a competitive environment?

a Green Alliance briefing

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a competitive environment

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a competitive environment?

From sulphur emissions standards to the minimum wage, there has always been fierce debate about the impact of regulation on competitiveness. Recently, initiatives like the Prime Minister's Panel for Regulatory Accountability and the EU's new Competitiveness Council have put the political spotlight on regulation and its effects. Debates about environmental regulation often come down to issues of competitiveness and costs of compliance. The arguments on both sides are well-rehearsed. Industry lobby groups tend to say that badly-designed or overly burdensome regulation hinders competitiveness by driving up costs and bureaucracy. The environmental lobby responds by saying that regulation can drive competitiveness, because eco-efficient companies are more competitive, because regulation drives innovation, or because it gives a boost to environmental industries. It is very difficult to sustain either of these positions. The reality, as this paper shows, is somewhat more nuanced.

This paper aims to summarise the state of the debate on links between environmental policy and competitiveness, and recommend ways forward. It has been informed by conversations with a range of experts from government, industry and academia, as listed in the acknowledgements. The results of the interviews are reflected in the arguments below, but specific quotes have not been attributed.

defining competitiveness

Competitiveness is essentially the ability of a firm, sector or economy to compete against other firms, sectors or economies. However, in this paper, it is taken to mean the ability of a firm, sector or economy to compete internationally (ie with their equivalents in other countries) – in other words, macro-economic rather than micro-economic competitiveness. This therefore applies only to traded sectors – parts of the economy open to international competition. There is a tendency to conflate competitiveness with economic growth or performance. In other words, the question of whether environmental regulation harms competitiveness is seen as the same as whether environmental regulation harms economic growth. This is a very wide conception of competitiveness. Although this paper uses a wide definition of competitiveness, it also recommends (see the conclusions section) investigating a narrower definition of competitiveness impacts.[1]

what are the arguments?

Beyond the rhetoric, there are a range of arguments about the relationship between competitiveness and environmental regulation, which can be summarised as follows:

Position 1: Regulation harms competitiveness...
… because of red tape, and
… because it increases costs significantly.

Position 2: Regulation has little effect on competitiveness...
… because costs are not large, and can be minimised, and
… because environmental regulations are insignificant compared to other costs

Position 3: Regulation helps competitiveness...
… because it makes businesses more efficient,

… because it drives innovation,
… because of gains to environmental industries, and
… because a good environment is a prerequisite of a sound economy.

The huge range of opinion on this issue is partly because of differences in outlook, assumptions or theoretical position. It is also partly because generalisations are very difficult. It depends on the nature of the problem; how the regulation is designed; the ability of industry to innovate; whether the sector affected is traded or not; how significant environmental costs are compared to other costs; and so on. This paper examines each of the positions in turn.

Position 1: Regulation harms competitiveness...

...because of red tape

There are costs to business in proving that they have complied with regulation – time spent on consultation, registration, administration, and liaison with regulators and inspectors. Problems add up with multiple regulations and regulators. This is often cited as a barrier to competitiveness, particularly for SMEs. The Better Regulation Task Force's report on the IPPC[2] Directive, for example, highlights "problems caused by inconsistencies between legal instruments which attempt to regulate the same operations", and recommends "streamlining or eliminating the need to apply for multiple permits, authorisations, or make multiple notifications."[3] The ongoing Hampton Review of regulatory inspection and enforcement, established last year by the Chancellor, is looking at "reducing the administrative cost of regulation to the minimum consistent with maintaining the UK's excellent regulatory outcomes".[4] In a similar vein, the recently-established Chemicals Regulatory Forum in DTI aims to recommend ways of simplifying cumulative regulatory burdens in the chemicals sector. For Defra, the 'one farm, one form' idea is the holy grail of rural policy,[5] and the UK's 'one substance, one registration' proposal for the EU's REACH chemicals policy is a further example.[6]

The desirability of reducing administrative burdens is uncontroversial. But the severity of the problem is not as clear. One business representative I spoke to, in a heavily regulated industry, felt overwhelmed by the sheer volume of regulatory proposals that were issued to industry for consultation, each requiring different reporting frameworks. Another pointed to reduced levels of staff employed on such administrative functions, the opposite of what would be expected if burdens were increasing. The interim Hampton report estimates that a firm with 19 employees would spend less than 2.5 hours per person per month complying with all government-related regulation and paperwork, of which a tiny fraction would be environmental.

A further difficulty of this argument is that it is rarely separated from the issue of costs of the regulation itself. Many of the people I spoke to expressed scepticism that initiatives like the ones described above were really intended just to reduce administrative burdens, seeing them as part of the more general argument about the costs of regulation.

...because regulation increases costs significantly

A recent CBI study[7] put the costs to business of environmental regulation at £4 billion a year. Though the organisation made clear that they were not questioning the need to take action on environmental issues, they criticise the "sloppy laws that are implemented

poorly and enforced in an ill-considered fashion". A report prepared for the Dutch presidency of the EU put the direct costs to EU industry of implementing REACH at 4 billion euros, double the Commission's original estimates.[8] A study by McKinsey Consultants in the US reported that "responding to environmental challenges has always been a costly and complicated proposition for managers. In fact, environmental costs at most companies are skyrocketing, with little economic payback in sight." The same report estimated that between 1972 and 1992 total environmental protection costs for the US tripled as a percentage of GDP – from 0.88% to 2.47%. Costs of regulation are seen as most problematic in traded sectors, where industries face international competition: "a company's ability to respond to environmental challenges in a cost-efficient manner may well determine its viability… win-win opportunities become insignificant in the face of the enormous environmental expenditures that will never generate a positive financial return."[9]

A further problem is that most regulations will have distributional impacts, affecting different regions, industrial sectors or companies in different ways. This may be intentional – to reward less polluting industries or companies – or unintentional; either way, there will be economic and political consequences.

It is clear, therefore, that regulation imposes costs on business. Higher standards – whether for cars or power stations – mean that investment of time and money will be needed to meet them. (Of course these costs could be offset by efficiency gains or benefits accruing elsewhere – this is discussed in the following section.) There is little consensus, though, on the actual cost to industry of environmental measures. Many estimates derive from the regulatory impact assessments drawn up before the legislation is introduced, and as such are projections, rather than actual figures. As one academic study notes, "many firms have an incentive to inflate the costs of compliance before legislation is agreed… the same firms will typically work hard to lower the costs of compliance once the legislation comes into force."[10] In other words, such studies tend to downplay the possibility of companies finding innovative ways to reduce costs. This is discussed in the section on cost minimisation, below.

Much argument about the competitiveness effects of environmental regulation centres on the design of the regulations themselves. Straightforward regulatory approaches, based on prescribed standards for certain pollutants, or prescribed mitigation technologies – so-called 'command-and-control' regulation – are generally seen to be less effective than market mechanisms, or outcome-based regulation. With the former, companies are merely required to meet a certain standard. As one business person I spoke to said, there is a danger of 'perverse anti-innovation outcomes if government regulates for a specific technology'. With the latter, companies are incentivised to find the most efficient way of meeting the environmental outcome. This is discussed below.

Conversely, however, some argue that outcomes-based approaches are actually more costly for business, as firms need to invest time and resources in finding ways to meet requirements. With a command-and-control approach, at least businesses know exactly what they have to do. Why should they be concerned with environmental outcomes? As the McKinsey study notes, "old-fashioned command-and-control regulations, which allow managers very little freedom, are giving way to market-based incentives… the result?

Senior managers must frequently juggle a number of issues without a means of setting priorities or a method for integrating those issues into business decision making."[11] Or, in the memorable words of one government interviewee, "just because things are outcome-based, I wouldn't expect the level of complaint to lessen."

Despite these arguments, there are many who maintain that environmental regulation has little effect on competitiveness, because the costs of compliance are actually fairly small, particularly compared to other business costs. These arguments are presented next:

Position 2: regulation has little effect on competitiveness...

...because costs are not large, and can be minimised

The CEO of Exel Energy is a surprising advocate of this argument – speaking about his company's involvement in the US sulphur dioxide trading scheme, he said that "we reduced emissions ahead of schedule and at lower cost."[12] In the UK, emissions of sulphur dioxide fell by 80%, with, according to Paul Ekins, "essentially no negative impact on economic growth at all. In this case, economic growth and sustainability in sulphur emissions have proved to be quite compatible."[13] With energy efficiency, the Climate Change Agreements – binding energy efficiency targets agreed between business and government in 2000 – have been reached earlier, and at less cost, than predicted. In terms of comparison between countries, considerable differences in industrial energy prices have not made a discernible difference to economic performance. A recent Carbon Trust study on the EU's Emissions Trading Scheme, based on modelling data, says that the scheme "is unlikely to reduce the profitability of most industrial sectors, providing that it is implemented in roughly equivalent ways across different EU countries and that the price rises are not so large as to make non-EU imports profitable on a large scale."[14]

Most estimates of the costs of environmental regulation are drawn up before the regulation takes effect, as part of the process of negotiation and assessment of policy proposals. However, costs are almost always far lower than predicted. A study by the Stockholm Environment Institute[15] demonstrates this across a range of case-studies, including sulphur, ozone-depleting chemicals and vehicle emissions standards. Catalytic converters for cars were predicted by industry to cost around £500 per vehicle; the reality was £30 - £50. The EU chemicals trade body, CEFIC, predicted that implementing the Montreal Protocol on ozone-depleting chemicals would entail huge costs, with "an effect on inflation and employment nationally and internationally."[16] In the end, the transition was straightforward and uneventful.

Differences between predicted and actual costs come about because "compliance cost assessments are limited by a number of factors ranging from inaccurate cost data, omission of certain types of cost data, and the difficulties of predicting the response of the firm or industry to meet the regulation", according to one academic study. The same report argue that "many firms have an incentive to inflate the costs of compliance before legislation is agreed… the same firms will typically work hard to lower the costs of compliance once the legislation comes into force."[17] The situation is made more difficult by a clear information asymmetry, in that industry has access to far more information on abatement costs than government does, and methods used to predict costs of compliance are not standardised or assessed against actual costs once the regulation is in place.

Whilst it does seem clear that compliance costs are nearly always less than predicted, though, this does not necessarily mean that impacts are minimal. Time, attention and investment focussed on meeting environmental regulations has an opportunity cost – it could have been spent on other issues. One chemical company mentioned in the McKinsey study "found that it was starving other important projects, like plant upgrades, and that roughly two-thirds of its capital budget went to environmental spending."[18] They argue that companies themselves have the best idea about how to get the highest return on investment; environmental regulations skew investment decisions and result in economically sub-optimal outcomes. Even energy efficiency, which is proven to be extremely cost-effective over a relatively short timescale, requires management time and attention that could have been spent elsewhere – so it may be economically rational for a company not to invest in energy efficiency measures, even when they would pay back over time.

Timescales are an important consideration in this argument. Adair Turner makes this point, saying that estimates of price elasticity of demand for petrol and diesel, for example, range from -0.1 in short-term to -1.0 in long term, and that "the case for high and steadily rising energy taxes is in economic terms overwhelmingly strong", but is politically difficult, owing to these short-term costs.[19] Losers lose immediately; gainers gain slowly. As well as these political difficulties, the timescales involved make for methodological difficulties in assessing costs against benefits. As an ESRC study of the issue points out, "the time between a policy pronouncement and the time a final optimum equilibrium is reached, if it is ever reached at all, is usually a generation (particulate matter, tailpipe emissions from vehicles), two generations (acid deposition) and may even extend to a century (municipal wastewater treatment and, perhaps, climate change)."[20]

...and because environmental regulations are insignificant compared to other costs

A further argument is that environmental regulations have little effect on competitiveness because they are insignificant compared to other factors shaping companies' costs and the economy more widely. A recent study for the European Commission into competitiveness implications of air pollution policies makes this point: "it would clearly be wrong to conclude that equipping cars with sophisticated equipment for emission control reduces prices. However, it is apparent that any effect of improving the capacity of cars to meet new emission limits is very much secondary to other determinants of price… it is difficult to assess the competitiveness impacts of air pollution legislation in an area where more important determinants of price are occurring."[21] The ESRC study makes a similar point: "though often appreciable in absolute terms, when expressed relative to the level of output or overall costs in an industry or activity, the costs of environmental control are generally small."[22]

Studies by business organisations like the CBI routinely show that employment costs are by far the most significant determinant of investment decisions, although this will, of course, depend upon the industry. The same European Commission study argued that "the most important factors in relocation are labour costs, access to markets and the existence of a developed industrial base. Factors such as environmental regulations and corporate tax rates emerge as less important." In reviewing the literature, the study concluded that "there is little evidence of industrial relocation because of different environmental regulations." This seems to disprove the 'pollution haven' hypothesis, which states that companies will relocate to areas with less stringent environmental regulation.

This is particularly the case with arguments over jobs – the structure of the economy is changing constantly, and whilst environmental regulation may have some effect on the nature and location of jobs, it is difficult to demonstrate whether particular jobs won or lost are due to regulatory changes. As one economist I spoke to said, "no regulation is as influential as interest rates".

Many proponents of environmental regulation do, in fact, go beyond the basic proposition that environmental regulations do not harm competitiveness, and try to show that there are actual economic gains from good environmental policy. These arguments are reviewed next.

Position 3: regulation helps competitiveness...

...because it makes business more efficient

The Harvard business studies professor Michael Porter is one of the leading proponents of the 'win-win' argument, that environmental regulation can actually aid competitiveness. As he writes, "low pollution and efficient energy use are a sign of the highly productive use of resources. Policies that stimulate improvements in environmental quality, then, may actually foster improvements in competitiveness."[23] His most recent work, with Daniel Esty, ranks countries according to both economic and environmental performance, and, whilst the authors point to considerable data gaps and methodological difficulties, they do "find substantial evidence that environmental performance varies systematically with both the quality of a country's environmental regulatory regime and its broader economic and legal context", implying that "environmental improvement is not merely a function of economic development but benefits from conscious policy choices". Countries with strong ratings in the Current Competitiveness Index also tend to score strongly in terms of environmental performance – Finland is an example – but there are exceptions, including the United States, whose environmental performance lags behind its economic results.[24]

Many specific examples are quoted in support of this view. Technology company 3M began its pollution prevention programme in 1975 and is still profiting from it – saving over $900m, according to an Environment Agency study.[25] An ESRC study cites the example of the efficiency of thermal fired power stations – from 30-35% in 1950s to 45-55% today, far outweighing any cost increases arising from environmental controls.[26] The Environmental Industries Commission advocates mandatory environmental audits for firms, arguing that if companies are required to assess their environmental performance, they will find opportunities for cost-effective efficiency gains which it would be in their clear economic interest to enact. The Carbon Trust, which provides advice and support to business, similarly points out the cost savings from simple energy efficiency measures. This suggests that companies do not take action simply because they are not aware of the benefits that could accrue.

The counter-argument here, though, is that firms left to their own devices will find the most profitable solutions, so the idea of a 'win-win' is a myth.[27] This is not to say that the regulation should not be enacted, just that the true costs should be acknowledged. The opportunity cost of the investment of time and money must be considered, so even if it looks like a no-cost solution, it may be less profitable than alternative investments. If it was profitable, it would have been done anyway. To some extent, this argument depends on one's theoretical position. A neo-classical economic view would suggest that firms will

allocate resources effectively if unconstrained by regulation. A business or management studies perspective does not assume that this is the case, so regulation could prompt firms into action that will actually be in their own interests.

A further development of the win-win argument is that environmental regulation drives competitiveness not just because of incremental efficiency gains, but because it prompts significant innovation, which has its own economic benefits.

... because it drives innovation

The IT company Intel recently demonstrated how regulation, or the threat of it, can lead to innovation. In a Business Week interview, a company representative said that the company was worried that the EU could ban the use of perfluorcarbons used in chipmaking, as they are a potent greenhouse gas, and that they were "looking for substitutes… we want to show leadership and not have the EU regulate us."[28] It could be that the substitutes found would actually be more competitive, as Michael Porter claims: "properly designed environmental standards can trigger innovations that lower the total cost of a product or improve its value."[29]

Following this argument, regulation creates possibilities for innovation by stretching a firm's ambitions and capabilities, and providing new markets. A major ESRC study on innovation and environment reports that uncertainties about cost trajectories may prevent firms from innovating unless they are prompted to do so by regulation, even though such innovation may be beneficial. Writing about energy policy, the report states that "although widespread use [of renewable energy] might entail a significant increase in the costs of energy, an 'economic surprise in which costs fall through innovation and market application is no less likely." The report argues that most analysis of environmental decision-making wrongly assumes that future costs are known, "but the costs of future products and production processes – those developed through innovation – cannot be known, by definition… it is possible for environmental policymaking to take the dynamic of technological innovation into account – by explicitly focussing some policy measures upon innovation."[30] Hence the findings of the recent renewables innovation review: although wind energy is currently the only cost-effective renewable energy source, with the right policies and encouragement for innovation, all renewables technologies could form part of the UK's energy mix by 2050.[31]

This argument is strengthened if widened to include the issue of 'lock-in'. It is argued that incumbent technologies have advantages over innovative technologies, because the economic and regulatory system has 'co-evolved' with them. This acts as a disincentive to innovation. Economies of scale, institutional learning, skills development and existing regulation all tend to favour existing technologies over innovative ones, particularly disruptive innovations like small-scale renewable energy. Again taking the example of renewables, Catherine Mitchell criticises the expectation that "…a diverse set of new technologies, with very different operating characteristics from conventional technologies and which have had very little R&D, will be able to compete against conventional technologies, which have had generous R&D over the years, in a competitive market-place where the market rules value the characteristics of the conventional technologies."[32] Following this argument, it is misleading to characterise environmental regulation as an additional burden hindering the operation of the free market. Instead, one should accept that the market is shaped by complex social, technological and regulatory interactions, and

that policy should be designed explicitly to reshape the market. It is, therefore, in the interests of both economy and environment to design policy to overcome lock-in and promote innovation.[33]

The main difficulty is that promoting innovation requires very carefully designed regulations. Approaches based on 'best available technology' (BAT) do not, by definition, promote innovation. Regulation specifying a certain level of emissions is not likely to encourage innovation, either, as firms will meet the fixed standard at least cost and effort, rather than innovating to reduce emissions to as low a level as possible. All the interviewees for this report specified that the design of regulations is crucial, with one saying that, to promote innovation, "regulations would need to be an awful lot smarter than they are at the moment." One gave an example of a possible approach to buildings regulations. At present, these specify minimum standards which can be reached using existing technologies and approaches. Instead, buildings regulations could be designed to specify an outcome – such as a level of carbon emissions for a building – and for this outcome to be ratcheted up steadily, over time. This would give firms both a reason to invest and enough lead-time, providing the right conditions for innovation. The Californian Zero Emission Vehicle mandate is often cited as an example of a regulation that works in this way.[34] Trading mechanisms, like the Renewables Obligation and the EU emissions trading scheme, may promote innovation, as well, by providing an incentive to exceed targets and sell the excess.

Driving innovation through environmental policy does seem to depend, then, on the ability of policymakers to design clever regulations, and the ingenuity of businesses to find ways to meet them. Until both conditions are in place, it is by no means automatic that environmental policy will lead to significant innovation and subsequent competitive advantage.

There is one particular sector of the economy, though, that does obviously stand to gain from environmental policy – the environmental industries sector. This is a further argument – that regulation helps competitiveness because of the benefits to this particular industry.

...because of gains to environmental industries

Environmental regulations will obviously benefit certain industries by providing a market for goods and services like pollution control equipment, renewable energy technologies or consultancy. There are first-mover advantages in this sector, as well. If domestic regulations are ahead of the international norm, this gives the industry a head start to compete in international markets. The Danish wind industry is the most commonly cited example. Ambitious targets and policies within Denmark led to the development of a wind turbine manufacturing capability, which then benefited from increased demand from overseas, as other countries followed suit. Similarly, German and Japanese industries gained first-mover advantage in flue gas desulphurisation technologies in the 1980s.

The economic significance of this sector is considerable. The OECD estimates that the environmental goods and services industry was worth US$147 billion in North America, and US$98 billion in Europe, in 2000.[35] The UK exports around a billion euro of environmental goods.[36]

Costs to some industries, then, in the form of environmental expenditure, are benefits to another. The challenge is to develop a strong indigenous environmental industry – and regulation is one of the key drivers of this sector. The market has to be created by regulation, so it does not make sense to talk about 'market interference'. The end-of-life vehicles directive, for example, could impose costs on the vehicle industry and benefits on the waste processing industry.

There are two main difficulties with this argument. Firstly, it assumes that environmental standards will continue to increase, at home and overseas, thereby providing markets. If other countries decide to opt for lower environmental standards, there will be no market. Secondly, the key question is whether the gains to the environmental industry outweigh the losses elsewhere. It is very difficult to assess the counterfactual – what would have happened if companies had been free to invest as they chose, rather than investing in environmental goods and services? Would the result have been better or worse for competitiveness of the economy overall?

The final argument in favour of environmental regulation is equally as hard to prove or disprove – that a good environment is an economic necessity.

... because a good environment is a prerequisite of a sound economy

This is obviously the case, given that human health and economic activity depends to some extent upon a stable climate, clean air, potable water, and so on. The debate is around what level of environmental quality is optimal for prosperity. The insurer Swiss Re put the costs of the 1995 heatwave in the UK at 1.5 billion, and says that the costs of climate change could be 'financially devastating'. Though climate change is a global phenomenon, it affects different countries – and different economies – differently. Tourism is an industry that depends upon environmental quality, like clean beaches and protected countryside. And advocates of corporate social responsibility claim that high environmental standards will enhance a company's overall reputation and share price.

The problem with this argument, though, is that it is extremely hard to gauge the economic benefits of a sound environment, and even harder to ascribe certain generalised environmental gains to a particular regulatory measure. Attempts are often made to quantify and monetise such gains, but the methodologies are fraught with difficulty.[37] As a result, assessments of particular regulatory proposals tend only to consider immediate, direct costs and benefits. One critique of the EU's better regulation initiatives puts it well: "What is missing from these initiatives is equal attention to developing methodologies for quantifying the longer term environmental benefits of proposed legislation, and the costs of non-action in terms of damage to human health and, for example, soil and water resources. Such asymmetrical quantification inevitably places environmental priorities at a disadvantage."[38]

some conclusions and ways forward

The first conclusion to be drawn is that the relationship between environmental regulation and competitiveness is complex, much more so than protagonists in the debate would want to admit. There is no necessary relationship, either positive or negative, between environmental regulation and competitiveness. Arguments either way depend on

a whole range of variables and framing assumptions: What environmental problem? What type of regulation? Whose costs? Whose benefits? Over what timescale? And so on. However, some clear findings emerge from the evidence surveyed above – and with them, some recommendations.

there is a need to tighten the definition of competitiveness

When regulatory proposals are being scrutinised, 'effects on competitiveness' are often used as a shorthand for 'negative economic effects'. It is important to emphasise that competitiveness concerns really only apply to traded sectors, ie those competing internationally. For example, an aluminium producer will compete with aluminium producers overseas, to try to sell the best-value product. Differences in the regulatory environment will therefore affect their ability to compete. Housebuilders building homes in the UK, by contrast, will not be affected by different regulatory regimes elsewhere, as houses are obviously not traded internationally – all housebuilders operating in the UK will have to comply with the same regulation.

negative effects of environmental regulation on competitiveness tend to be overestimated, and benefits tend to be underestimated

This is particularly a problem in regulatory impact assessments, drawn up in advance of legislation (see position 2, above). Regulations designed to bring about significant innovation are particularly hard to cost, as the innovative solutions are – by definition – not known. (see position 3, above). Whereas costs tend to occur in the short-term and to the sector being regulated, benefits tend to accrue over time, and may be felt more widely. It is, therefore, harder to estimate benefits accurately. Whilst this will always remain difficult, there are some obvious steps that can be taken to lessen the problem:

- The methodology for regulatory impact assessments (RIAs) should be standardised, and there should be a requirement to estimate wider benefits, such as efficiency gains and benefits to the environmental industries.
- RIAs should be reviewed after the regulations have been in effect for some time – perhaps five years – to compare the difference between predictions and reality. If this was done routinely, it would lead to more considered predictions in RIAs.
- There could be a role for the National Audit Office in scrutinising RIAs, particularly in the assessment of predicted against actual impacts.
- Even with these changes, it is still likely that the economic benefits of environmental regulation will be underestimated. As described above, not all benefits will be captured, and the inherent bias should be taken into account when regulations are drawn up. This will require a robust stance from government.

further efforts could be made to reduce administrative burdens caused by environmental regulations

Administrative burdens, or 'red-tape', are real, though they tend to be exaggerated and conflated with compliance costs (see position 1 above). There are some obvious steps that can be taken to streamline the process:

- The requirements for firms obviously in compliance could be reduced. Instead of regular, automatic inspections, these could be more sporadic for better companies. This is the intention of the Environment Agency's risk-based regulation initiative.
- There could be a move toward a system of 'earned autonomy' whereby regulation is internalised more, with regulators performing more of an audit role than an inspection role. This could be accompanied by higher penalties for non-compliance.
- Regulations could contain a 'sunset clause' so that they are reviewed after a certain time and possibly withdrawn.
- Efforts could be made to integrate permitting – following Defra's 'one farm, one form' approach.

The design of regulations is important, particularly in order to drive innovation. As the discussion in position 3 above demonstrates, the way regulations are designed has a significant impact on both economic and environmental outcomes. Although there is still considerable debate on this issue, there are some generally-accepted ways forward:

- Straight 'command-and-control' legislation is necessary, to ensure minimum standards, and to reach all areas of the economy, including SMEs.
- Market mechanisms (trading, taxes) and outcome-based regulation (such as long-range target-setting) should be used to drive innovation (this is discussed in more detail above).
- Regulations should set an end goal and a clear trajectory, to give industry enough certainty to justify innovation. For example, buildings regulations could include a carbon index, with requirements rising all the time, toward a long-term target.
- Regulations should be ambitious. If they do not set stretching standards, companies will not find innovative solutions, and are more likely to incur costs without benefits.
- One interviewee suggested a modification of the patent system for environmental gain. Following this model, a patent would be granted on grounds of benefit to society, offering companies a 'licence to innovate'.

further work needed

Given the limitations of the evidence to date, there is need for further research on this issue. Particular areas raised by interviewees were:

- A Wanless-style government-backed inquiry into the issue, to test the assumptions and positions outlined above and draw general conclusions on design and implementation of environmental regulations.
- A study on the competitiveness effects of climate change policy. This would examine which sectors were affected, by applying a 'filter' mechanism. For example – is the sector traded or not traded? (see above). If it is not traded, international competition is not an issue. How significant is energy as a proportion of costs? The higher the proportion, the more likely the effects on competitiveness. Using this method, it would be possible to draw up a hierarchy of industries or sectors affected by competitiveness concerns, and make clear which sectors were not affected.

- More empirical work, to assess past progress. For example, how much have the past thirty years' worth of environmental improvements cost? What are the benefits, both environmental and economic?
- Industry-specific studies, particularly for traded sectors such as pharmaceuticals or chemicals.

environmental regulations can be justified on environmental grounds

Lastly, just as social policy is justified on grounds of social progress, so environmental policy can be justified in terms of environmental improvement. Given the uncertainties inherent in the environment-competitiveness debate, environmental regulation should not be justified purely in economic terms. The main benefits of environmental regulation are to society – in terms of improved quality of life, health and environmental quality. If economic benefits can be shown, so much the better, but they should be a secondary justification.

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