governments, and will play an important role in determining any transition to a low carbon economy.

## **6. Concluding Remarks**

This policy briefing reports on research into historical transitions where the benefits of the transition result from the increased provision of a public good (rather than private benefits to the consumer, as is the case in most energy transitions). It showed that while environmental campaigners may manage to get draft legislation introduced, industrialists may manage to weaken the Parliamentary bill's effectiveness and its enforcement. Nevertheless, each time demands for environmental improvements are made, they send signals both to government (to introduce effective legislation) and to polluters (that they should seek low pollution solutions and, if they find sufficiently cheap alternatives, to introduce them rather than lobby against the bill and its enforcement). Thus, the development of effective and sustained environmental legislation is not a one-off 'game', but rather an iterative series of demands (and opposition) that can take decades or centuries to unfold, eventually leading to a sufficiently low-cost solution for polluters to stop opposing the demands (or possibly the disappearance of the problem,

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