

CRANFIELD UNIVERSITY

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AN EVIDENCE BASE AND CRITIQUE FOR ENVIRONMENTAL
REGULATORY REFORM

SCHOOL OF APPLIED SCIENCES

PhD Thesis

Academic Year: 2013 - 2014

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December 2013

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ABSTRACT

Societies have established various forms of governance to protect the natural environment from the adverse effects of human activity. While direct “command and control” regulation has achieved significant improvements in environmental protection, concerns for its efficiency have led governments to seek alternative approaches to achieve environmental policy objectives. Commentators describe a shift from “government” to “governance” as policy makers and regulators seek to harness wider social forces beyond government, while risk-based regulation is pursued to target constrained regulatory resources for maximum effect. However, robust evidence for the effectiveness of different forms of regulation is lacking. This thesis addresses this gap, providing an evidence base for instrument selection and a data-informed critique of regulatory reform practice. Research followed a case study strategy, gathering qualitative data through 58 in-depth semi-structured interviews, analysed using the NVIVO™ Computer Aided Qualitative Data Analysis System (CAQDAS), with senior policy makers at the Department for Environment, Food and Rural Affairs, England (Defra) and senior executives in businesses and trade associations in 5 UK sectors.

(1) A new typology of regulatory instruments has been compiled, validated with sector experts, refined for policy end-users, and published as part of Defra’s guidance on instrument selection.

(2) The critical case of instrument selection in practice at Defra has been examined for the first time, revealing factors affecting choice, the use of co-regulation to develop evidence and the importance of retaining policy maker skills for new forms of regulation.

(3) A multiple-case study of senior business representatives found five strongly preferred voluntary regulation, seven expressed significant doubts about its effectiveness, and 19 expressed no general preference. While voluntary approaches were valued for flexibility and lower burdens, direct regulation offered stability and a level playing field. They sought *inter alia* coherent, evidence based regulatory frameworks, delivered through positive regulatory relationships.

This research progresses the better and smarter regulation debate on the use of alternatives to direct regulation and has already been used to inform policy making in practice.

Keywords: Environmental policy; Regulation; Regulatory reform

ACKNOWLEDGEMENTS

The work contained in this thesis was kindly co-funded by the Department for Environment, Food and Rural Affairs (Defra), Engineering and Physical Sciences Research Council (EPSRC), Natural Environment Research Council (NERC) and Economic and Social Research Council (ESRC), without which this research programme would not have been possible.

I would like to thank my supervisors, Professor Simon Pollard and Dr Andy Angus for their help, support and guidance throughout the programme. I would also like to thank Edward Lockhart-Mummery for his support during my work with Defra.

I would also like to thank the many individuals from across the government and business environmental management community who participated in this research for their insight and assistance.

Most of all I would like to thank my wife Helen for her support, interest and tolerance throughout this endeavour, and my family and friends for their new-found interest in environmental regulation.

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LIST OF ABBREVIATIONS

BAT	Best Available Technique
BATNEEC	Best Available Technique Not Entailing Excessive Cost
BPEO	Best Practical Environmental Option
BPM	Best Practicable Means
BRIC	Brazil, Russia, India and China
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CCA	Climate Change Agreement
CFC	Chlorofluorocarbon
CITES	Convention on International Trade in Endangered Species
CIWEM	Chartered Institution of Water and Environmental Management
COMAH	Control of Major Accident Hazards
CRC EES	Carbon Reduction Commitment Energy Efficiency Scheme
CSR	Corporate Social Responsibility
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EC	European Commission or European Community
EIA	Environmental Impact Assessment
EPR	Environmental Permitting Regulations
ETS	Emissions Trading Scheme
EU	European Union
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
HMRC	Her Majesty's Revenue and Customs
HSE	Health and Safety Executive
IPPC	Integrated Pollution Prevention and Control
LAPPC	Local Authority Pollution Prevention and Control
MSC	Marine Stewardship Council
NEPI	New Environmental Policy Instruments

NGA	New Governance Arrangements
NGO	Non-Governmental Organisation
NIM	National Intelligence Model
NVZ	Nitrate Vulnerable Zone
OECD	Organisation for Economic Co-operation and Development
OIRA	Office of Information and Regulatory Affairs
OMB	Office of Management and Budget
PES	Payment for Environmental/Ecosystem Services
REACH	Registration, Evaluation, Authorisation & restriction of CHemicals
REDD	Reduced Emissions from Deforestation and Forest Degradation
RIA	Regulatory Impact Assessment
RSPB	Royal Society for the Protection of Birds
SERR	Smarter Environmental Regulation Review
SiLC	Specialist in Land Condition
SWMP	Site Waste Management Plan
TEEB	The Economics of Ecosystems and Biodiversity
UK	The United Kingdom of Great Britain and Northern Ireland
UN	United Nations
UNEP	United Nations Environment Programme
VEP	Voluntary Environmental Programmes
WRAP	Waste and Resources Action Programme
WTO	World Trade Organisation
WWF	World Wide Fund for Nature

LIST OF PUBLICATIONS AND PRESENTATIONS

Taylor, C.M., Pollard, S.J.T., Rocks, S.A. & Smith, M.C. (2011). *Environmental risk management and economic performance of policy instruments: A strategic analysis of UK experience since 1997*. In: Society For Risk Analysis Annual Meeting 2011, Charleston, U.S.A. 2011.

Taylor, C.M., Pollard, S.J.T., Rocks, S.A. & Angus, A.J. (2012). *Selecting Policy Instruments for Better Environmental Regulation: a Critique and Future Research Agenda*. *Environmental Policy and Governance*. 22 (4). p.pp. 268–292.

Taylor, C.M., Pollard, S.J.T., Angus, A.J. & Rocks, S.A. (2013). *Better by design: Rethinking interventions for better environmental regulation*. *Science of The Total Environment*. 447 (0). p.pp. 488–499.

Taylor, C.M., Pollard, S.J.T., Angus, A.J. & Rocks, S.A. (2013). *Better by design: Rethinking interventions for better environmental regulation - a case study of environmental policy making in the UK*. In: Society for Risk Analysis Europe Conference, Trondheim, Norway. 2013.

Taylor, C.M., Lockhart-Mummery, E., Pollard, S.J.T., Angus, A.J. & Allen, C. (2013). *20 ways to influence business behaviour - A short guide to instrument selection for policy makers and regulators*. Defra, London, U. K. Available from:

http://randd.defra.gov.uk/Document.aspx?Document=11687_InstrumentSelectionGuidance041113-external.pdf

1 INTRODUCTION

1.1 Context and background

Markets can provide effective mechanisms for balancing supply and demand for goods and services, but can also fail (Perman et al., 2003). Businesses can produce socially beneficial products, but in the process market failures can allow socially unacceptable damage to people and to the natural environment on which all life relies. Societies create and enforce rules to protect the environment, which governments can codify into laws and statute enforced by government agencies. Alternatively, rules may be created and enforced by other social actors, for example in the form of agreements between businesses along supply chains. These different forms of governance for environmental protection are described here as “regulation” in its broadest sense (after Gunningham & Sinclair, 1999), to include both the influence of government and the influence of other social actors on business behaviour. The term “instruments” is used to describe different component parts of regulation, such as licences or taxes.

Government environmental regulation has developed over the last 150 years from measures to tackle local pollution (e.g. The UK Alkali Act, 1863) to international agreements to tackle global environmental problems. In 1972 the Stockholm Conference established the United Nations Environment Programme (UNEP), since when international agreements have been pursued for example to prevent trade in endangered species (CITES, 1973), control ozone depleting substances (Montreal Protocol, 1987), protect biological diversity (Rio Earth Summit, 1992) and to tackle climate change (Kyoto Protocol, 2005) (UNEP, 2005). The European Union (EU) has implemented environmental directives and regulation across member states, for example to control the management of waste (Waste Framework Directive, 2008), water quality and use (Water Framework Directive, 2000) and the production and use of chemicals (Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), 2007).

Over time, government regulation has been supplemented with other forms of social control that place greater responsibility for environmental protection on the private sector. These forms of governance seek to harness social forces other than direct government influence affecting business behaviour, such as the buying behaviour of consumers or customer-supplier relationships between businesses. Commentators have described this development as a shift from “government to governance”, observing the wider adoption of “new environmental policy instruments” across the EU (Jordan et al., 2005).

Modern regulation should be risk-informed, targeting regulatory resources to where they can have the greatest impact on outcomes (Hampton, 2005). Risk has been defined as “a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of that occurrence”, where a hazard is a “property or situation that in particular circumstances could lead to harm” (Gormley et al., 2011). Scholars have examined how risk-based regulation can be achieved in practice and how analysis of environmental risks should inform the selection of regulatory instruments (e.g. Hood et al., 2001; Pollard et al., 2004; Hutter, 2005; Rothstein et al., 2006; Gouldson et al., 2009). Rothstein et al. (2006) note that modern, risk-based regulation is likely to deploy mixtures of tools to achieve regulatory objectives and may improve effectiveness and efficiency, but anticipate epistemic, institutional and normative challenges in its implementation. Epistemic challenges may arise from regulation asking the scientific community questions it is unable to answer; institutional challenges may arise from the difficulties of prioritising regulator resources according to risk, in the context of existing resource commitments; and normative challenges may arise from stakeholders unfavourably viewing trade-offs of costs and benefits chosen through bureaucratic decision-making processes (Rothstein et al., 2006).

Today, businesses may be subject to a wide range of governmental and non-governmental forms of regulation, which together influence their environmental performance as part of a mix of instruments. This mix of instruments can include direct “command and control” regulation, economic instruments such as

taxes and emissions trading schemes, information based instruments, co-regulation, self-regulation and support and capacity building (e.g. Department for Business Innovation and Skills, 2013a; Gouldson et al., 2008). Instruments are often compared in terms of the effectiveness in achieving their environmental objectives, and the efficiency with which they do so. While direct regulation has proved an effective mechanism for reducing environmental damage and often presents a strong, clear signal to the market of government commitment, it has also been criticised frequently on the grounds of relatively poor efficiency (e.g. Gunningham & Sinclair, 1999). Alternative instruments typically offer greater flexibility to businesses and may prove more efficient, but may offer less certain environmental outcomes.

Concern that regulation imposes unnecessary costs on businesses, undermines their competitiveness and adversely affects economic growth, has led to continual effort by governments across the western world to improve regulatory design and delivery. Regulatory impact assessment (or analysis) (RIA) is a policy analysis method used to assess regulatory impact across economic, social and environmental dimensions (Kirkpatrick & Parker, 2007). RIA was adopted in the USA in the 1970s (Anderson, 1998), monitored by the Office of Management and Budget (OMB), and has gradually been adopted by most Organisation for Economic Co-operation and Development (OECD) countries over the last 30 years (OECD, 2005). The OECD's Regulatory Policy Division aims to promote good regulatory policy among member countries (OECD, 2005), and in the EU the established "better regulation" agenda has further developed into "smart regulation" (European Commission, 2010). In the UK the Coalition Government initiated the "Red Tape Challenge" in 2011, a pan-government review process to identify opportunities to improve or remove regulation (Cabinet Office, 2013a) with an emphasis on reducing regulation and adoption of non-governmental approaches where possible (Department for Business Innovation and Skills, 2013a).

Under these demands for regulatory reform, government policy makers and regulators are faced with the challenge of selecting the best combination of

instruments, balancing effectiveness, efficiency and other considerations, to achieve environmental goals (Gunningham, 2009). Evidence is required to inform these decisions, in pursuit of “evidence-based policy” (Solesbury, 2001). Evidence for regulatory effectiveness rests on understanding the complex chain of interactions from regulatory intervention, through business and individual behaviour change and its impact on the environment, to the harm caused or averted. It is intrinsically challenging to isolate these interactions through experimentation, and understanding is further clouded by multiple confounding factors. While stakeholders may demand “proof” for the effectiveness of interventions, science may at best only be able to provide a robust consensus and process for ongoing inquiry, testing and revision (Oreskes, 2004). While evidence is gradually accumulating for the effectiveness of environmental regulatory interventions, it is often lacking. Policy makers and regulators must therefore undertake the process of instrument selection under conditions of significant uncertainty.

In this context, this thesis provides an evidence base for instrument selection and a critique of regulatory reform, to extend the prior art, and to provide assistance to policy makers, regulators and other stakeholders engaged in regulatory reform.

1.2 Problem statement

There is a lack of evidence to inform the choice of regulatory instruments by policy makers and regulators.

1.3 Aims and objectives

The research question that this thesis addresses is:

“What instruments work when, with whom and why?”

This thesis focuses on the factors that affect the effectiveness, and therefore suitability, of regulatory instruments in different business contexts.

The key research objectives are to:

- (1) Identify the total range of instruments available to policy makers and regulators and the factors thought to affect their effectiveness and efficiency in practice.
- (2) Examine the regulatory frameworks in place for illustrative case study business sectors in the UK.
- (3) Identify the factors that policy makers believe affect the selection, effectiveness, and efficiency of policy instruments.
- (4) Identify the factors that businesses believe affect selection, effectiveness and efficiency of instruments.
- (5) Evaluate existing evidence and theory in light of the data gathered from these case studies, and develop recommendations for future regulatory reform programmes.

1.4 Thesis structure

Chapter 2: Presents a review of the relevant literature. A typology of instruments is constructed from the prior art and evidence for the effectiveness of example instruments is reviewed. While factors likely to affect effectiveness can be identified, evidence is often found lacking. The research question is formulated from this observation.

Chapter 3: Describes the methods adopted. An inductive, theory building approach, using case studies drawing on data from semi-structured interviews, was used to develop and extend theory. Data were stored and analysed using the Computer Assisted Qualitative Data Analysis Software (CAQDAS,) NVIVO™.

Chapter 4: Presents summaries of the environmental regulatory framework for five case study industries, and examines perspectives on their operation provided by industry experts.

Chapter 5: Presents the data gathered from the case study research with Defra policy makers. Themes that emerged are described and the frequencies of their occurrence among interviewees are presented in tables. Factors thought to affect instrument effectiveness and other reasons for instrument selection

emerged, and an overall logic model for instrument selection by policy makers is presented.

Chapter 6: Presents the data gathered from multiple-case study research with senior representatives of UK businesses and trade associations. Themes that emerged are described and the frequencies of their occurrence among interviewees are presented in tables and a chart. Factors thought to affect instrument effectiveness and efficiency emerged, and respondents provided perspectives on the relative merits of different forms of regulation.

Chapter 7: Compares results from the government and industry case studies provided in Chapters 5 and 6, and reviews them in the light of the relevant academic literature, assessing their novelty and contribution. Their implications for government regulatory reform programmes are considered.

Chapter 8: Conclusions and summary. Describes and summarises the central findings of this thesis, highlights novelty and contribution, critically reviews this research, outlines suggestions for further research and summarises recommendations for government and industry.

1.5 Contribution

The novelty and contribution to science of this thesis is summarised here and discussed further in Chapter 7:

- As described in Chapter 3, the research has been undertaken using a novel methodology that includes close working with a government department through an industrial placement, providing an “insider’s view” of the realities of government policy making and regulation.
- The research developed and refined a typology of regulatory instruments based on the prior art (Department for Business Innovation and Skills, 2013a; Gouldson et al., 2008; Perman et al., 2003) through validation with 67 practitioners from government and industry (Table 5-3, Table 6-3, Table 7-1). This has been developed into guidance for practitioners now in use at Defra (Appendix E).

- The research provides new data and insight into instrument selection at Defra, which is a critical case for UK environmental policy making (Chapter 5), and new data and insight into industry preferences for instrument selection in the UK context (Chapter 6).
- The research provides a considerable body of evidence for the impact of a range of factors on regulatory effectiveness in the UK context, including the quality of relationships between regulatory officers and the regulated (Section 7.3.2), the coherence of the regulatory framework (Section 7.3.3.1), the suitability of the level of flexibility or prescription in rules for regulated businesses (Section 7.3.3.2), and the administrative design of regulation at the interface between businesses and regulators (Section 7.3.3.3).
- The research provides evidence concerning risk characterisation by policy makers, regulators and businesses for regulation, demonstrating the challenges of risk-based regulation in practice (Section 7.3.4).
- The research provides evidence that, to maximise effectiveness and efficiency, regulatory frameworks should be tailored to the target businesses, utilising a mix of instruments rather than any one intervention being more or less effective in general (Section 7.4).
- The research provides evidence for the tactical development and communication of evidence of business environmental impact among stakeholders, and the effect of evidence for the effectiveness of regulation on motivations for compliance (Section 7.5).
- The research highlights the need for policy makers and regulators to work collaboratively with the business community in the process of regulatory reform, to gain insight into the impact of regulation on business operations (Section 7.6), and provides new evidence that improved processes and skills in business engagement and regulatory analysis may be required by government to enable greater use of non-governmental forms of environmental governance (Section 7.7).

1.6 Motivation

This research adopted a theory building approach, drawing on qualitative data gathered through semi-structured interviews for case study organisations (Eisenhardt & Graebner, 2007; Miles & Huberman, 1994; Payne & Payne, 2004; Yin, 2009). This approach has been adopted to provide in-depth insight into the perceptions, motivations and behaviours of stakeholders affected by and involved in the design of environmental regulation. This research approach seeks to develop theory through “analytic generalisation”, analogous to theory development through multiple experiments, rather than “statistical generalisation” that seeks to characterise a population through sampling and statistical analysis. Claims for generalisation of findings in line with this approach are reflected in the text.

2 LITERATURE REVIEW

2.1 Introduction

This chapter presents a synthesis of available literature and a critical literature review to identify the range of instruments available to policy makers and regulators and the factors thought to affect their effectiveness and efficiency in practice, to meet Objective 1 of this research programme. This chapter was written for this PhD thesis by the author under normal PhD supervision conditions. It was published subsequently in *Environmental Policy and Governance* (Taylor et al., 2012), with supervisors acknowledged as co-authors.

2.2 Abstract

There is a lack of evidence on regulatory effectiveness available to support policy makers with the selection of appropriate instruments to deliver better environmental regulation. We identify the types of evidence required to enable regulatory reform, characterize evidence gaps, and explore how these may be filled through future research. A typology of regulatory instruments is presented, and evidence of what has worked, when and why is examined, drawing on international experience and recent cases from the United Kingdom (UK). Evidence of the capabilities of good environmental regulators for regulatory effectiveness is lacking, and it is proposed that ethnographic research that captures the nuances of regulatory practice will prove necessary to address this. This paper is of value to policy makers and regulators around the world considering the selection and deployment of the full range of environmental regulatory instruments to respond to environmental risks and in support of economic growth. It can inform the selection of suitable approaches and the design of institutions capable of delivering them.

2.3 Context for environmental regulatory reform

Demand for regulatory reform has intensified internationally as governments seek ways to meet the challenges of stagnant growth levels and debt reduction. A sharper focus on the outcomes of environmental regulation has highlighted a lack of evidence for regulatory effectiveness available to policy makers to

support the selection of appropriate instruments to deliver better environmental regulation (e.g. Gouldson et al., 2009). The aim of this paper is to identify the kinds of evidence required to enable regulatory reform, to characterise evidence gaps, and to explore how these gaps may be filled through future research. We seek to forward the debate on well-designed interventions in a climate whereby accountabilities for risk management are being shared more widely and where there is intense scrutiny on justifying market interventions. A typology of regulatory instruments is presented, including interventions by government regulators, non-government regulators and approaches that harness other societal influences on environmental behaviour, and evidence of what has worked, when and why is examined, drawing on international experience and recent cases from the UK. In principle, many different instruments could be deployed to tackle specific environmental policy objectives. This research finds that their effectiveness in practice has depended on features of the instrument design, the motives and capabilities of the regulated community, and the motives and capabilities of the (governmental or non-governmental) regulator. Evidence for the impact of the capability of regulators on regulatory effectiveness, in terms of outcome, is found to be lacking, and it is proposed that ethnographic research that captures the nuances of regulatory practice will prove necessary to address this gap.

In developed countries many governments have established permanent institutions to drive regulatory reform across government departments and agencies, and the OECD has a long-established programme focussed on promoting regulatory reform across its members (Cordova-Novion & Jacobzone, 2011). For example, the Office of Information and Regulatory Affairs (OIRA) was established in the USA as part of the 1980 Paperwork Reduction Act to review all information collection by the Federal Government, and under Executive Order 12866 reviews draft regulations across government to ensure benefit-cost analysis has been used to assess regulatory policy options (Arbuckle, 2011). Presidential Executive Order 13563 (January 2011) has recently reaffirmed the government's commitment to regulatory reform, initiating a retrospective review of existing regulations to determine whether

they can be improved or removed (Obama, 2011a). Similarly in Australia the Department of Finance and Deregulation promotes the government's better regulation objectives through the operation of the Office of Best Practice Regulation and the Deregulation Policy Division, which support other departments in ongoing regulatory reform activities (Australian Government Department of Finance and Deregulation, 2013). The Netherlands, considered a leader in regulatory reform, has an ongoing programme of red tape reduction driven by a cross-ministerial project team and independently monitored by the Advisory Board on Administrative Burdens (Actal) (OECD, 2007). Similar initiatives exist outside the OECD. For example, Singapore established the Pro-Enterprise Panel to cut red tape in 2000 which continues to operate today (Singapore Ministry of Trade and Industry, 2013).

Esty and Porter (2005) examined the relationships between environmental performance, economic competitiveness, the national environmental regulatory regime and national economic and legal context across a sample of developed and developing countries. They found strong associations between environmental performance and GDP per capita; in general richer countries enjoy better environmental quality than poorer countries (Esty & Porter, 2005). However, they also found significant variance in environmental performance between countries with similar GDP per capita, which may be significantly explained by both the quality of the national environmental regulatory regime and national economic and legal context (Esty & Porter, 2005). They argue that better, more stringent and strictly enforced, environmental regulation is associated with more rapid economic growth. Policy makers therefore face a choice between "clean" or "dirty" trajectories to increase GDP per capita and enhance environmental regulation (Esty & Porter, 2005).

There is evidence to suggest that policy makers in the rapidly developing economies of Brazil, Russia, India and China (the BRICs) are actively considering alternative mixes of environmental instruments whilst choosing different development paths. In response to serious environmental problems that have accompanied rapid economic growth, the government of China has

shown increasing interest in the use of alternatives to direct environmental regulation in policy documents 1999-2008, particularly economic instruments, and makes use of various voluntary and information based approaches (Huang et al., 2010). Brazil faces particular challenges in protecting natural vegetation under pressure from rapid expansion of agriculture. Policy makers are actively considering policy mixes including the use of international direct conservation payments for Reduced Emissions from Deforestation and Degradation (REDD), an approach considered only likely to be effective if underpinned by strong national command and control regulation (Börner et al., 2010). Since the Bhopal accident of 1984 India has significantly strengthened environmental regulation, so that the framework is considered now by some to be world class (Mejia, 2009). However, enforcement remains a significant challenge with low levels of compliance in some areas (Mejia, 2009). Mol (2009) has argued that Russian policy makers have chosen to prioritise economic growth whilst environmental institutions have weakened during the last decade, illustrating that progress towards greater environmental protection is far from guaranteed in all countries. Yin-Fang Zhang (2010) highlights a dearth of empirical data on the progress of regulatory reform in less-developed economies and finds limited progress where data are available, and cautions that constraints in regulatory capacity and legal, political, administrative and economic processes will present significant challenges to transferring practice from developed economies.

Nevertheless, policy makers around the world have an opportunity to learn from a wide range of approaches and experiences in regulatory reform both in general and for the specific purpose of improving environmental regulation. This paper will be of value to policy makers and regulators considering the selection and deployment of the full range of environmental regulatory instruments to respond to environmental threats and enable economic growth, providing learning from the UK experience. Thus it can inform the selection of suitable approaches and the design of institutions capable of delivering them.

2.4 Instrument selection for better regulation

Markets can prove effective mechanisms for balancing the supply and demand for goods and services. However, pervasive market failures cause under-provision of goods and services (Perman et al., 2003). Societies have developed rules that describe how people should behave, which can include rules to address market failures. Rules may be formalised into laws, written down as statute and enforced by governments and their agencies. Governments seek to achieve objectives by pursuing strategies and courses of action described as policies, designed by policy makers. In the UK, government intervention is justified on the grounds of market failure, government failure, distributional objectives, or to tackle public risks (Department for Business Innovation and Skills, 2013a). Regulation is one strategy that policy makers might pursue. In line with Gunningham and Sinclair (1999), the term is used here in its broadest sense to include the full spectrum of social control, including direct “command and control” regulation and more flexible approaches harnessing the influence of businesses and other third parties. The term “instrument” is used to describe generic components of regulation, such as licensing and taxes.

Regulation has been widely used to reduce and manage public risk, and to protect the ecosystems on which we depend from harm arising from human activities. Government action may be required at a local, national and international level. While early environmental regulation was targeted at specific local sources (e.g. The UK Alkali Act, 1863), by 1972 the United Nations (UN) recognised the need for international action to tackle environmental risks and convened the UN Conference on the Human Environment in Stockholm, Sweden. The Stockholm Conference established the UN Environment Programme (UNEP), which is responsible for assessing the state of the global environment and providing a focal point for coordinating international action. Since 1972 UNEP has established international frameworks to target a range of issues including the international trade in endangered species (CITES, 1973), the control of ozone depleting substances (Montreal Protocol, 1987), the protection of biological diversity (Rio “Earth Summit”, 1992) and the reduction of

climate change (Rio “Earth Summit”, 1992, and Kyoto Protocol, 2005) (UNEP, 2005). The effectiveness of these international initiatives is dependent on the ability of national governments to implement effective environmental policy and regulation in response, whilst remaining within international trade rules.

In England, environmental policy making is centred within the Department for the Environment, Food and Rural Affairs (Defra) and the Department of Energy and Climate Change (DECC). Modern regulation should be risk-informed so that interventions are targeted to where they can have most effect in terms of outcome (e.g. Hampton, 2005). Defra defines a risk as “a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence”, where a hazard is defined as a “property or situation that in particular circumstances could lead to harm” (Gormley et al., 2011). Defra’s policy responsibilities include the management of flood risk, the control of animal disease, waste management, control of water quality, monitoring and elements of control of air quality, and policies associated with agriculture and fisheries. Defra and DECC set policies intended to influence businesses and individuals to achieve the government’s environmental objectives, and set the policy framework for a further network of government agencies, some of which have responsibility for implementing and enforcing environmental regulation. The Environment Agency (EA) is the largest of these bodies, and is responsible for managing a wide range of environmental issues including flood management and regulation of pollution from industrial sites.

While regulation is intended to deliver net social benefits, it may also impose costs on businesses and individuals, including the costs of administration, costs arising from changes to business practices such as installing new cleaner technologies, and potentially indirect costs arising from constraints on competitiveness or innovation imposed by regulation.

Regulation can be achieved through a wide range of instruments that are often compared in terms of their effectiveness and efficiency (e.g. Gunningham & Sinclair, 1999). For the purposes of the discussion here, effectiveness is used

to describe how reliably an instrument is expected to bring about the intended environmental objective. The term efficiency is often used broadly to describe how well people use resources to deliver beneficial results. Economists provide tighter definitions of the related concepts of economic efficiency and cost-effectiveness, which will be used for this discussion (e.g. Kolstad, 2000). Economic efficiency describes the extent to which the distribution of resources in an economy maximises the overall benefits to society. In the context of environmental regulation, policy makers may seek to identify the level of a given pollutant that is economically efficient, reducing pollution to improve the welfare of people adversely affected while imposing abatement costs on polluters. Cost-effectiveness describes the extent to which the overall costs to society of achieving a given objective are minimised. Having identified a target pollution level, different regulatory approaches may prove more or less cost-effective in achieving that goal.

Since the early 1990s, governments have sought to improve the delivery of public services, including through regulatory reform. Regulatory impact assessment (or analysis) (RIA) is a policy analysis method originally conceived to assess the burden of regulations on the private sector, which has now been broadened to assess regulatory impact across the three pillars of sustainable development (economic, social and environmental) (Kirkpatrick & Parker, 2007). RIA-based approaches were adopted in the USA in the 1970s in response to fears that the regulatory burden was becoming excessive and adding to inflationary pressures (Anderson, 1998), and since 1995, the Office of Management and Budget (OMB) has reported to the United States Congress on the benefits and costs of government regulation. The Organisation for Economic Co-operation and Development (OECD) Regulatory Policy Division aims to promote good regulatory policy through a programme of work with member countries, and in 2005 published its *Guiding Principles for Regulatory Policy and Performance* (OECD, 2005), building on international experience and updating its 1995 *Reference Checklist for Good Regulatory Decision Making* (OECD, 1995). RIA has gradually been adopted by most OECD countries over the last 30 years.

In the UK, the 1999 Modernising Government white paper included a “new drive to remove unnecessary regulation” and introduced RIA to assess burdens associated with new regulation (Cabinet Office, 1999). The UK Hampton Review into reducing administrative burdens of regulatory enforcement and inspection recommended that regulatory resources should be targeted according to risk, together with better advice provision and streamlined processes (Hampton, 2005). Risk-based regulation has continued to be developed internationally (e.g. OECD, 2006; Rothstein et al., 2006; Gouldson et al., 2009). The international financial crisis of 2008 has precipitated further calls for regulatory reform, to tackle inter alia financial market instabilities and the threats of climate change, with European Union (EU) calls for the “better regulation” agenda to further develop into “smart regulation” (European Commission, 2010). In 2011 the UK Coalition Government initiated the “Red Tape Challenge”, a pan-government review process including public consultation intended to identify opportunities to improve or remove regulation (Cabinet Office, 2013a), with an emphasis on reducing regulation and the adoption of non-governmental approaches where possible (Department for Business Innovation and Skills, 2013a). Meanwhile the OECD has called for “green growth” that both protects the environment and enables economic development, and highlights the need for imaginative use of a broad range of regulatory instruments to achieve this twin objective (OECD, 2011).

UK environmental policy is significantly influenced by European Union (EU) policy and law. EU directives, such as the Water Framework Directive adopted in 2000 (European Commission, 2013a), require transposition into member state legal systems, with the potential to add to national stocks of law and regulation and increase the costs borne by businesses and government. Concerns that the burden of regulation is increasing are reflected in current UK Government policies to only allow the introduction of new regulations when old regulations are removed so that net costs to business do not increase (“one-in, one-out”) and to ensure that burdens are not increased any more than necessary during the process of transposition (preventing “gold plating” through “copy out”) (H. M. Government, 2011).

Efforts to improve the efficiency and effectiveness of environmental regulation have led to the development of a wide range of different regulatory approaches for tackling environmental risks. Commentators have observed that early government action tended to rely on direct regulation based on mandatory operating requirements, inspection and enforcement, which in many instances has proved successful in reducing the targeted problem. However, over time direct regulation has been supplemented with regulatory approaches that do not enforce mandatory changes to behaviour on regulated parties, but instead seek to harness other social forces, such as the buying behaviour of consumers or customer-supplier relationships amongst businesses, to influence business and individual behaviour. This development has been associated by commentators with a shift from “government” to “governance” (Jordan et al., 2005). While the meaning of the term governance varies across branches of social science, scholars generally associate it with a decrease in the ability of central government to influence society, with greater reliance placed upon the private sector to achieve objectives (Jordan et al., 2005). Jordan et al. (2005) examined the increasing use of certain “new environmental policy instruments” (NEPIs) across nine European Union states to assess whether their adoption represented a shift from government to governance, concluding that there is some shift towards governance but significant government involvement in environmental regulation remains the norm. Gunningham (2009) has charted the “shifting architectures” of environmental law, regulation and governance since 1970 across various Anglo-Saxon jurisdictions and to a lesser extent the EU, finding that while many architectures (combinations of instruments) exist and have been effective in different contexts, no single approach would be appropriate to apply across the full spectrum of environmental problems. Instead he concludes that the objective for policy makers and regulators is to achieve substantive compliance using whichever combination of approaches works best for a given environmental goal (Gunningham, 2009).

Other commentators have approached the question of instrument selection from the perspective of risk-based regulation (e.g. Hood et al., 2001; Pollard et al., 2004; Hutter, 2005; Rothstein et al., 2006; Gouldson et al., 2009). Rothstein et

al. (2006) note that modern, risk-based regulation is likely to deploy mixtures of tools to achieve regulatory objectives and may improve effectiveness and efficiency, but anticipate epistemic, institutional and normative challenges in its implementation. Epistemic challenges may arise from regulation asking the scientific community questions it is unable to answer; institutional challenges may arise from the difficulties of prioritising regulator resources according to risk, in the context of existing resource commitments; and normative challenges may arise from stakeholders unfavourably viewing trade-offs of costs and benefits chosen through bureaucratic decision-making processes (Rothstein et al., 2006).

In concert, these conclusions highlight the need for policy makers and regulators to apply considerable skill in the formulation of regulation, to move from the identification of possible tools in theory into their selection and successful implementation in practice. Sparrow (2000, 2008) has described this skill set as the “regulatory craft”, and finds that the risk literature has not provided practitioners with a well-developed organisational theory for controlling risks, which would illuminate the use of “intelligence, analysis, creativity, and sensible use of discretion” that can significantly alter the effectiveness of operations without any change to the overarching macro-level policy framework (Sparrow, 2008). Gouldson et al. (2009) have examined the use of risk based regulation at the Environment Agency for England and Wales, and note that while risk based regulation has been applied in several policy domains and is generally believed to deliver better regulatory outcomes, challenges remain in its implementation, most notably with respect to understanding best practice and promoting consistency, improving the reliability and responsiveness of risk assessment and monitoring, building capacity, assessing the influence of different regulatory styles and understanding when and how the regulator could delegate some of its powers to the private sector (Gouldson et al., 2009).

2.5 Using evidence for regulatory reform

Policy makers need to decide which instruments to use as they design national policy frameworks within which regulators will work, in order to provide

regulators with the flexibility to decide how and when to use the regulatory instruments at their disposal. In order to make these decisions, policy makers and regulators need to be able to answer the broad question “what instruments work, when and with whom, and why?”

This question is not easy to answer. Regulatory effectiveness rests upon a complex chain of interactions from regulatory intervention, through business and individual behaviour change, through the impact of behaviour change on the environment, to the harm caused or averted and attributable to the intervention discussed. Evidence of how these interactions function is required to enable regulatory reform. Ideally, experiments would be devised to identify causal factors influencing behaviour at each link in the chain, with control experiments used to include or exclude factors to test their significance, and environmental, economic and social effects assessed with precise empirical measurement (Denscombe, 2007). While such experiments may be possible for some parts of the chain (for example to test specific chemical, physical or biological processes), they are more likely to be difficult to identify because the regulatory instrument in question only exists in one instance in a specific form. The presence of a vast array of “confounding factors” that also may influence an environmental outcome in addition to a regulatory intervention means that at best researchers of regulatory practice and style may only observe an “association” between these factors, rather than establishing “causality”. The involvement of people and complex systems, and the consideration of alternative future scenarios make prediction of the impact of regulation intrinsically uncertain. Oreskes (2004) argues that in debate concerning environmental issues, opponents of environmental action often claim that scientific evidence of harm to the environment is uncertain and unproven, while some scientists respond by trying to provide “proof”. She argues that in most cases, science does not provide logically indisputable proof about the natural world, and instead can at best provide a robust consensus and a process for ongoing inquiry, testing and revision (Oreskes, 2004). In cases where scientific consensus does not exist science can provide informed opinions about possible consequences of actions, and monitor effects.

Therefore policy makers and regulators must become adept at decision-making under conditions of considerable uncertainty, and select approaches to policy development that take this into account. “Evidence-based policy” emerged as the UK Government’s preferred approach to policy making during the 1990s, with an increased emphasis on the need to understand “what works” in public policy leading to a greater emphasis on the use of evidence to inform policy making (Solesbury, 2001). “Systematic review”, a tool used to appraise previous research to methodically synthesise results, is one approach available to policy makers to support evidence based policy (Solesbury, 2001). It has been pioneered internationally (Cochrane Collaboration, 2013) in medical science, although it is recognised that for the broader question of health policy and management, variations of the systematic review approach better suited to analysing qualitative and quantitative information are required (Mays et al., 2005). The Campbell Collaboration has more recently promoted such broader systematic review approaches in education, crime and justice, and social welfare (Campbell Collaboration, 2013).

Weighing up multiple lines of evidence to support decision making is a recurring requirement in the design and implementation of environmental regulation. Environmental Impact Assessment (EIA) is the evaluation of effects likely to arise from a project or action likely to have a substantial impact on the environment (Jay et al., 2007). However, for comparing environmental risks and designing policy and regulatory responses that apply to multiple cases, an approach that can assess classes of harm rather than specific projects is required. Prpich et al. (2011) describe a policy-level framework applied at Defra to characterise environmental risks, and demonstrate its successful application in stimulating debate within the organisation about proportionate mitigation actions and allocation of resources. Pollard et al. (2004) describe strategic risk assessment approaches that have been developed at the Environment Agency for England and Wales, which includes risk characterisation across multiple environmental, economic and social dimensions, risk communication, screening and prioritization, and options appraisal and risk management. The design of policy and regulation is further complicated when other stakeholders are

involved in consultation and deliberation, who may broker evidence to support their own interests (Davies et al., 2010), for example to decide how to handle nuclear waste, or the assessment of appropriate policy responses to the threats posed by climate change. Established techniques are deployed depending inter alia on the political context within which policy development takes place, ideally to incorporate both deliberative and participative processes to engage stakeholders and tackle political and ethical issues, and a strong analytical framework to incorporate scientific evidence (e.g. Dietz & Morton, 2011).

2.6 The growing toolkit of instruments

Various instrument typologies have been proposed to assist in the analysis and reform of regulation. For example Hood's 8-variant typology is based on the general purpose of the instrument versus the principle governing resource used (Howlett & Rayner, 2007). Five types of regulatory policy appear regularly in the literature and are consistent with the categorisation currently in use in UK Government: i) direct "command and control" regulation, ii) economic instruments, iii) information-based instruments, iv) co-regulation and self-regulation, and v) support mechanisms and capacity building (e.g. Department for Business Innovation and Skills, 2013a; Gouldson et al., 2008), and this provides the overall structure for the typology presented here. Key features of these categories are described below, and variations and examples summarised in Table 2-1. To inform this paper, a critical review of the prior art evaluating UK policy instruments explores the availability of evidence for the effectiveness of environmental regulation in the UK. These sources are identified in Table 2-1.

2.6.1 Direct "command and control" instruments

Direct, or "command and control" regulation, operates by "imposing mandatory obligations or restrictions on the behaviour of firms or individuals" (Perman et al., 2003). In the context of air quality emissions control, Brady (1983) defined "command and control" regulation as "a regulatory scheme based on rules that apply specific technical performance standards – generally based on known feasible control technology – to each discharge point within a regulated

process.” While highlighting the great variety of regulatory systems in place around the world, Perman et al. (2003) identify input restrictions, technology controls, output quotas, emissions licences, zoning and ambient pollution requirements as important elements of command and control regulation (Table 2-1).

When enforced, command and control regulation enables government to mandate behaviour through law, so it should provide relatively high levels of certainty that businesses and individuals will comply. Monitoring and enforcement are likely to be resource intensive for the regulator and the regulated, so under the principles of risk-based regulation, direct regulation would typically be targeted at the largest risks (Pollard et al., 2004). However, direct regulation may not be a feasible nor a desirable option in some circumstances and for the control of some major risks, such as anthropogenic climate change, direct regulation typically only forms part of the policy framework, requiring a mix of incentives and interventions (e.g. Simeonova & Diaz-Bone, 2005).

Direct regulation has proved an effective mechanism for reducing environmental damage and often presents as a strong, clear signal to the market of government commitment. For example, ambient concentrations in the UK atmosphere of a wide range of metals have fallen over the last 25 years as a result of legislation, alongside abatement strategies and changing fuel use (Brown et al., 2008). Similarly, UK atmospheric concentrations of polychlorinated biphenols have shown a sustained fall over the last 40 years following their ban in production and use, which followed the introduction of voluntary restrictions in the 1960s/early 70s (Schuster et al., 2010).

Direct regulation has been criticised frequently on the grounds of relatively poor efficiency because it may limit innovation and constrain the flexibility of businesses to choose the most cost-effective way to achieve a given environmental objective (e.g. Gunningham & Sinclair, 1999), although smaller firms may prefer prescriptive regulation if they lack skills or capacity to design their own solutions (Sinclair, 1997). Environmental regulation in general has

also been criticised for placing businesses at a disadvantage compared to competitors, typically overseas, who do not have to comply with such stringent controls. However, in their seminal paper, Porter and van der Linde (1995) argued that more stringent environmental controls can also encourage regulated businesses to innovate, leading to greater competitive advantage. Testing the validity of the “Porter hypothesis” is an active area of research (e.g. Rennings & Rammer, 2011; Rassier & Earnhart, 2010; Ramanathan et al., 2010).

The limitations of direct regulation have led governments to add the search for “alternatives” to direct regulation to their intellectual agenda for regulatory reform (Department for Business Innovation and Skills, 2013a). Pivotal questions to address in this search include: what are the alternatives to direct regulation? Can they reliably provide the level of environmental risk control that society requires, more cost-effectively than direct regulation? What determines when and with whom they are effective?

2.6.2 Economic instruments

Economic instruments operate by changing the incentives faced by firms or individuals to encourage them to voluntarily change their behaviour (Perman et al., 2003). Varieties include taxes, subsidies, tradable rights and payments. Economic instruments are intended to provide flexibility to businesses and individuals to decide how to improve environmental performance targeted by the instrument, overcoming some of the limitations of direct regulation in this respect. It is argued they are generally more cost-effective than direct regulation, but less certain to deliver a target outcome because regulatees may choose not to respond to market signals in the specific way intended by policy makers (Gunningham & Sinclair, 1999). Economic instruments may also prove politically unacceptable in some circumstances. For example, in the UK, environmental taxes have been criticised by some as “stealth taxes” for many years (Daily Telegraph, 2011; Jordan et al., 2003).

Environmental tax reform has sought to shift the tax burden from employment, income and investment to pollution, resource depletion and waste, thus

encouraging the production of desirable social “goods” while discouraging undesirable social “bads”. This shift offers the hope of a “double dividend” of better environmental performance and better economic performance (Bosquet, 2000). Environmental tax reforms were implemented by various countries during the 1990s, for example in Sweden (on CO₂ and SO₂), Denmark (gasoline, electricity, water, waste, cars, CO₂, SO₂, capital income), Netherlands (CO₂), UK (landfill tax), Finland (CO₂, landfill), Norway (CO₂, SO₂, diesel oil), Germany (petroleum products) and Italy (petroleum products) (Bosquet, 2000). In a review of available appraisals of these tax reforms, Bosquet (2000) concluded that typically they had delivered significant reductions in pollution, small gains in employment and marginal gains or losses in production in the short term; although longer term impacts are less clear (Bosquet, 2000). However, Fullerton et al. (2008) caution that while economic instruments such as taxes offer advantages over direct regulation they are not a panacea. They can encourage costly avoidance activities such as waste dumping, may have significant distributional consequences placing heavy burdens on the poor, create distortions raising prices of goods, and in the UK existing large scale taxes are already near or at the upper limit of what can be justified on environmental grounds (Fullerton et al., 2008). Taxes are likely to be best deployed as part of a mix of instruments, and their choice and design have been considered to be crucial (Fullerton et al., 2008).

The effort required on the part of regulatees, government and regulators to operate and enforce economic instruments depends on the type and design of instrument, but may represent a significant burden. For example, the EU Emissions Trading Scheme (EU ETS) (Clò, 2009) requires effort on the part of participating operators of power stations and industrial plants to calculate their allowance requirements, trade allowances and apply actions to enable them to operate within their allowances; while EU ETS regulators must decide on the level of allowances to issue during different trading periods, operate the trading market and monitor participant compliance with their allowances (Clò, 2009).

In recent years, interest has grown in Payments for Ecosystem Services (PES), where individuals or governments pay ecosystem managers (e.g. farmers) to sustain ecosystems from which they benefit (e.g. for flood protection, water purification or carbon sequestration) (Engel et al., 2008). The Environmental Stewardship Programme in the UK is a PES scheme under which farmers are paid to improve land management practices to improve water quality and biodiversity. The scheme has been extensively taken up by farmers and some stewardship measures have been demonstrated to improve environmental outcomes. For example, Kay et al. (2009) have found that some measures have been scientifically proven to improve water quality. However they also determined that evidence is lacking for the effectiveness of other agri-environment measures.

2.6.3 Information-based instruments

Information-based instruments are intended to improve environmental performance of businesses and individuals by providing better information to base decisions on. Gouldson et al. (2008) identify three main types of information-based instrument: targeted information provision, naming and shaming/faming, and registration, labelling and certification schemes. Gunningham and Sinclair (1999) expect information-based approaches to be unintrusive, non-coercive and generally cost effective, but exhibiting low reliability.

Information-based instruments, particularly naming and shaming/faming, are often implemented to complement existing harder direct regulation. For example, the US Toxics Release Inventory (Hamilton, 1995) and the European Pollutant Emissions Register (Cañón-de-Francia et al., 2008) seek to enhance the effectiveness of direct regulation by publishing details of emissions releases by regulated businesses, to harness public and investor pressure for better environmental performance. Both have been observed to result in a negative impact on share prices of listed businesses on inclusion on the emissions register (Cañón-de-Francia et al., 2008; Hamilton, 1995), presenting an incentive for businesses to avoid being listed through better environmental

performance. However, a comparison of pollution transfer and release inventory programmes in the USA, Canada, Australia and England concluded it was impossible to generalise about the effect of these systems on emissions or risk, whilst observing encouraging downward trends in emissions in the USA and England (Kerret & Gray, 2007). Naming and shaming has also been used with small businesses. For example the UK “Scores on the Doors” scheme publishes food hygiene risk assessments for restaurants gathered through direct inspection of premises, harnessing consumer pressure on restaurants and leading to improved hygiene standards (Stanton et al., 2008).

Targeted information provision, for example providing advice and training to improve environmental performance of businesses, has been highlighted as an important component of regulatory activity (Hampton, 2005). However, measuring the impact of such educational interventions may prove challenging as effects may be slow to materialise and difficult to attribute to the specific intervention. The Envirowise Programme (Mattsson et al., 2010) provided resource efficiency training to businesses across the UK. While Mattsson et al. (2010) demonstrate positive feedback from participants and value efficiency improvements identified, their evaluation approach has no counterfactual, nor is it able to confirm independently that reported improvements have in fact been achieved.

Registration, labelling and certification schemes have become widely adopted internationally, and rely on buyers preferring labelled goods to exert pressure on businesses to adopt associated environmental standards. Some schemes have been established with government support (e.g. the EU Ecolabel), some are associated with producer trade bodies (e.g. UK Farm Assurance Scheme), while others have been established by non-governmental organisations. The Marine Stewardship Council (MSC) and Forest Stewardship Council (FSC) certification schemes were both initiated by the World Wide Fund for Nature (WWF), and provide international standards for fisheries and forestry respectively (Eden & Bear, 2010). The effectiveness of certification schemes can be difficult to assess if success is measured against participant compliance

with process management standards rather than environmental impact. For example Gulbrandsen (2009) concludes that MSC schemes are likely to be improving management standards, but it is too early to say what impact this has on the marine environment, and that MSC alone is unlikely to ensure the sustainability of fisheries.

2.6.4 Co-regulation and self-regulation

The UK Government describes “self-regulation” as “an approach initiated and undertaken by those whose behaviour is to be regulated” and “co-regulation” is “similar to self-regulation but involves some degree of explicit Government involvement” (Department for Business Innovation and Skills, 2013a). Co-regulation as a descriptive term has not been widely adopted in the literature, featuring more commonly as a subset of voluntary regulation which includes direct government involvement (e.g. Koehler, 2007). Gouldson et al. (2008) identify six variants of “private and voluntary regulation”: voluntary regulation; covenants and negotiated agreements; private corporate regulation; private professional regulation; self-regulation; and civic regulation.

Co-regulation and self-regulation provide a significant degree of flexibility to businesses to decide how to achieve environmental objectives, with the potential benefit that they will choose the most cost-effective approaches. However, their flexibility and voluntary nature presents the risk that businesses do little if anything more than they would have done in the absence of the instrument (“business as usual”), providing the appearance of good environmental behaviour without the costs of implementing it or the delivery of authentic outcomes for the environment (sometimes referred to as “greenwashing”). Voluntary approaches may prove effective when combined with the threat of more direct regulation if performance does not improve, as avoiding harder regulation provides an incentive to improve now. Evidence of the effectiveness of voluntary approaches is mixed, with ongoing calls for further research. Bizer and Julich (1999) undertook an early review of four voluntary agreements in the Netherlands and Germany and concluded that they could form a valuable part of a mix of instruments, but that voluntary

agreements in place of direct regulation or economic instruments would constitute a deregulatory “trick”. A more recent extensive study of voluntary environmental programmes (VEPs) based largely on research from the US Environment Protection Agency concludes that based on current knowledge, VEPs in the US that target pollution arising from production processes do not incrementally yield significant environmental improvement, although they can attract participants and should not be discarded; more research is required (Koehler, 2007). In a review of EU experience Bertoldi and Rezessy (2007) have found that voluntary agreements for energy efficiency can deliver energy savings and could play an important part in climate change mitigation, alongside other policy instruments.

As for the certification schemes described earlier, a key challenge to understanding the effectiveness of co- and self-regulation has been the absence of environmental outcome measures from their evaluation. For example, the UK Assured Farms Standards scheme provides standards against which farm performance is assessed, but Lewis et al. (2010) were unable to find conclusive evidence that compliance with standards led to better environmental performance as this was not measured. Dahlström et al. (2003) found that although businesses who had elected to adopt the ISO14001 environmental management standard exhibited better environmental management processes than those who had not, this did not appear to reduce the likelihood of environmental incidents or complaints. Again, the accreditation requirement focuses on procedural matters rather than an absolute outcome-based measure of environmental performance.

Few examples of private professional regulation have been identified in environmental practice, although this is a developing area. The Specialist in Land Condition (SiLC) qualification established by the Royal Society of Chemistry and other professional bodies provides assurance of expertise for land contamination experts as part of the overall land contamination regulatory framework (Luo et al., 2009), and now has more than 140 members (CIRIA, 2013). The Chartered Institution of Water and Environmental Management

(CIWEM) has a code of ethics for members (CIWEM, 2004) and the Society for the Environment has established a “chartered environmentalist” professional qualification (SocEnv, 2013). However the contribution of professional membership to environmental outcomes would be hard to attribute and has not been attempted to date.

2.6.5 Support mechanisms and capacity building

Gouldson et al. (2008) identify three forms of "support mechanisms and capacity building": research and knowledge generation; demonstration projects and knowledge diffusion; and network building and joint problem solving. The development of institutions to encourage investment in new technologies, such as the Green Investment Bank in the UK (Green Investment Bank, 2013), is another variant. Demonstration projects have been used to help overcome innovation uncertainties amongst businesses considering adopting or developing new techniques or technologies. In the case of technology innovation, it is argued that businesses may struggle to engage in extended periods of experimentation with uncertain pay-offs, so government intervention may be justified to overcome innovation uncertainties (Hendry et al., 2010). Evaluation of demonstration projects is difficult as failure of some initiatives is a necessary feature of the innovation process. However Hendry et al. (2010) found that demonstration projects for solar photovoltaics and wind in the EU, Japan, US, Germany and Switzerland had delivered significant benefits to businesses innovating in these areas.

A key challenge for policy makers is ensuring that funding for support and capacity building is well targeted. For example, Armsworth et al. (2010) found that UK research funding is not always well aligned with the needs of business, which they considered to be a missed opportunity to ensure research findings see more widespread application.

2.6.6 Instrument mixes

In practice, individual instruments are rarely implemented on their own, and more typically form part of an overall mix of instruments which act together to

achieve multiple objectives within a policy area. Practically, multiple instruments may be required where multiple market failures exist or where multiple objectives are to be tackled (Braathen, 2007). Many of the instruments described above complement direct regulation, and are considered unlikely to be effective in isolation. However, it is possible that over time, a complicated mix of different instruments is put in place that results in redundant or conflicting measures that may unnecessarily increase the burden on regulatees and regulators with little net benefit to society. It may also be the case that despite a mix of instruments important issues remain unaddressed.

Howlett and Rayner (2007) described the history of instrument mix analysis in terms of three generations of thought. They argue that first generation students of instrument choice, citing examples from the mid to late 20th century, focused either on technical or on political explanations for choice and on the debate between “good” pro-market approaches and “evil” non-market approaches, and were detached from practices on the ground. Second generation analysts at the turn of the 21st century attempted to become more policy relevant, for example by considering the role of policy networks in instrument development, but still tended to focus on single instruments, albeit acknowledging that others are present. Third generation thinking in the early 21st century has now recognised the need to develop “optimal policy instrument designs in complex multi-instrument settings” (Howlett & Rayner, 2007). Gunningham’s work (Gunningham & Sinclair, 1998) is considered particularly influential in calling for “smart regulation”, proposing that policy designers should consider all instruments available, employ a carefully designed mix responding to context-specific features, consider non-state options to do more with less, and actively consider procedural options such as information-based and network management approaches. Howlett and Rayner (2007) describe these designed mixes as “new governance arrangements” (NGAs), used to reshape regulatory structures where the goals of policy may be incoherent, and mixes of instruments inconsistent. They argue that “integrated” NGAs are both coherent in goals and consistent in mix, and they caution against attempting to develop NGAs by “layering” new instruments on top of old, “drifting” by shifting policy

goals leaving inconsistent mixes, or attempting “conversion” of a consistent existing set of instruments by adding new incoherent goals. This view builds on Howlett’s previous work (Howlett et al., 2006) that explores the challenges of identifying what the component parts of a mix of instruments are in reality, highlighting the considerable effort required even to establish an inventory of instruments in a given policy area, and the lack of data that they found to describe each part on which to base reform.

A useful example is that of UK waste policy, which includes a complex mix of instruments of different types targeted at businesses, households and waste disposal operators (Braathen, 2007). UK waste strategy is often described in terms of a “waste hierarchy”: prevent, reduce, reuse and recycle (Martin & Scott, 2003). Interventions are targeted at preventing or reducing the amount of waste produced, at reusing material where possible, and recycling what remains, so that disposal is minimised. The presence of multiple instruments is consistent with this multiplicity of forms of market failure for different actors and multiple objectives.

The UK Landfill Tax was introduced in 1996 to discourage the use of landfill for waste disposal, as land for this purpose was becoming increasingly scarce and there was concern about the damaging impact of landfill on groundwater, amenity for local residents, methane emissions and human health impacts (Martin & Scott, 2003). The Landfill Tax is payable by landfill operators and acts to increase the cost of landfill to discourage its use, and was established as an escalating fee so that incentives become stronger over time. While the Landfill Tax can act to disincentivise landfill where the additional costs can be passed on to waste producers, this has not been possible for householders, where separate legislation prevents householders being directly charged for waste production (Martin & Scott, 2003). Therefore additional measures have been put in place to tackle household waste production, including information campaigns and changes to collection processes to encourage reuse and recycling.

Table 2-1: Variants of regulatory instruments and examples from use

Type	Variant	Description	Example applications	Examples and sources examined for this paper
Direct "command and control" regulation	Ambient pollution requirements	The regulator specifies required maximum levels of ambient pollution, allowing flexibility to polluters to decide how to achieve that level. In the EU, ambient targets have been set within EU directives, which members states tackle through their national policy mix	Water quality targets, air pollution targets	Ambient metals targets (Brown et al., 2008)
	Input restrictions and output quotas	Restrictions are applied in the use or output of products. If a material or practice is considered to be sufficiently harmful its use may be restricted or banned entirely, with penalties enforced for violations of the ban. Where banned materials remain in use, their disposal will need to be carefully controlled.	Restrictions in pesticide or fertiliser use, restrictions in production of potentially harmful chemicals	Ban on holding PCBs under The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) Regulations 2000 (Schuster et al., 2010)
	Non-transferable emissions licences	Typically a regulator issues a non-transferable licence, in the UK often referred to as a permit, to a business that gives authorisation to operate according to specified environmental performance requirements, for example maximum permitted levels of emissions. The regulator monitors the operation to ensure compliance, and may enforce penalties for non-compliance.	Controls on emissions to air and water, controls on waste production and disposal	Permitting under Integrated Pollution Prevention and Control (IPPC) in dairy industry (Honkasalo et al., 2005)

Type	Variant	Description	Example applications	Examples and sources examined for this paper
	Technology controls	The regulator specifies requirements for how a business operates, specifying the use of particular processes or technologies. Variations of standards include application of “best practicable environmental option” (BPEO), “best practicable means” (BPM), “best available techniques not entailing excessive cost” (BATNEEC) and “best available technique” (BAT) (Gray et al., 2007).	Mandatory use of catalytic converters in road vehicles, use of specific pollution abatement technologies	Farming input and process standards in Nitrate Vulnerable Zones enforced under Nitrate Pollution Prevention Regulations 2008 (as amended) (Worrall et al., 2009)
	Zoning/ location controls	Human impacts on the environment in a particular area can be controlled through spatial controls. Spatial controls can be used to locate polluters away from people and sensitive ecosystems, or to prevent clustering of harmful activities, or (less commonly) to move people away from sources of harm.	Low emissions zones in urban areas, building development controls, national parks and conservation areas, controlled fishing zones, marine conservation areas	Conservation designations including Site of Special Scientific Interest, National Nature Reserves, Areas of Outstanding Natural Beauty (Selman, 2009)
Economic instruments	Taxes and subsidies	Environmental taxes and subsidies operate by changing the market price of a good or service, reducing or increasing the quantity demanded and supplied in the market (Perman et al., 2003 p217).	Taxes on emissions to air, land (Bosquet, 2000) Subsidies to support renewable energy	UK Landfill Tax (Martin & Scott, 2003)
	Tradable rights	Tradable rights systems work by specifying a quantity of allowances, e.g. to abstract water or to emit carbon, which can then be traded amongst users. The system is designed to create an opportunity cost of using an allowance, and therefore also creates benefits from not using an allowance. Trading allows market actors to find the allocation of allowances that maximises the cost-effectiveness of using the allowance (Perman et al., p223).	Individual tradable quotas for fisheries, water abstraction rights, emissions trading e.g. for CO ₂ , SO _x , discharge to water	EU Emissions Trading Scheme (Clò, 2009)

Type	Variant	Description	Example applications	Examples and sources examined for this paper
	Payments	Conditional payments may be made to incentivise a particular activity. "Payments for Environmental Services" (PES) (e.g. Engel et al., 2008) involve beneficiaries (state or private) paying ecosystem managers for the benefits delivered by those ecosystems. The effectiveness of PES schemes depends critically on their design (Engel et al., 2008).	Agri-environment payments, conservation payments, deposit return payments	Agricultural stewardship payments (Kay et al., 2009)
Information-based instruments	Targeted information provision	Information is made available by public or private bodies to enable businesses or individuals to make better-informed decisions that impact upon the environment. The effectiveness of the approach is likely to depend both on the capacity and inclination of the targeted group to change their behaviour, and on the relevance, accessibility and perceived trustworthiness of the source (Gouldson et al., 2008).	Training programmes, advisory bodies (e.g. UK Carbon Trust and Energy Savings Trust)	Envirowise (a UK resource efficiency club) (Mattsson et al., 2010)
	Naming and shaming/faming	Information is made available describing the environmental performance of businesses, through for example a publicised inventory of toxic emissions, with the intention of incentivising better environmental behaviour through avoided damage to or enhancement of corporate reputation. The effectiveness is likely to depend on the level of external scrutiny a business receives, and therefore this approach may be less effective for smaller business that receive less attention (Gouldson et al., 2008).	Emissions inventories, public accolades and prizes, adverse publicity associated with prosecutions	"Scores on the Doors" (Stanton et al., 2008) European Pollutant Emissions Register (Cañón-de-Francia et al., 2008)

Type	Variant	Description	Example applications	Examples and sources examined for this paper
	Registration, labelling and certification	Typically information describing the environmental performance of the businesses delivering a product or service is made available to consumers using a product label, enabling consumers to choose products with better environmental performance. The approach may encourage businesses to gain certification to enhance their reputation, and relies on consumers buying on the basis of better environmental performance (Gouldson et al., 2008).	Food labelling, electrical product labelling	Forest Stewardship Council certification scheme; Marine Stewardship Council certification scheme (Eden and Bear, 2010)
Co-regulation and self-regulation	Voluntary regulation	Gouldson et al. (2008) use "voluntary regulation" to describe a group of actors agreeing standards which individual businesses can sign up to.	Responsible Care Initiative in chemicals industry	Assured Food Standards Scheme (the "Red Tractor") (Lewis et al., 2010).
	Covenants and negotiated agreements	In this approach government makes an agreement with regulated businesses to achieve particular standards, which forms a contract and may incur sanctions if the contract is not met (Gouldson et al., 2008).	Packaging reduction agreements, recycling agreements, pollution reduction agreements	Climate Change Agreements, related to the Climate Change Act 2008 (Davies & Makuch, 2009)
	Private corporate regulation	Gouldson et al. (2008) use "private corporate regulation" to describe situations where one firm defines standards with which suppliers are required to comply in order to maintain ongoing business.	Food retailer sustainability programmes, government procurement requirements	Corporate social responsibility programmes at Waitrose (a food retailer) (Spence & Bourlakis, 2009)
	Private professional regulation	A professional body acts to apply standards through conditions of membership (Gouldson et al., 2008).	Membership of professional bodies	CIWEM code (CIWEM, 2004)

Type	Variant	Description	Example applications	Examples and sources examined for this paper
	Self-regulation	Gouldson et al. (2008) use "self-regulation" to describe situations when actors choose to apply and comply with environmental standards without threat of sanctions for non-participation or non-compliance.	Environmental management systems, unilateral commitments to good performance	ISO14001 (Dahlström et al., 2003)
	Civic regulation	Gouldson et al. (2008) use "civic (or community-based) regulation" to describe situations where community or pressure groups agree performance standards with particular firms.	Activities of NGOs and community groups	WWF discourse in sustainable Tilapia farming (Belton et al., 2009)
Support mechanisms and capacity building	Research and knowledge generation	Governments or other actors may undertake research to increase knowledge that informs better environmental decision making (Gouldson et al., 2008).	Funding of university research	Activities of Natural Environment Research Council (Armsworth et al., 2010)
	Demonstration projects and knowledge diffusion	Governments may choose to invest in demonstration projects to demonstrate feasibility, raise awareness and reduce risks of new technologies or processes (Gouldson et al., 2008). This investment could be managed through a specially designed investment institution, such as the UK's Green Investment Bank (Green Investment Bank, 2013).	Carbon capture and storage, sustainable agriculture practice, eco-homes and buildings	Solar voltaics and wind demonstration projects in EU, US and Japan (Hendry et al., 2010)
	Network building and joint problem solving	Initiatives designed to encourage people to exchange ideas and learning to improve environmental performance (Gouldson et al., 2008).	Discussion groups, conferences, networking events, best practice programmes, industry-initiated guidance (e.g. on surface water management at construction sites).	Countryside Stewardship and Environmentally Sensitive Area schemes knowledge sharing (Morris, 2006)

2.7 The availability of evidence for regulatory reform

The design of environmental regulation requires the prediction of the behaviour of a chain of influences from the regulatory intervention, through its impact on business or individual behaviour, to the impact that the changed behaviour has on the environment, to the harm or benefit that the environmental change has on people. Each of the links in this causal chain needs to be understood, where that understanding is informed by evidence drawn from a wide range of disciplines including the social and physical sciences. Table 2-2 highlights sources of evidence available to UK policy makers.

Table 2-2: Sources of evidence available to UK policy makers

Information required	Potential sources
State of the environment affected, the pressures upon it and their drivers, and the resulting impacts	Environmental monitoring data. Social and natural science research
Identity of regulations and other policy instruments for the policy area	Statute. Definitions of policy programmes
Constraints imposed by current legal framework	Legal advisors
Industry's perspective on where burdens lie, scope for improvement and innovative ideas for reform	Engagement of individual businesses and trade associations
Civil society's perspective on where burdens lie, scope for improvement and innovative ideas for reform	Engagement of civil society groups. Direct engagement with individuals
Policy makers'/ regulators' perspectives on where burdens lie, scope for improvement and innovative ideas for reform	Consultation and discussion through formal and informal organisational links
Political preferences for different approaches	Communication with ministers
Overall social costs and benefits of specific regulations and policies (ex ante and ex post)	Regulatory impact assessments. Policy appraisals.
Composition and characteristics of regulated businesses and people	National statistics and surveys. Segmentation models. Monitoring and inspection information from regulators.
Alternative regulatory approaches	International comparisons. Comparisons with other policy areas, and with non-governmental approaches.

The need for cross-disciplinary evaluation is highlighted by the varying foci of the studies examined for this review. For example, Spence and Bourlakis (2009) review the nature of a food retailer's relationship with suppliers and the mechanisms through which this may propagate corporate social (and environmental) responsibility along the supply chain from a social science perspective, but do not assess the effectiveness of this activity in reducing environmental harm. Meanwhile several

physical science studies observe trends in environmental impacts (e.g. Worrall et al., 2009; Schuster et al., 2010), but do not attempt to assess causal relationships with regulation. More comprehensive analyses of evidence do exist in some policy areas, but are far less common. For example Kay et al. (2009) have undertaken a broad assessment of peer-reviewed evidence for agricultural stewardship measures, concluding that while evidence exists for some interventions, for many it does not because scientific evaluation has not been undertaken.

The different interests of researchers may result in a patchwork of evaluations which provide policy makers with a partial evidence base for decision-making. In addition to incomplete evidence about specific implemented regulatory instruments, in many instances evidence is entirely absent from the literature. For example, the Courtauld Commitment (WRAP, 2013) is a high-profile and reportedly successful voluntary agreement for packaging reduction in the UK retail sector, but no academic appraisals of whether and why it has been a success have been identified. Similarly the impact of the “What’s in your backyard?” website (Environment Agency, 2013a), which may have some impact on operator proclivity to pollute, has not been assessed in the literature.

2.8 Factors that may influence regulatory effectiveness in practice

The lack of evaluation evidence is one amongst many sources of uncertainty faced by policy makers and regulators in regulatory reform efforts. Despite this, some recurring factors that may influence the effectiveness of regulation in practice emerge from this review.

2.8.1 Characteristics of instrument design

Coherence: A lack of coherence with other instruments may limit the effectiveness of instruments in practice. For example, Braathen (2007) questions the benefit of targeting both the UK landfill tax and the tradable landfill allowance scheme at the same issue. Confusing, complex or inconsistent regulation seems unlikely to encourage business compliance. Instrument effectiveness may also be affected by their consistency over time, as businesses and individuals may prefer clear long-term signals about policy direction against which they can plan, as reflected in the call from business for “*long, loud and legal*” climate change policy in the UK

(CEMEP, 2007). Honkasalo et al. (2005) emphasise the importance of consistent requirements and signals that improvements will be needed in the short and long term as elements of the ideal permitting process, and these principles seem likely to hold for other instruments. Poorly integrated mixes of instruments are expected to be complicated, costly to administer, provide conflicting incentives and to be difficult to change (Howlett & Rayner, 2007) so the coherence of regulatory design has been highlighted as a key factor influencing efficiency and effectiveness.

Flexibility: A lack of flexibility could result in regulatory instruments ceasing to be suitably targeted and their effectiveness diminishing. The necessity for change may arise as a result of social, economic or environmental change, or as a result of new information becoming available. For example, Selman (2009) highlights the possibility of climate change leading to changes in the geographical distribution of biodiversity that conservation areas are intended to protect, so that their boundaries are no longer appropriate. In the case of the UK Landfill Tax, Martin and Scott (2003) highlight the impact that changing commodity prices have on the incentives for recycling, and Davies and Makuch (2009) argue that the apparent impact of Climate Change Agreements was significantly as a result of the decline of the UK steel industry, which may have reduced the pressure on other sectors to achieve as significant emissions reductions as they could have done. Policy instruments may be deliberately designed to change over time. The EU ETS began with a pilot phase so that regulators for the first time were able to establish a measure of the emissions levels of regulated industries. While the lack of information about emissions meant that emissions permits were over-allocated in the pilot phase, leading ultimately to the carbon price falling to zero (Clò, 2009), the new information gathered has meant that a more challenging cap can be designed for the next phase of trading.

Jones (2007) has identified seven approaches in which environmental regulation exhibits adaptability to address scientific uncertainty, ranging from simply acknowledging that uncertainty needs to be taken into account in decision making, through to “adaptive management”. Adaptive management explicitly recognises managers’ uncertainty in knowledge about a system, and holds that if no single best policy can be chosen a set of alternatives should be trialled and monitored to learn about the effects of different courses of action (Linkov et al., 2006). While an adaptive management approach has been adopted for various ecosystem

management and remediation challenges (Linkov et al., 2006) it is unlikely to be appropriate for all regulatory problems, for example where a monitored failure could still have a major impact (e.g. the building of a nuclear power plant (Jones, 2007)). It has been argued that much environmental law is based on the principles of preservation and restoration to their original state (“stationarity”), and on the belief that environmental impacts can be accurately anticipated, and are not therefore designed to accommodate adaptive management (Craig, 2010; Thrower, 2006). Craig (2010) argues that environmental law needs to be reformed to become “bimodal”, allowing on the one hand an adaptive management approach to deal with unpredictable impacts of climate change, and on the other a precautionary approach to reduce all other stressors on the environment (e.g. land, water and air pollution) to maximise ecosystem and social resilience.

2.8.2 Characteristics of the regulated

Motivation: Much of regulatory design for businesses begins from the primary assumption that business behaviour is driven by the desire to maximise profits and strategic competitive advantage. This profit motive underlies the design of instruments designed to influence input costs and output prices, to influence purchasing decisions of customers, to influence reputation, and to influence investor behaviour through environmental performance disclosure. The effect of an instrument on business behaviour can reasonably be expected to depend on the impact it is expected to have on profitability. Martin and Scott (2003) suggest, for example, that the Landfill Tax was originally set at too low a level to significantly influence business behaviour, so was increased gradually until it presented a sufficient economic incentive to drive change amongst operators.

Porter and Kramer (2006) argue that businesses have become increasingly motivated by their position on corporate social responsibility (CSR) rankings, such as the Dow Jones Sustainability Index or FTSE4Good Index, which seek to reflect the businesses’ ethical behaviour and attract considerable publicity. Proponents have argued that good CSR performance should be expected on grounds of a company’s moral obligation to “do the right thing”, to operate sustainably to protect the wellbeing of future generations, to maintain its licence to operate from government and society, and to protect and enhance its reputation (Porter & Kramer, 2006).

Increasingly it is argued that CSR and good environmental performance should be embedded into core business strategy to maximise its benefit for both business and society (Porter & Kramer, 2006). The recent United Nations Environment Programme Economics of Ecosystems and Biodiversity initiative (UNEP TEEB) has sought to highlight the benefits of biodiversity to human welfare, and the risks presented by its degradation, so that businesses can incorporate analysis of these opportunities and risks into corporate strategy (UNEP, 2010). In the UK various organisations (e.g. Tomorrow's Company, and Forum for the Future) seek to help businesses embed CSR and good environmental performance into their strategy and operations, and many businesses are pursuing good environmental performance amongst other CSR commitments (e.g. Marks & Spencers' Plan A).

Environmental policy design for individuals is moving increasingly to influence other drivers of individual behaviour beyond the financial and economic, informed particularly by insights from psychology and behavioural economics highlighting the bounded rationality of human decision making (e.g. Kahneman, 2002). The MINDSPACE model promoted by the UK Cabinet Office (Dolan et al., 2010) identifies nine important influences on behaviour from theory (Table 2-3) and emphasises the need to “exemplify” behaviour change in individuals, suggesting that people will be influenced by the behaviour of peers, and to “engage” the public to increase their commitment. However, economic drivers remain important for individuals (recognised by the need to “encourage” in the MINDSPACE model), who may be expected to change relative prioritisation of environmental behaviour (e.g. in the purchase of goods with good environmental credentials) as their personal financial position changes.

Capacity: The extent to which regulated actors change behaviour in response to regulation is also likely to depend upon their ability to understand the implications of regulation and to manage related risks and business opportunities. Organisational maturity models for assessing this capacity have been developed generically, for example the risk management standard produced by risk management institutions in the UK (AIRMIC/ALARM/IRM, 2002), and for specific industrial sectors, such as the offshore industry (Strutt et al., 2006) and the water industry (MacGillivray & Pollard, 2008). Support mechanisms and capacity building instruments are specifically designed to increase this capacity in businesses, and similarly MINDSPACE

recognises the potential need to “enable” individuals to change behaviour (Dolan et al., 2010). Other instruments may also increase capacity, for example by providing standards that serve to educate the regulated in better environmental management, or through advice and guidance provided by regulators.

Table 2-3: MINDSPACE mnemonic: Influences on behaviour (Dolan et al., 2010)

Messenger	we are heavily influenced by who communicates information
Incentives	our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses
Norms	we are strongly influenced by what others do
Defaults	we “go with the flow” of pre-set options
Saliency	our attention is drawn to what is novel and seems relevant to us
Priming	our acts are often influenced by sub-conscious cues
Affect	our emotional associations can powerfully shape our actions
Commitments	we seek to be consistent with our public promises, and reciprocate acts
Ego	we act in ways that make us feel better about ourselves

2.8.3 Characteristics of the regulator

Motivation: The motivations of the regulator, both corporately and individually, may affect the overall effectiveness of the regulatory instrument which they oversee, for example by influencing the ambition with which targets are set or the rigour with which standards are enforced. Government and non-government regulators may have incentives to enforce rules more or less strongly. While government regulators are likely to face safeguards in place to monitor and prevent “regulatory capture”, governments could be influenced by groups lobbying for particular interest groups, for example as Sharman and Holmes (2010) have argued has been the case for setting biofuels targets in the EU. In the case of non-governmental regulators, NGOs may be motivated to demonstrate effective regulation in order to maintain support from funders, whereas other non-governmental institutional models may have industry interests in the strongest position in decision-making. The MSC and FSC certification schemes emphasise the use of peer-reviewed science to inform the rules to which certified organisations must adhere to avoid bias towards or against industry interests, although Eden and Bear’s (2010) account illustrates how different

interest groups within the schemes' governance have debated how stringent rules should be. In a recent review of research on regulatory enforcement Pautz (2010c) has argued that while the transition to next-generation environmental policies will have significant implications for environmental inspectors, the concerns of regulatory capture are overstated. Nevertheless, the motivations of regulators have been identified as an important factor influencing instrument effectiveness.

Risk-based decision-making capability: In the operation of regulation, regulators will need to continually gather and assimilate information to inform better strategy and tactics, and to inform the allocation of finite resources. This kind of risk-based decision-making underpins the regulator's capacity to apply risk-based regulation, and has been frequently called for (e.g. Hampton, 2005). While organisational maturity models have been developed for various industries and purposes they have not been developed specifically for benchmarking environmental regulator performance. Risk-based decision-making elements have been reflected in the National Intelligence Model (NIM) for UK policing (Association of Chief Police Officers, 2007), which have been applied for environmental regulation on the Great Barrier Reef (Weekers, 2011). The NIM highlights processes considered necessary to enable effective intelligence-led policing, including intelligence gathering and analysis, tasking and coordination of operations, tactical resolution by choosing the right interventions for a given problem, and operational review to assess overall trends and strategic organisational responses (Association of Chief Police Officers, 2007). Sparrow (2008) argues that organisations focused on harm reduction are most effective when their resources are organised around the identification and reduction of specific harms, rather than around processes or skill-based functions, while acknowledging that this presents a major challenge to many organisations to implement in practice. The capacity of regulators to make risk-based decisions has been highlighted as a key factor influencing the effectiveness of regulation, although consensus on what this means in practice has yet to be clearly defined.

Technical knowledge: As discussed earlier, evidence of what works when is frequently patchy and contested, and failure to use technical knowledge effectively may lead to considerable wasted effort for regulator and regulated, and failure to achieve environmental objectives. For example, Kay et al. (2009) emphasise that much evidence is lacking to inform the use of agricultural stewardship measures,

while Worrall et al. (2009) conclude that the lack of objective success of Nitrate Vulnerable Zones (NVZs) demands that the approach is rethought, despite NVZs having been extensively deployed across the UK. Belton et al. (2009) argue that a deep understanding of food production practice overseas is critical to the success of any international food sustainability initiative. The capacity of the regulator to understand the relationships between regulatory interventions, changes in business and individual behaviour, and the ensuing impact on the environment has been considered key, and is a major challenge.

Negotiation skills: Regulators may need to negotiate with the regulated during the design of regulation, for example to agree overall objectives for a sectoral agreement, or during its operation, for example to agree the terms of a specific licence for an operator. The EU ETS has required national negotiations between member states and affected industries to agree appropriate emissions caps, and between member states to agree how the burden of achieving the overall EU carbon reduction target should be distributed across states (Clò, 2009). On a more local scale, regulators may need to act as facilitators and negotiators to establish new institutions through which groups can self-regulate, for example to further encourage the development of Water Abstraction Groups (Leathes et al., 2008). Regulators' effectiveness in undertaking these negotiations has been seen to have a direct impact on the overall effectiveness of the instrument concerned.

2.9 The role of ethnography in research for better regulation

Many of the factors emerging as important for regulatory effectiveness are subtle, nuanced, and concerned with how the regulation is implemented in practice. Understanding these softer aspects of regulatory practice may enable the better design of both governmental and non-governmental approaches to regulation, but they are rarely researched explicitly. A recent literature review by the Environment Agency (2011) found relatively little evidence of the effectiveness of regulator advice and guidance, boardroom interventions, approaches to regulating good performers or third-party activity to deliver regulation, and little analysis of their relative cost-effectiveness. Better understanding of regulatory practice may play a key part in addressing day-to-day frustrations that businesses and the public may encounter that may contribute to the perceptions of regulation as bureaucratic "*red tape*" that

are reflected in current UK Government initiatives to deliver better regulation (e.g. Cabinet Office, 2013a).

In order to reveal these nuanced elements of regulatory practice, researchers may adopt methods which include an element of “ethnography”. Ethnography was originally developed as a method for describing peoples or cultures and is rooted in anthropology, but more recently has been adapted for “real life” research in studies of the researcher’s own culture, including in business research (Denscombe, 2007). Ethnographic research is likely to require that the researcher spends significant amounts of time with the subjects of study (government or non-government regulators), examining how they understand things and perceive reality, gathering research data on all aspects of day to day activities, adopting a holistic approach “which stresses processes, relationships, connections and interdependency among the component parts”, while acknowledging the researcher’s own role in interpreting and explaining what they observe (Denscombe, 2007). Similar research objectives can be observed in “service design” practice which has been adopted in private and public sector performance improvement contexts (e.g. The Design Council, 2011; Maglio & Spohrer, 2008). While lessons can be drawn from these sources to inform the design of risk-based decision-making processes for environmental regulation, no academic research has been identified that develops an organisational capability model for this purpose. Elements of the analysis in this section could form the basis of such a model. Furthermore, the model could be used to assess the suitability of non-governmental forms of regulation (e.g. to assess whether a particular industry group has or could develop the capability to become a non-governmental regulator), which may provide a useful decision support tool for policy makers.

2.10 Conclusions

This review has explored the range of instruments available to policy makers and regulators for the delivery of better regulation, and examined the role of evidence in instrument selection. Recurring factors affecting regulatory effectiveness have been identified that provide a guide to policy makers and regulators considering regulatory reform. Environmental regulation has shifted forms over recent decades, as policy makers and regulators supplement direct regulation with economic instruments and voluntary approaches, and seek to harness the influence of non-state actors to

achieve environmental objectives (Gunningham, 2009). The collective international experience that has been accumulated over this period provides policy makers and regulators with a wide range of successful regulatory approaches from which to learn, and provides ideas for the design of better regulation elsewhere.

Good policy and regulation should be “evidence based” and “risk informed”. However, evidence for the efficiency and effectiveness of specific instruments in managing public risks is frequently lacking. It may be limited by incomplete or non-existent evaluation of existing instruments. Evidence available may be brokered by stakeholders to influence regulatory reform, constraining its availability to policy makers and regulators. Scientific understanding of risks may be limited, and will always be open to change as new evidence emerges. How can policy makers and regulators decide what constitutes a sufficient body of evidence on which to base instrument selection? Weight of evidence frameworks and systematic review methods offer promising ways forward, but current use of such approaches in environmental policy lag far behind their use in other domains, such as medical science. Howlett and Rayner (Howlett et al., 2006) illustrate the difficulty of even identifying the full set of regulations and influences that need to be included in an analysis of a policy mix to support regulatory reform. The task is made more complex by the range of business motivations and capabilities of different sectors and of individual businesses within sectors. Yet this is the task faced by policy makers and regulators. How should policy makers go about performing this task? How then can they understand the complex system of society, the environment and regulatory action that they seek to improve? New approaches are required to support this complex task.

It seems clear, as Sparrow (2008) has argued, that in many cases rather than attempting to identify standard approaches to managing environmental risk across the whole industries or sectors, instead regulators must become expert in the process of picking important problems, and fixing them, using whatever methods are appropriate to tackle a specific harm. Whether designing national frameworks or local solutions, policy makers and regulators need to understand the subtleties and nuances of how different actions undertaken by regulators (state or otherwise) influence business behaviour in practice. This remains a significant gap in research

that needs to be urgently addressed, and will require ethnographic approaches to reveal.

3 METHODOLOGY

3.1 Introduction

This chapter explains the choice and use of methods for this research. Section 3.2 explains methodology selection, addressing the chosen approach to social science and logical reasoning, the selection and approach to qualitative research, and the use of the case study approach, concluding with a summary of the overall research approach. Section 3.3 explains data collection, management and analysis methods, ethical considerations, and the evolution of the methods during the course of the research. Finally Section 3.4 discusses potential methodological weaknesses and how these have been addressed.

3.2 Methodology selection

3.2.1 Approaches to social science

Neuman (Neuman, 2003) describes three approaches to social science: i) positivist, ii) interpretive, and iii) critical social science. Broadly defined, positivist social science, or positivism, is the approach of natural sciences such as chemistry and physics, and sees social science as *“an organised method of combining deductive logic with precise empirical observations of individual behaviour in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity”* (Neuman, 2003). Positivism was developed by Auguste Comte (1798-1857), John Stuart Mill (1806-1873) and Emile Durkheim (1858-1917), and researchers following this approach prefer to use quantitative data and often use statistics, surveys and experiments.

The approach of interpretive social science is *“the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understanding and interpretations of how people create and maintain their social worlds”* (Neuman, 2003). Interpretive social science originates from the work of Max Weber (1864-1920) and Wilhelm Dilthey (1833-1911). While positivists assume that everyone shares the same meaning system and experiences the world in the same way, the interpretive approach assumes that this may or may not be the case and places importance on understanding the meaning people place upon social interactions. Interpretive researchers may seek to

understand meaning through close analysis of transcripts of conversations, or through participant observation and field research, obtaining detailed qualitative data to gain in-depth understanding of the motivations for why people have behaved as they have (Neuman, 2003).

The critical social science approach sees social science as a *“critical process of inquiry that goes beyond surface illusions to uncover the real structures in the material world in order to help people change conditions and build a better world for themselves”*, and can be traced to Karl Marx (1818-1883), Theodor Adorno (1903-1969), Erich Fromm (1900-1980) and Herbert Marcuse (1898-1979) (Neuman, 2003). In common with interpretive social science, the critical social science approach criticises positivism for failing to address the meanings people ascribe to events, their capacity to feel and think and their social context. Furthermore, the critical social science approach criticises positivism for assuming an unchanging social order and, therefore, defending the status quo, and criticises interpretive social science as immoral and passive without a strong value position to help people see “false illusions” around them so that they can improve their lives (Neuman, 2003). The critical social science approach is often adopted by community action groups, political organisations and social movements; the researcher should be a “transformative intellectual” (Neuman, 2003).

This thesis has adopted a predominantly interpretive social science approach, in so far as the research has examined meanings and motivations of social actors through qualitative analysis, and has tended towards a relatively neutral view on the rights or wrongs of opinions expressed by participants. However, in common with a more positivist approach, the research has sought to build on existing theory so that better decisions can be made by policy makers, regulators and other stakeholders to improve environmental regulation in future.

3.2.2 Inductive and deductive reasoning

When developing theories about the social world, researchers may begin with an abstract hypothesis and seek data to test it, an approach described as “deductive”. Alternatively, the researcher may begin with data from observations of the world and seek to move towards more abstract generalisable theory, an approach described as “inductive” (Kelle, 2005).

In their 1967 book “The Discovery of Grounded Theory: Strategies for Qualitative Research”, Strauss and Glazer criticized what they saw as the over-emphasis of theory testing using the deductive approach in sociology, and the accompanying de-emphasis of discovering the concepts and hypotheses that best describe the subject of research (Kelle, 2005). This they believed perpetuated “great man” theories, and reduced researchers to a mass of “proletariat testers” (Kelle, 2005). In their “grounded theory” approach, Strauss and Glazer intended to create a research method that allowed theory to “emerge” from the data rather than “forcing” data to fit with preconceived theories. The researcher must make use of their “theoretical sensitivity” to draw on their pre-existing knowledge, though Strauss and Glazer diverged in their views on how to achieve this in practice (Kelle, 2005).

The case study research described in chapters 5 and 6 of this thesis has pursued an inductive, grounded approach, seeking to develop explanatory theory from the qualitative data gathered through interviews with case study participants.

3.2.3 Qualitative and quantitative social research

Payne and Payne (Payne & Payne, 2004) distinguish between quantitative and qualitative methods of social research. Quantitative methods look for regularities in peoples’ lives by identifying empirical components of the social world that can be described numerically and whose associations with each other can be examined through statistical techniques. Quantitative methods tend to be associated with deductive reasoning. In contrast, qualitative methods produce non-quantitative, descriptive accounts of small numbers of people, aiming to understand the meanings people make of their lives. Qualitative methods are based on the belief that “social interactions form an integrated set of relationships best understood by inductive procedures” (Payne & Payne, 2004).

Both quantitative and qualitative methods of research are relevant to the study of environmental policy and regulation. For example, quantitative analyses have been used to examine the relationship between environmental performance of firms and their adoption of specific environmental management standards (Dahlström et al., 2003), and the relationship between stock market valuation of firms and the publication of their environmental performance (Cañón-de-Francia et al., 2008; Hamilton, 1995). Qualitative analyses have been used to examine why particular

voluntary agreements have been effective (Bizer & Julich, 1999), and to understand the interactions between regulatory officers and regulated businesses (Pautz, 2010b).

The research described in this thesis has drawn on both qualitative and quantitative evidence to address the research question. However, the new research undertaken for this thesis has been qualitative, as it has sought to examine the perceptions of different stakeholders involved in regulatory reform to explain why they behave as they do. These perceptions would not be readily accessed through quantitative methods.

As explained in Section 2.9, during the course of the literature review for this thesis ethnography was identified as a suitable methodology for examining the practice of regulatory officers. Close working with Defra officers during some stages of this research has provided the author with something of an “insiders view” of the realities of policy making in government, reflecting some aspects of the ethnographic approach. However, as the research objectives required a broader consideration of factors affecting policy and regulatory effectiveness beyond the practice of policy makers and regulators, a more traditional interview-based approach was adopted for the formal research presented in this thesis.

3.2.4 Qualitative data analysis techniques

Miles and Huberman (Miles & Huberman, 1994) describe an iterative process for analysing qualitative data, as illustrated in Figure 3-1.

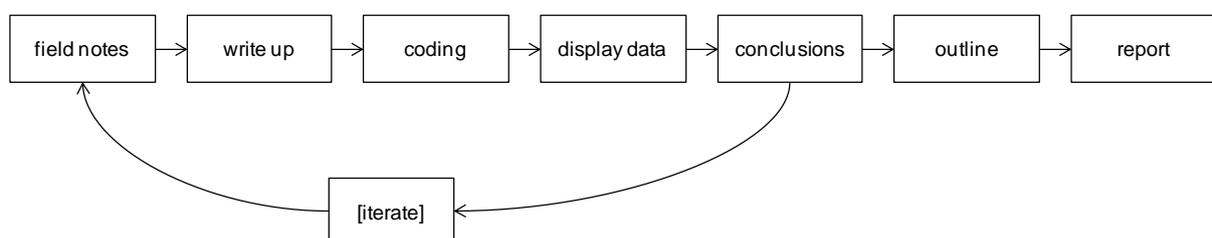


Figure 3-1: Iterative process for qualitative data analysis (Miles & Huberman, 1994)

Field notes (e.g. notes made during interviews, or recordings of interviews) are written up into a form that can be understood and analysed (e.g. through transcription of recorded interviews into a text transcript). The next stage, called “coding”, is the process of adding tags or labels (“codes”) to chunks of text, that are

used to retrieve and organise this data for analysis (Miles & Huberman, 1994). Miles and Huberman (1994) identify various types of code, that may be “descriptive” entailing little interpretation by the researcher, or more “interpretive” reflecting the interpretation of the meaning of the data by the researcher, or “pattern” codes may be used to identify recurring patterns in the data. Various coding strategies have been proposed by social researchers over recent decades. The data display stage involves presenting information systematically in a visual format so that the researcher can draw valid conclusions. At this stage the researcher is likely to need to return to earlier stages in the process to gather further field notes and/or refine coding, through an iterative process, until finally data can be summarised into an outline, which is finally written up as a report (Miles & Huberman, 1994). Miles and Huberman also suggest an alternative process where an outline of the final version of the study is developed before field research begins, to help structure the enquiry from the outset.

3.2.5 Case study research

There are various social science research methods, including experiments, surveys, archival analysis, histories, and case studies. Yin (2009) defines a case study as follows:

“(1) A case study is an empirical enquiry that

- investigates a phenomenon in depth and within its real-life context, especially when
- the boundaries between phenomenon and context are not clearly evident.

(2) The case study inquiry

- copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result
- benefits from the prior development of theoretical propositions to guide data collection and analysis.”

Yin (2009) argues that three conditions distinguish the appropriate method, as summarised in Table 3-1.

Table 3-1: Relevant situations for different research methods (Yin, 2009)

METHOD	Form of research question	Requires control of behavioural events?	Focuses on contemporary events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

Firstly, the form of the research question differentiates between methods. “What” questions may be exploratory (e.g. “what can be learned from a study of a start up business”), in which case any of the methods may be used, or about prevalence (e.g. “what have been the ways that communities have assimilated new migrants?”), when surveys or archival analyses will be appropriate. Similarly surveys or archival analyses are appropriate to address “who”, “where”, “how many” and “how much” questions, as they are also concerned with incidence or prevalence. “How” and “why” questions are more explanatory, and are likely to require the use of experiments, histories or case studies to trace operational links over time.

Secondly, if the researcher is able to manipulate behaviour of the studied subjects directly, precisely and systematically, an experimental method may be feasible, in a laboratory setting or in the field. For example, randomised field trials, where different groups of individuals are subjected to an intervention while others are not and the resulting changes in behaviour are compared, can be valuable for examining the effectiveness of social policy. Randomised field trials are more difficult to use when examining changes in communities rather than individuals (as is often the case in social policy) because the design of the experiment becomes limited by the number of participating communities rather than the number of individuals, and communities may change during the course of the experiment. If the researcher is unable to control behavioural events then surveys, archival analyses, histories and case studies remain feasible options. Finally, histories focus on past events where the researcher has virtually no access to individuals involved and must rely on documentary evidence, whereas experiments, surveys and case studies can also gather evidence from direct observation and interviews.

The central research question for this thesis, “what forms of policy and regulation work when, with whom and why?”, combines “what” and “why” questions concerned with contemporary events, suggesting that a survey or archival analysis method to address the “what” would need to be combined with experimental or case study methods for the “why”. Since the researcher lacked control over behavioural events studied, a case study approach is the feasible option to explore “why”.

Yin (2009) identifies various sources of evidence for case studies, including documentation, archival records, interviews, direct observations, participant-observation and physical artefacts.

Findings from case study research may be used for “analytic generalisation”, where each case study is analogous to a new experiment to test theory with new empirical data. If a case study provides support for a theory then replication may be claimed, and results may be considered more potent if they support one theory and do not support an alternative plausible theory (Yin, 2009). “Analytic generalisation” is different to “statistical generalisation”, where an inference is made about a whole population from a sample.

Case studies may follow single case or multiple-case designs, and in either design the study may be holistic (a single unit of analysis is studied within each case) or embedded (multiple units of analysis are studied within each case) (Yin, 2009). Rationales for single case designs include when (i) the case is considered critical in so far as in itself it can confirm, challenge or extend a well defined body of theory, (ii) the case is extreme or unique, for example examining a case of a rare disease (iii) the case is representative or typical, (iv) the case is revelatory, analysing a phenomenon previously inaccessible to social science, or (v) the case is longitudinal, examining theories of change over time (Yin, 2009). For this research, the case of instrument selection at Defra described in Chapter 5 is a critical case for theories of environmental policy making; if theories do not reflect the realities of policy making at Defra then their value in the UK context should be seriously questioned.

The rationale for multiple-case designs is analogous to the rationale for completing multiple experiments which test the same set of theories while varying some elements of the experimental conditions; each case should be selected either predicting similar results (a literal replication), or to predict contrasting results for

anticipatable reasons (a theoretical replication). This “replication” logic is different from the “sampling” logic used for surveys, where the data from the sample surveyed is assumed to reflect the entire universe or pool under examination, and inferential statistics are used to assess confidence intervals for the results (Yin, 2009). For this research, to gain insight into the perceptions of businesses and trade associations on instrument selection, a multiple-case study design was adopted examining perspectives from five different industry sectors.

3.2.6 Summary of research lines of enquiry

The overall research question for this study is “what policy and regulatory instruments work when, with whom, and why is this the case?”.

This question has been explored through a literature review, high-level case studies of regulatory frameworks for example industries, a detailed case study of policy making in practice, and a multiple-case study of business and trade association perceptions of the effectiveness and efficiency of regulation. Yin (2009) recommends defining questions asked of case studies at a number of levels, ranging from those asked of individual participants, to those asked of individual cases, those concerned with patterns across multiple case studies, questions asked of the entire study, and normative questions about policy recommendations and conclusions. The structure of this research and associated questions are illustrated in Figure 3-2.

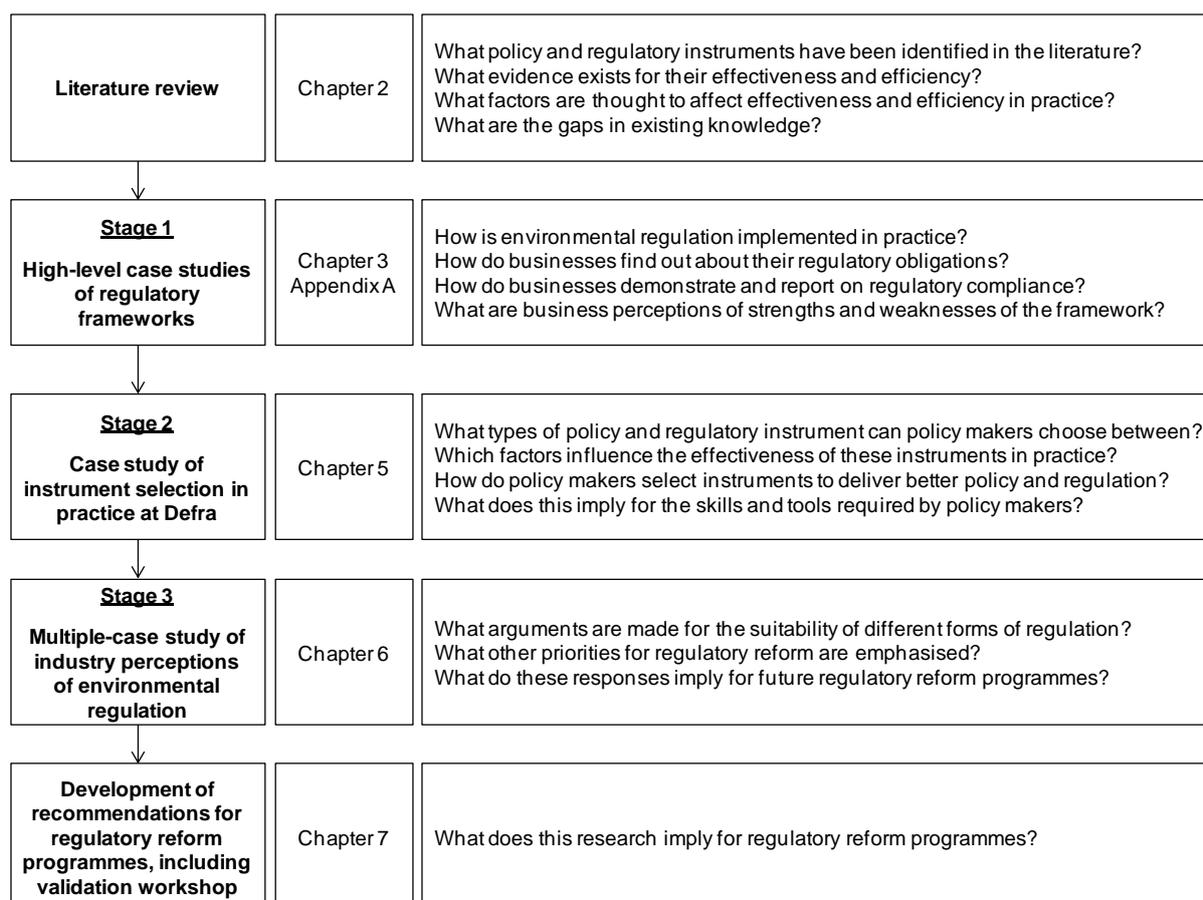


Figure 3-2: Summary of lines of enquiry for this thesis

Stage 1: Defra’s sponsorship of this PhD research programme allowed the author to participate in a placement with the Department during the summer and autumn of 2012. During this time the author provided research support to the Smarter Environmental Regulation Review (SERR) (Defra, 2013a), developing a set of case studies describing the environmental regulatory framework for 5 industries (Chapter 4). This included 15 interviews and 1 workshop with business and trade association representatives.

Stage 2: The purpose of this case study (Chapter 5) was to examine policy makers’ perspectives on what policy and regulatory instruments work when and why. Policy leads across all Defra policy areas (see Table 5-2) were invited to participate by the PhD programme sponsor at Defra, and all who were invited agreed to participate. Thirty-three policy makers were interviewed in 28 discussions.

Stage 3: The purpose of this multi-case study (Chapter 6) was to examine industry perspectives on instrument selection and the factors affecting effectiveness of

regulation in practice. Interviewees were typically policy leads in trade associations, senior managers or heads of environmental compliance in businesses. Thirty-four individuals were interviewed in 30 discussions.

The process of developing conclusions and recommendations included the design and delivery of a validation workshop held with senior Defra and Environment Agency representatives, a leading environmental consultant, and senior academics in the field of environmental policy and regulation, in June 2013. Interim findings from the research were presented thematically for discussion, and feedback provided has been incorporated into the discussion presented in Chapter 7.

3.3 Methods

3.3.1 Data collection methods

The following sections explain why and how data were collected and managed for the research presented in this thesis.

3.3.1.1 Case selection

Stage 1: The high-level case studies presented in Chapter 4 were completed during the author's placement with Defra as part of a Defra research project. The industries examined for these case studies were selected to include sectors that have a significant environmental impact, are subject to a complex set of regulations thought to impose a significant burden, that interact with multiple government departments, include a range of business sizes, are thought to have significant potential for economic growth, and that are representative of both urban and rural economic activity (Defra, 2013a). For the purposes of the research presented in this thesis, these cases provide additional contextual information to supplement the literature review presented in Chapter 2, and informed the design of later stages of the research.

Stage 2: Defra was selected for the case study of instrument selection by policy makers presented in Chapter 5 because Defra has primary responsibility for policy making and regulation for a wide range of environmental objectives in England, and as such may be considered a "critical case" for theories of environmental policy making (Yin, 2009). Other critical cases in the context of this research would include the Department of Energy and Climate Change (DECC) and the Department for

Communities and Local Government (DCLG) for central government instrument selection, and the Environment Agency for England, the Health and Safety Executive (HSE) and local authorities for instrument selection carried out by regulatory agencies. Examination of these cases, and for the equivalent bodies in devolved administrations and other national jurisdictions, is left to future research.

Stage 3: Industry sectors for the multiple-case study of business and trade association perceptions of environmental regulation presented in Chapter 6 were selected to span a wide range of environmental regulations and types of environmental risk: (i) Construction and construction products; (ii) Food and agriculture; (iii) Personal care products; (iv) Waste management and (v) Water collection, treatment, supply and management. This selection is not intended to be representative of all industries in the UK; rather it provides a range of contexts in which theories concerning environmental regulation can be developed and tested, in pursuit of a theory-building research strategy. The sectors selected illustrate both product based and operational site based regulation; sectors with large and small businesses; environmental risks arising from waste, emissions to air, ground and water; and dispersed and point source pollution. Summaries of key elements of the regulatory framework, illustrating the diversity of regulatory instruments encompassed by each of these industries, are provided in Appendix B.

3.3.1.2 Case study data collection and management

Yin identifies three principles of data collection for case study research: (i) using multiple sources of evidence to develop converging lines of enquiry through “triangulation”; (ii) creating a case study database, that separates the data or evidentiary base, and the investigator’s reports about those data; and (iii) maintaining a chain of evidence, to allow an external observer to follow the derivation of any evidence (Yin, 2009).

Principle 1 - Drawing on multiple sources of evidence: Case studies developed for Stages 1, 2 and 3 have drawn primarily from three sources of evidence: interviews, academic literature, and “grey” literature, to provide triangulation. The high-level case studies describing business experiences of the environmental regulatory framework (Stage 1) addressed two types of questions: (i) what is the regulatory framework for the case study industry? and (ii) what do industry

representatives consider to be its strengths and weaknesses?. The first question is factual and can be examined through review of the academic and grey literature; the second question examines perspectives which can be obtained primarily from industry representatives. Triangulation for the case studies in Stages 2 and 3 has been pursued through comparison of opinions expressed by respondents with each other, and with existing grey and academic literature.

Principles 2 - Creating a case study database: Interview transcripts for the case studies for Stages 2 and 3 have been stored in two separate NVIVO™ database files (Bazeley, 2007). NVIVO™ is Computer Assisted Qualitative Data Analysis Software (CAQDAS) and provides functionality to enable coding of source documents that separates the coding from the source. Summaries of codes applied are provided at Appendix C. Reports based on this coding form Chapters 5 and 6. Triangulating sources of evidence are referenced via citations within the report text, linked to the references provided at the end of this thesis.

Principle 3 - Maintaining a chain of evidence: This thesis has been structured to provide the chain of evidence to support the final conclusions as illustrated in Figure 3-3.

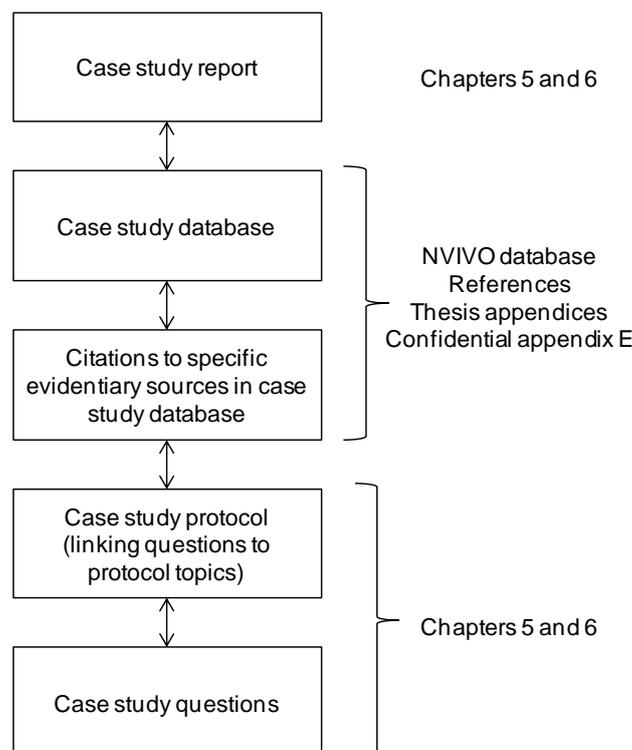


Figure 3-3: Chain of evidence provided by this thesis, after Yin (2009)

3.3.1.3 Interview methodology

Narrative data were gathered through semi-structured interviews. Semi-structured interviews have predetermined questions, but order, wording and associated explanation can be modified, and questions can be added or omitted, according to the interviewer's perception of what seems most appropriate (Robson, 2002). This interviewing approach allows open discussion without straying too far from the research topic, and explanations to be elicited (Miles & Huberman, 1994). Interviews were either conducted face-to-face or by phone, recorded with the permission of the interviewee, and transcribed verbatim.

The high-level case studies for Stage 2 were completed during the author's placement with Defra as part of a Defra research project. Respondents were invited to participate by Defra as part of the informal consultation process for the project. Participating organisations selected the respondents to participate, who were generally heads of policy in trade associations or senior managers with responsibility for environmental regulatory compliance in businesses.

Participants for the Stage 2 case study of instrument selection by policy makers were identified with the support of the Defra sponsor for the research, targeting heads of policy across all Defra's policy areas (Table 5-2). Respondents were typically senior civil servants, or Grade 5 or 7 managers. Respondents were invited to participate via email, and provided a briefing note explaining the purpose of the research, research questions and the typology of regulatory instruments to be discussed (Appendix A.1).

For the Stage 3 multiple-case study of business and trade association perceptions of environmental regulation, organisations that had previously contributed to a Defra regulatory reform programme were invited to participate under a covering letter from the Department, explaining the research was being undertaken independently, explaining its purpose, the research questions to be discussed and the typology of regulatory instruments (Appendix A.2). Respondents were supplemented with organisations selected for their complementary perspectives, including recruitment through a personal care products trade show, and membership of waste industry professional association. Interviewees were typically policy leads in trade associations, senior managers or heads of environmental compliance in businesses.

Interviews were conducted in line with Robson's (2002) recommendations for interviewing style:

- Listening more than speaking;
- Putting questions in a straightforward, clear and non-threatening way;
- Eliminating cues which lead interviewees to respond in a particular way;
- Enjoying it (or at least appearing to do so).

3.3.1.4 Additional sources of data

In addition to data obtained through interviews, publicly available sources were used to gather information to support the discussions and inform the research, particularly in the following areas:

- The key regulatory instruments relevant to the sector under discussion, including statutory instruments and industry-led initiatives (Appendix B);
- Characteristics of the industry sector e.g. number and size of businesses, recent growth rates, key environmental issues; and,
- Characteristics of the respondents' organisations e.g. key lines of business, size, operating locations, customers, suppliers.

3.3.2 Data analysis

This research pursued a strategy of "theory building" from case studies, which involves using one or more cases to create theory or propositions from case-based, empirical evidence (Eisenhardt & Graebner, 2007). Theory is developed inductively, and is "emergent" in the sense that "it is situated in and developed by recognizing patterns of relationships among constructs and across cases and their underlying logical arguments" (Eisenhardt & Graebner, 2007).

Yin (2009) describes five analytical techniques for case study research. "Pattern matching" compares an empirically based pattern (e.g. a pattern of behaviour in an organisation) with predicted patterns. "Explanation building" is a special type of pattern matching mainly relevant to explanatory case studies, where case study evidence is examined and theoretical positions are revised, and then evidence is examined again from this new perspective, for a number of iterations. "Time series analysis" involves tracing changes over time to examine empirical trends against those suggested by theory. "Logic models" stipulate a complex chain of events over

an extended period of time, and analysis consists of matching observed events to those predicted by theory. Logic models are typically presented diagrammatically as a kind of flow chart. “Cross case synthesis” is used to aggregate findings across individual case studies.

For this research the Computer Assisted Qualitative Data Analysis Software (CAQDAS) NVIVO™ (Bazeley, 2007) was used to support an iterative process of coding and analysis to support theory building, drawing on a number of the techniques proposed by Yin (2009), as illustrated in Figure 3-4.

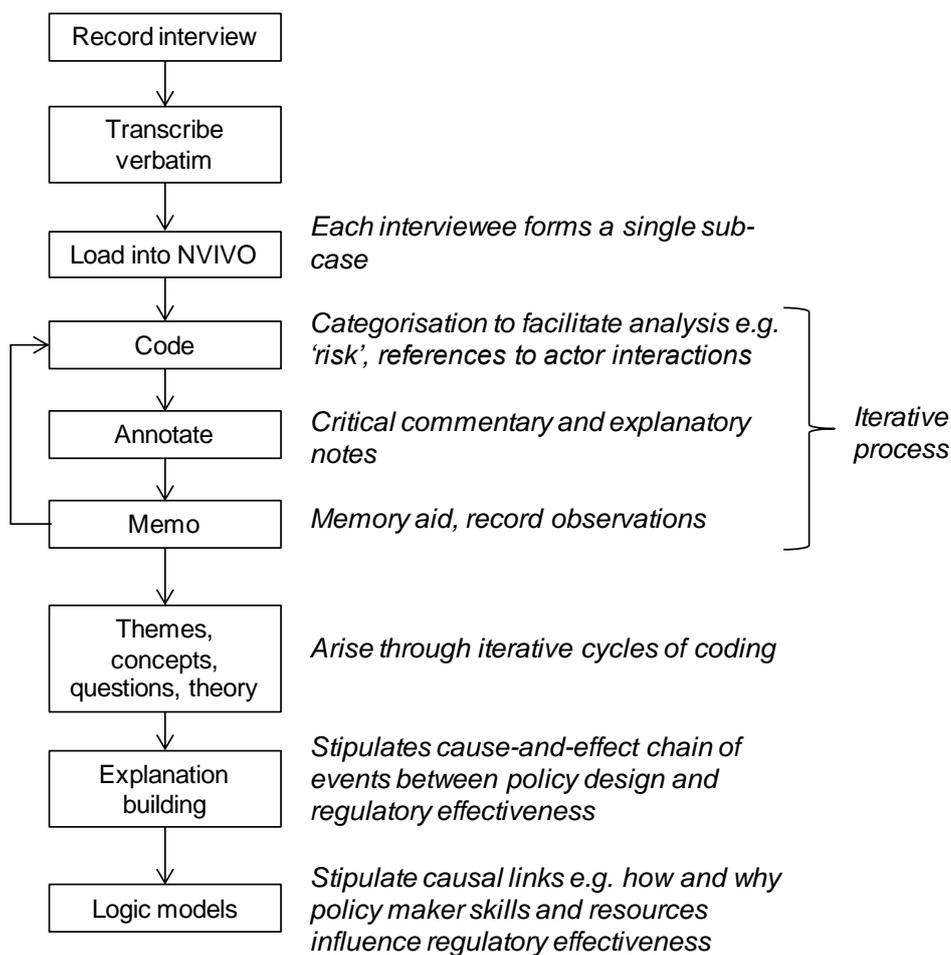


Figure 3-4: Analysis approach, from Taylor et al. (2013) after Summerill et al. (2010)

As described in more detail in Chapter 5, the case study of instrument selection among policy makers at Defra focused on explanation building, leading to the development of a simple logic model describing the process of instrument selection described by respondents (Figure 5-4).

The multiple-case study examining business and trade association perspectives on the effectiveness and efficiency of regulatory instruments described in Chapter 6 also focused on explanation building, making extensive use of cross-case synthesis to identify recurring patterns in respondents' narratives (e.g. Table 6-4 and Table 6-5).

3.3.3 Ethical considerations

Varying degrees of anonymisation have been applied to each stage of research presented in this thesis.

Stage 1: The high-level case studies presented in Chapter 4 were completed during the author's placement with Defra as part of a Defra research project. It was agreed with Defra and participating organisations that responses provided by trade associations would be attributable to their organisation, but responses from individual businesses would be anonymised. The case studies were checked with participants to ensure accuracy and to gain their consent before publication (Defra, 2013a).

Stage 2: The case study of instrument selection by policy makers names Defra as the case study organisation. Policy makers interviewed contributed anonymously although the policy areas for which they spoke at the time are identified in the case study text. To ensure accuracy, references to policy-specific issues described in the text and direct quotes were checked with respondents before the case study was published as a journal article (Taylor et al., 2013).

Stage 3: The multiple-case study of business and trade association perceptions of environmental regulation has been anonymised at both the organisational and individual level. Data were anonymised to encourage respondents to be open and honest in their responses, while the nature of their roles and organisations has been described in sufficient detail to support the analysis presented. To ensure accuracy and gain consent for publication direct references to points made by respondents, direct quotes, and the summaries of responses provided in Table 6-5 were checked with respondents via email.

The Cranfield University Ethics Policy (Appendix F) was followed during the conduct of this research, which requires that in their research all staff and students will endeavour to:

- Maintain professional standards including honesty and integrity;
- Properly document all results;
- Evaluate critically all results;
- Attribute honestly the contribution of others;
- Wherever possible report all results openly, bearing in mind the University's commercial considerations and sponsors' needs for confidentiality.

In addition all staff will endeavour to:

- Educate and develop new research workers to an understanding of good research practice;
- Secure and store primary data for an appropriate period of time.

3.3.4 Evolution of methodology

The evolution of methods during the course of the research is discussed below.

Stage 1: The process of developing these case studies demonstrated that it is a time-consuming process to document the regulatory framework for a specific industry, and that businesses and trade associations were generally keen to participate in research that they believed would have a direct influence on government policy. It also highlighted the importance of preparation time before undertaking interviews to ensure that the researcher was ready to discuss industry-specific, technical issues at a level that reassured the interviewee of the interviewer's competence for the task in hand.

Stage 2: 28 interviews were conducted face-to-face over a 2 month period, which provided limited time to analyse responses between interviews. Interviews were analysed and an explanatory case study in the form of a journal article was produced during the period November 2011 to August 2012, reflecting the time-consuming process of iteratively coding approximately 28 hours of recorded interviews, amounting to around 180,000 words of transcribed text (for comparison, "Great Expectations" by Charles Dickens is approximately 184,000 words in length (Feedbooks.com, 2013)). In retrospect, spreading the interviews over a longer period

to allow more time to analyse and begin to code transcripts would have allowed more time for ideas and insights to form in the mind of the researcher, and increased the enjoyment of the task by providing greater variety in the structure of day to day research work. A further learning point was that coding primarily at a line-by-line level within transcripts made stepping back from the analysis to see the overall emerging picture difficult at times, and could have been assisted with greater use of higher-level summary notes of insights from each interview.

Stage 3: The purpose of the third stage of research was to examine perspectives on instrument selection of case study industry and trade association representatives. The experience of the preceding stages was reflected in various aspects of the method adopted for this stage:

- (1) Selection of case study industries:** In choosing the number of industries included within the multiple-case study a balance was struck between providing diversity in the industries examined and the amount of background research required to allow the researcher to engage with interviewees at their level of understanding of the issues discussed.
- (2) Selection of case study respondents:** Respondents who were as experienced as possible in the design and function of environmental regulatory frameworks were sought to maximise the breadth and depth of knowledge on which they could draw. To this end, interviewees were required to be policy leads in trade associations, or senior managers or heads of environmental compliance in businesses.
- (3) Recruitment of case study respondents:** Respondents were invited to participate through a Defra-branded invitation (see Appendix A.2) to reassure them that their contribution was likely to be heard by government.
- (4) Familiarisation with relevant regulatory frameworks before interviews:** The researcher ensured that time was devoted to preparation for interviews through background research into key industry characteristics and important elements of the regulatory framework. This understanding was validated with

interviewees at the beginning of the discussion, in part to reassure them that the interviewer was able to understand their views in context.

(5) Staggering interviews and starting to code early in the process: Learning from Stage 2 of the research, interviews were staggered over a longer period to allow time to reflect on and begin to code transcripts between interviews. This also proved necessary as interviewee recruitment proved more time-consuming than for Stage 2.

(6) Use of higher-level summary notes: More extensive use of high-level notes to summarise each interview was made, which made understanding overall trends in the data easier. In addition, a short summary statement on each respondents' views on direct and voluntary regulation was synthesised by the researcher and checked with each respondent following the interview (see Table 6-5), providing a mechanism for checking that the researcher had successfully understood respondents' views of the world, which as discussed above is a key objective of interpretive social science.

3.4 Potential methodological weaknesses

3.4.1 Potential criticisms of case studies

Yin identifies, and counters, a number of criticisms of case study research (Yin, 2009). Criticism that case studies lack rigour can be countered through following a rigorous case study methodology as outlined in this chapter. Criticism that case studies provide little basis for scientific generalisation requires a more complex response. In short, case studies are best viewed as experiments to expand and generalise theory (analytic generalisation), rather than seeking to enumerate frequencies across a population (statistical generalisation). Care has been taken to pursue analytic rather than statistical generalisation throughout the analysis presented in this thesis. Criticism that case studies take too long and result in massive unreadable documents are also misdirected; while ethnographic or participant-observer methods may require extensive time in the field, Yin asserts that a high quality case study could be completed using the telephone and internet, depending on the topic (Yin, 2009).

3.4.2 Validity and reliability

Four tests have been commonly used to establish the quality of social research: (i) construct validity, (ii) internal validity, (iii) external validity and (iv) reliability (Yin, 2009). How these quality measures have been addressed in this research is summarised in Table 3-2.

Table 3-2: Tactics to ensure quality of this research, after Yin (2009)

Quality test	Description	Tactics adopted in this research
Construct validity	Requires that the correct operational measures are identified for examined concepts.	Using multiple sources of evidence. Establishing a chain of evidence.
Internal validity	Requires that causal relationships are distinguished from spurious relationships.	Using explanation building. Addressing rival explanations. Using logic models.
External validity	Requires that the domain to which a study's findings can be generalised is correctly defined.	Using theory in single case study. Using replication logic in multiple-case study.
Reliability	Requires that the operation of a study can be repeated with the same results.	Documenting research methods. Developing case study database.

3.4.3 Potential bias

Miles and Huberman (Miles & Huberman, 1994) identify two possible forms of bias: (A) the effects of the researcher on the case, and (B) the effects of the case on the researcher.

Bias of type A is considered first. For the Defra case study, respondents were invited to participate explaining that the research would contribute towards guidance materials for policy makers as well as this PhD thesis, and generally appeared to the researcher to contribute their views in the spirit of candidly sharing experience and good practice. However, they did so in the knowledge that findings would be published, so may have withheld information that they thought could be damaging. For the high-level case study research with businesses and trade associations presented in Chapter 4, respondents were providing opinions to influence government policy, potentially for their business advantage. These case studies were created for publication (Defra, 2013a) and were subject to public scrutiny, so were required to provide a balanced summary. For the multiple-case study research with businesses and trade associations presented in Chapter 6, the invitation to

participate made it clear that the research was being undertaken independently by Cranfield University, with Defra's sponsorship, and providing anonymity. In this case, respondents appeared to generally speak candidly, although sometimes showed awareness of Defra's involvement.

Miles and Huberman and others have described bias of type B as arising from the researcher "going native" (Miles & Huberman, 1994). While the researcher has spent time working with Defra during the course of the research, exposure to the often contrasting perspectives of businesses and trade associations, combined with the majority of time being spent based at Cranfield University, have provided some balance in influences on the researcher's perspective.

While these sources of bias are difficult to eliminate, a method that provides a transparent chain of evidence between data and conclusions has been used to make clear to the reader the nature of the data gathered and how it has been used to draw conclusions. Findings have also been triangulated with other sources of evidence (e.g. academic research, grey literature) where possible.

3.5 Summary

This research adopted a theory building approach, drawing on qualitative data gathered through semi-structured interviews for case study organisations (Eisenhardt & Graebner, 2007; Miles & Huberman, 1994; Payne & Payne, 2004; Yin, 2009). This approach has been adopted to provide in-depth insight into the perceptions, motivations and behaviours of stakeholders affected by and involved in the design of environmental regulation. This research approach seeks to develop theory through "analytic generalisation", analogous to theory development through multiple experiments, rather than "statistical generalisation" that seeks to characterise a population through sampling and statistical analysis.

4 ENVIRONMENTAL REGULATION IN PRACTICE

4.1 Introduction

This chapter examines the regulatory frameworks in place for illustrative case study business sectors in the UK through a review of grey literature and interviews with industry sector experts, to meet Objective 2 of this research programme. These case studies were developed by the author during an industrial placement at Defra, providing evidence to inform the work of the Smarter Environmental Regulation Review (SERR) programme (Defra, 2013a). In line with the Terms of Reference of SERR, the purpose of the case studies was to examine the regulatory framework for a set of sectors, particularly with regard to the environmental legislation that applies, the guidance available to businesses from government or other sources, the associated obligations for businesses to provide information to government, and the processes of compliance assurance.

4.2 Methodology

The case study sectors were selected for SERR to illustrate varied impacts of environmental regulation, to include:

- Sectors that have a significant environmental impact;
- Sectors subject to a complex set of regulations thought to impose a significant burden;
- Sectors that interact with multiple Government departments and agencies;
- Sectors that include large businesses, small and medium sized enterprises (SME) and micro-businesses;
- Sectors that are thought to have potential for significant growth or steady demand (as indicated through their inclusion in the UK Government's 2011 Growth Plan (H. M. Treasury/ Department for Business Innovation and Skills, 2011));
- Sectors representative of both urban and rural economic activity.

The full set of case studies developed for the SERR project is included in Table 4-1 below. Case studies developed by the author and included in this thesis are marked with an asterisk.

Table 4-1: Case studies developed for SERR

Case study sector	Key sector characteristics		
	Mix of large, SME and micros	Urban or rural activities	Links to Growth Plan Themes
1: Quarrying*	Mix	Mainly rural	Construction
2: Arable farming	Mix	Rural	Rural Economy
3: Soft drinks manufacturing	Mix	Both	(indirectly, Rural Economy)
4: Waste management	Mix	Both	Low carbon investment
5: Commercial construction	Mix	Both	Construction
6: Personal care product manufacturing*	Mix	Both	
7: Non-ferrous metals and surface treatment*	Mix	Both	Advanced manufacturing
8: Biofuels manufacturing*	Mix	Both	Low carbon investment
9: Electronic product manufacturing*	Mix	Both	Advanced manufacturing
10: Water collection, treatment and supply	Mainly large	Both	
11: Dairy product manufacturing	Mix	Mainly rural	(Indirectly, Rural Economy)

Desk research was used to gather information on key features of the industry and its regulatory framework. Businesses and trade associations were invited to provide their views on the regulatory framework through a series of semi-structured interviews. The purpose of this research was to provide illustrative case studies to inform more in-depth work later in the SERR programme, rather than to provide a representative sample of all UK businesses in each sector. However, consultation with industry trade associations as well as individual businesses aimed to provide a wide cross-industry view. In total the author independently undertook 15 interviews across 5 industry sectors. For the quarrying sector the author then designed and led a workshop with 5 business and trade association representatives to feed back findings. Case study reports were written on the basis of background research and interview notes, and then reviewed by interview participants and relevant policy leads and regulators to ensure accuracy. Comments received were incorporated into final versions for publication.

Some research assistance was provided to the author in initial desk research by WSP, a consultancy providing research support to Defra for SERR. More than 80% of the written material presented here (and a greater proportion of the total research

effort expended to produce these high-level case studies) is the author's original independent work. The completed case studies as they appear in this thesis have since been published in the SERR Phase 1 report (Defra, 2013a).

4.3 Case study: Quarrying

4.3.1 Industry characteristics

Quarrying is the extraction of useful materials from the ground. This case study focuses on the quarrying of construction aggregates which includes sand, gravel and crushed rock. The UK typically needs 205 million tonnes of aggregates per year, or approximately 4 tonnes per head of population, of which around 150 million tonnes is extracted, the remainder being from recycled or secondary sources (Mineral Products Association, 2013a). Around 90% of aggregates are used in construction, for houses, other buildings and structures, roads, railways and by the water industry (Mineral Products Association, 2013b).

UK quarrying businesses range in scale from large multinationals to micro-businesses. In the UK there are over 2,000 quarries and associated manufacturing sites. The sector supplies approximately £9 billion of products and services each year, and is an essential input to the construction industry. It provides nearly 30,000 jobs directly, many in rural areas (Mineral Products Association, 2013c).

4.3.2 Environmental regulatory framework

Although the total UK land use committed to mining and quarrying is relatively low (0.9%) compared to other uses (e.g. farming at 71%), the environmental and amenity impacts of quarrying can be significant (Beddington et al., 2009), and consequently the sector is subject to significant regulation. Prevention of pollution to land, water and air, control of noise, dust and vibration, protection of biodiversity and protection and creation of habitats are core environmental management objectives for the quarrying sector. While quarrying operations can significantly disrupt natural habitat, the restoration of quarrying sites after use can provide new valuable habitats such as wetlands and offer other benefits for water and flood management, and public amenity.

Operators tend to manage environmental regulations alongside development planning, and manage site health and safety as a separate issue. The businesses

we spoke to told us that planning and environmental regulations have a significant impact on investment in quarrying. For example, the permissions obtained control the activities allowed at a given site in line with sustainable development, environmental and social objectives. Some thought that changes to regulation of water abstraction within quarries may encourage different/ better water management, whilst the importance of efficiently integrating controls on abstraction with existing planning and permitting regulations, through co-design with the industry, was emphasised. For operators producing processed products environmental regulation and societal demands are reportedly important drivers for product development (e.g. with low embodied carbon, permeable paving). There may be scope to improve materials reuse and quarry restoration by modifying waste policy to enable the wider use of suitable "waste" material as an input to products and for use in restoration.

Figure 4-1 provides a summary of the environmental regulatory framework for the sector. In order to establish a quarry, operators must obtain planning permission from the local planning authority, which one business told us can take as long as 10 years. To obtain planning permission environmental impact assessments are undertaken and a restoration plan developed. Planning permission will include conditions on how the quarry is managed, including requirements for environmental protection. Environmental permits will also be required from local authorities (Environmental Permitting Regulations (EPR) Part A2 and B) and the Environment Agency (EPR Part A1, waste management, water management), and species licences from Natural England.

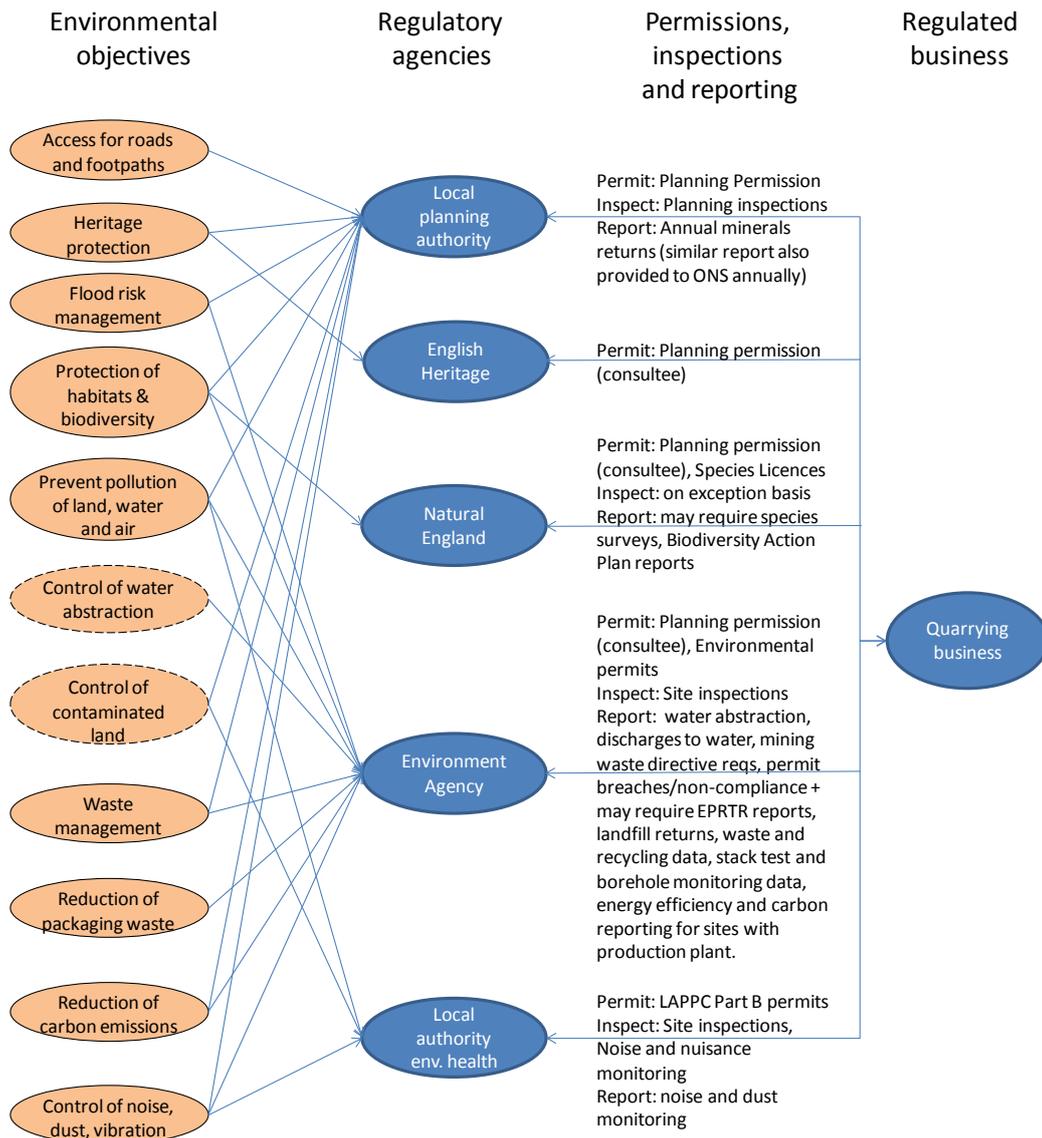


Figure 4-1: Summary of environmental regulatory framework for quarrying

4.3.3 Legislation

Important pieces of legislation that apply to quarrying businesses include the Environmental Permitting Regulations¹ (England and Wales) 2010 (as amended), Water Resources Act 1991, Town and Country Planning Act 1990 and National Planning Policy Framework 2012 (which includes technical guidance on flood risk), the Town and Country Planning (Environmental Impact Assessment) Regulations

¹ In England and Wales the permitting requirements as set out in article 7 of the Mining Waste Directive have been transposed through the Environmental Permitting (England and Wales) Regulations 2010 (Environment Agency, 2010).

2011, Conservation of Habitats and Species Regulations 2010 (as amended), the Environmental Protection Act 1990 (Part 3 - statutory nuisances) and the Contaminated Land² (England) Regulations 2006 (as amended). One business we spoke to told us there are 150 pieces of legislation that apply to their quarrying operations.

Businesses we spoke to identified a range of problems in the design of the regulatory legislative system including issues arising from:

- The interface between the planning permission process and environmental permitting process³.
- Inconsistency of definitions, e.g. definition of waste in different contexts.
- Duplicative provisions for species protection.

Ideas raised during this review for improving legislative aspects of the regulatory framework included (most important to businesses first⁴):

- Industry should be involved as standard practice in the design of new regulatory regimes and have greater influence over the final decisions made.
- Improve alignment between the planning process (led by local planning authorities), environmental permitting requirements (led by the Environment Agency), and species licensing (led by Natural England).
- Resolve inconsistencies in definitions and rules concerning the management of waste, particularly with regard to when material use is treated as “disposal” or “recovery”.
- Identify areas of ambiguity in the regulatory framework and develop position statements to clarify.
- Integrate Local Authority Pollution Prevention and Control (LAPPC) Part A and Part B permits where they apply to the same site.

² Contaminated Land Regulations would not apply to quarrying as a general rule, but when dealing with legacy contaminated land or activities that have caused land to become contaminated.

³ Work is underway to address this issue, so it is not discussed further here (Environment Agency, 2013).

⁴ Rankings of importance here and for other issues later in the case study were established through a workshop discussion with participating businesses.

4.3.4 Guidance

According to the businesses we spoke to, large quarrying businesses tend to have teams of specialists in-house focused on monitoring and influencing regulatory policy and ensuring compliance. Smaller operators are more likely to rely on external consultants to advise them. Businesses we spoke to use the Defra, Environment Agency and Her Majesty's Revenue and Customs (HMRC, for Landfill Tax information) websites as well as legislation.gov.uk and the Planning Portal. They generally found these sites to be acceptable, although some complained that the Environment Agency website could be hard to search and navigate but had shown some recent improvement. The former Netregs/Business Link site, which had areas structured around sectors, was thought to have been the right sort of idea. They also benefit from information and networking provided by the Mineral Products Association and British Aggregates Association, and informal professional networks.

Businesses typically commented that they could find out about environmental regulation because they have already invested time in getting to grips with it, but thought it would be very challenging for someone seeking to understand their environmental obligations for the first time.

Ideas raised during this review for improving the design and communication of environmental regulatory obligations included (most important to businesses first):

- More proactive dialogue with regulators to discuss upcoming issues and current problem areas.
- Improving the consistency in the design of guidance materials, so that they are written for the quarrying audience, in plain English.
- Government co-developing guidance materials with industry bodies or consultants who understand the quarrying industry to maximise relevance.
- Establishing a clear distinction between guidance materials that set out regulatory requirements and those that are best practice.
- Developing a single website providing a summary of, or pointing to, relevant regulations, guidance, permits and a forward plan of relevant consultations.
- Industry providing single named contacts to regulators to improve communications.

- A “rate this guidance” function on websites so that industry users can provide direct feedback to guidance authors on its usefulness.

4.3.5 Information obligations

Quarrying businesses have to report to local authorities for both planning and environmental health, the Environment Agency and Natural England, though there is reportedly relatively little duplication in the information provided. Ideas raised during this review for improving the reporting of regulatory information to Government included (most important to businesses first):

- Developing a Planning Portal style website for environmental permits, providing greater transparency of the application process and details of permits granted.
- Implementing a single consolidated annual quarrying monitoring report, including both operational environmental performance data and other information about environmentally beneficial activities such as habitat creation. This would be designed to ensure that reporting effort required was reduced.
- Developing a single place to which reporting information is provided, although noting that this could impose costs on business to establish new reporting processes.
- Ensuring that the emphasis of information reported is on indicators aligned closely to intended environmental performance outcomes rather than standardised monitoring requirements.
- Establishing a standard data interface definition to enable direct reporting from electronic information management systems into Government systems.

4.3.6 Compliance assurance

Quarry operators are inspected by the Environment Agency, local authority environmental health officers and local authority mineral planning authority officers. Planning permission conditions may need to be discharged prior to operations commencing or at certain points during the life of a development, and are monitored on site visits by the local planning authority or the Environment Agency to ensure compliance. Businesses told us that while site visits are necessary for regulation to

be effective, both the Environment Agency and local authorities may visit the same site to inspect different activities, which can cause confusion and sometimes results in different advice or comments being provided. They reported inconsistencies in the perceived quality of inspection carried out. Good inspectors maintain good relationships with local sites, allowing for pragmatic decision-making. Poor inspectors can come unprepared, lacking knowledge of the site and the permits that apply. Businesses perceived problems of inconsistency in discretionary decisions.

Ideas raised during this review for improving Government compliance assurance activities included (most important to businesses first):

- Increasing the recognition of actions to address issues when they occur, providing a more proportionate response rather than prosecuting for problems that were resolved.
- Examining the scope for recognising compliance with environmental management standards (e.g. ISO14001) with reduced inspections, although some expressed concern that this approach could be too “tick-boxy” and system focused, and insufficiently focused on environmental outcomes.
- Greater use of 3rd party assurance and reporting.
- Introducing annual compliance statements to reduce reliance on site-based inspection. The relevance of this approach would depend on company size, among other things.
- Introducing a single quarterly joint inspection that includes (as necessary for a given site) the Environment Agency, local authority environmental health and local planning authority officers in one meeting.

4.4 Case study: Personal care product manufacturing

4.4.1 Industry characteristics

Personal care products include toiletries, perfumery and fragrances, hair care, skin care, and decorative cosmetics (make-up). The European Commission defines a cosmetic product as “any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their

appearance, protecting them, keeping them in good condition or correcting body odours” (European Commission, 2013b).

According to the Cosmetic, Toiletry & Perfumery Association (CTPA), of the 500 million people living in the EU most will use a minimum of 5-7 cosmetic products on a daily basis (Cosmetic Toiletry & Perfumery Association, 2013a). More than 4,000 companies operate in the EU cosmetics industry providing jobs for over 500,000 people; two-thirds of these are SMEs (Cosmetic Toiletry & Perfumery Association, 2013b, 2013c). In 2011 the UK cosmetics market saw a 4.1% increase in value at retail sales price taking the total market to £8,356 million (against £8,028 million in 2010) (Cosmetic Toiletry & Perfumery Association, 2013d).

The trade associations we spoke to for this research were the CTPA, the British Association for Chemical Specialities (BACS) and the British Aerosol Manufacturers' Association (BAMA). One multinational and one smaller personal care manufacturing business were also consulted for this research.

4.4.2 Regulatory framework

All cosmetic products placed on the market in the EU are regulated by the Cosmetics Directive (76/768/EEC) (implemented in the UK through the Cosmetic Products (Safety) Regulations 2008 (as amended)), the primary purpose of which is to protect human safety (Department for Business Innovation and Skills, 2013b). From 11 July 2013, The European Union Regulation on Cosmetic Products (Regulation (EC) No 1223/2009) has full effect and the directive and UK regulations will be superseded. Enforcement powers in the UK will be enacted via the Cosmetic Products Enforcement Regulations 2013. The manufacturer or supplier of the cosmetic product is responsible for ensuring it is safe, and must collate information about the product including its ingredients and proof of any claimed effect. Under the Cosmetics Directive/Regulations substances are listed that must not be present in cosmetics products, and substances that may be used as ingredients subject to particular restrictions. For example, some ingredients must not exceed a certain level or may only be used in rinse-off products (Cosmetic Toiletry & Perfumery Association, 2013e). The safety of the finished product, all of the ingredients and how the products will be used must be assessed by a qualified professional. Assessors must be registered pharmacists, medically qualified, chartered biologists

or chartered chemists, and have appropriate experience to make the assessment. These assessments may be inspected at any time by the enforcement authorities, usually local authority Trading Standards in the UK. Environmental claims made about personal care products must also be substantiated in accordance with advertising standards and consumer protection law (Defra, 2011a).

As illustrated below, key environmental management objectives for the sector identified by the trade associations and businesses we spoke to are prevention of pollution to land, water and air, control of chemicals and hazardous substances, and reduction of production and packaging waste. Larger personal care manufacturers may undertake manufacturing processes that use significant energy and water, for which reduction of emissions of green house gases and control of water abstraction are also important environmental objectives.

Important items of legislation therefore include the Environmental Permitting Regulations (England and Wales) 2013 (as amended), the EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006 (as amended) and the REACH Enforcement Regulations 2008, the Waste (England and Wales) Regulations 2011 (as amended), Packaging (Essential Requirements) Regulations 2003 (as amended), Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (as amended) and potentially the Water Resources (Abstraction and Impounding) Regulations 2006 (as amended) and the Climate Change Act 2008. The Control of Major Accident Hazards (COMAH) Regulations 1999 (as amended) will apply to some personal care product manufacturers, for example if they store large volumes of aerosols or ecotoxic chemicals. Personal care products that contain biocides may also be subject to the Biocidal Products Regulations 2001 (as amended) if the primary claim is a biocidal claim. Personal care product manufacturers blend together ingredients purchased from manufacturers, and must ensure that chemicals used are permitted under REACH.

Environmental obligations may have implications for product design and for production processes. The businesses we spoke to told us that these tend to be separate functions within a personal care products manufacturing business, and both functions will manage some aspects of environmental compliance. In smaller

businesses these responsibilities may be addressed by the same person. Often environmental issues and health and safety issues are managed together.

Businesses and trade associations we spoke to reported that environmental regulation can affect both strategic and operational decisions of personal care product manufacturers. For example, we were told that the industry made a significant change in product design in response to environmental concerns by moving away from the use of chlorofluorocarbons (CFCs) in aerosols. Now under REACH, as "downstream users" personal care product manufacturers may need to change ingredients and/or suppliers depending on the REACH status of the ingredients suppliers provide. Some objectives of environmental regulation, such as packaging light-weighting and energy efficiency improvement, are reportedly well aligned to business objectives to reduce costs, and interviewees thought that significant improvements have been achieved by some members of the industry in these areas. For a large business we spoke to, carbon legislation (through the Carbon Reduction Commitment Energy Efficiency Scheme (CRC EES), the European Union Emissions Trading Scheme (EU ETS) and Climate Change Agreements (CCAs)) is significant and is being monitored as UK and EU requirements develop.

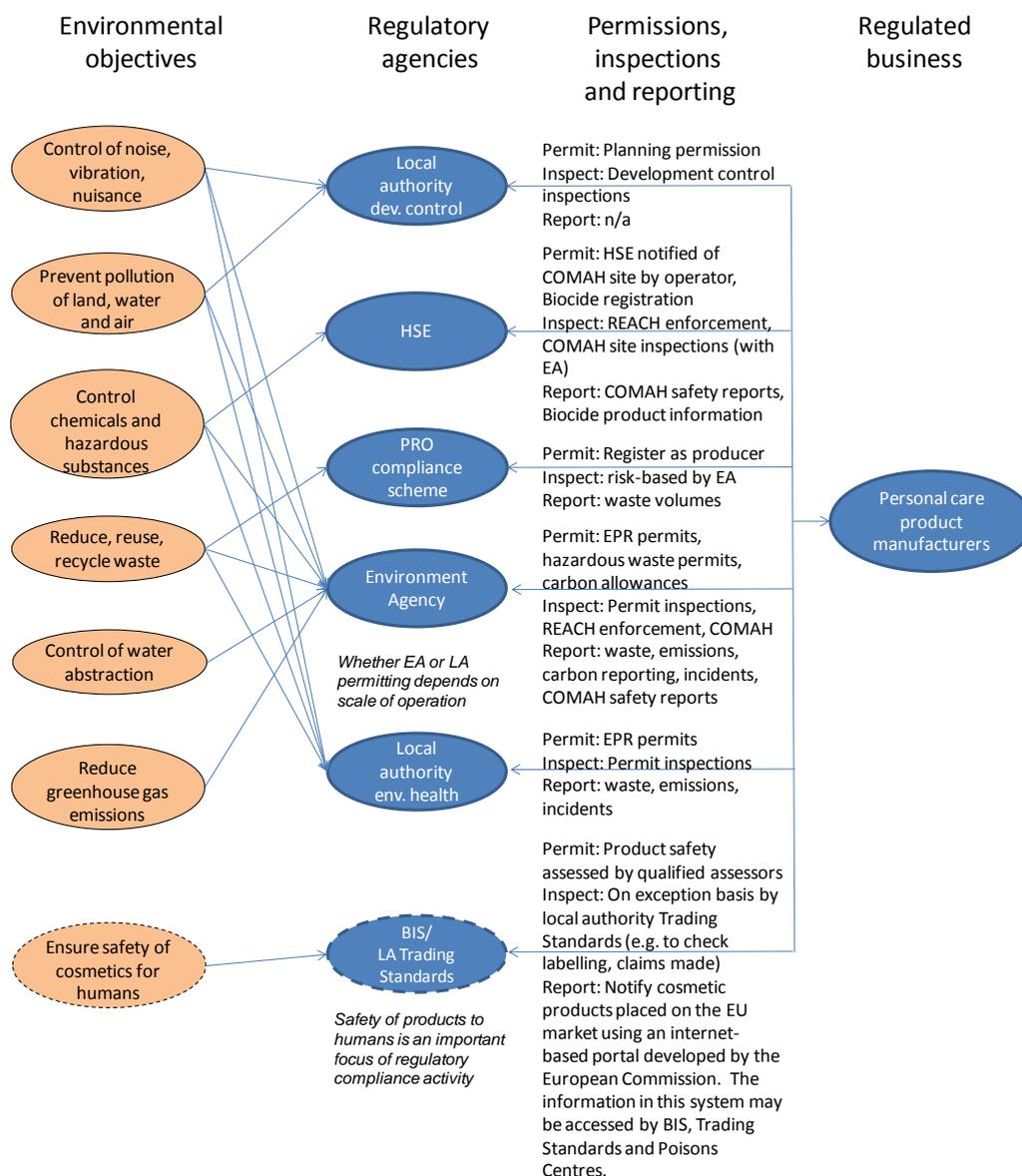


Figure 4-2: Summary of environmental regulatory framework for personal care product manufacturing

4.4.3 Legislation

Views among businesses and trade associations we spoke to about environmental legislation were mixed. One respondent aspired to legislation with text that was clear enough to not require separate guidance notes to explain what it means, and considered the Environmental Permitting Regulations to be a good example of this nearly being achieved. On the other hand, one respondent who had been working in environmental regulation for a large multinational for 20 years commented that the

regulation was still complex and difficult to understand, and therefore found supporting guidance essential.

The businesses and trade associations we spoke to noted that changes to the legislative framework could demand substantial business effort to understand and become compliant, citing the introduction of REACH and the CRC EES as examples. Some problem areas or areas of uncertainty were highlighted, including:

- Animal testing requirements for personal care product ingredients under REACH and the Cosmetic Products Regulation.
- The potential for dual regulation under the Biocidal Products Regulation.
- Forthcoming changes to COMAH regulations that may capture more businesses in the sector.
- Tensions between safety and environmental objectives for the management of volatile organic chemicals (although it was noted that some of these issues had been tackled through some positive joint working between the industry and Environment Agency).

For REACH, the HSE leads on registration for the whole of the UK (Health and Safety Executive, 2013), while the Environment Agency leads UK-wide intelligence-led REACH enforcement activities (Environment Agency, 2012a). However, BAMA commented that in general having separate laws and enforcement agencies in devolved administrations would inevitably lead to more compliance workload for businesses, even though they are all complying with the same EU rules and regulations.

One respondent emphasised the great value to businesses of better advance warning of anticipated changes to regulatory requirements, to enable planning for the next financial year. The value of a mixed approach to communicating regulatory changes to businesses was also emphasised, combining website updates with face-to-face presentations and discussions.

4.4.4 Guidance

Respondents use both the Defra and Environment Agency websites to find out about environmental obligations, and most felt they were clear and accessible. For simplicity, all REACH-related guidance is provided through the HSE website. Some

considered the HSE website to be very good and well thought out. Some commented that while in general guidance documents were clear, finding the right material could be challenging and a general overview to guide people new to the subject is lacking.

BAMA thought the apparent need for businesses to seek advice from trade associations and consultants was related to the quality of guidance available from Government, observing that while the issues and resultant regulations are intrinsically difficult, the guidance can also be tricky to understand. They thought that trade associations and consultants usefully share knowledge between businesses and provide specialist advice, and that small companies are unlikely to have in-house expertise for very specific issues. It can be more efficient to use external advisers, and the need is compounded by the fact that businesses are leaner and fitter with fewer staff and more generalists. Businesses will also use professional networks, trade associations and Government/industry groups to help them understand their obligations and keep up to date with developments.

One small business was supportive of the idea of a trustworthy "one stop shop" website that would explain environmental obligations. One large business thought that update emails similar to those provided by HSE would be helpful. Trade associations wanted to be able to give members weblinks pointing to the right areas of the Defra and EA websites that would continue to work as new information was added, but this did not seem to be possible at the moment.

4.4.5 Information obligations

Reporting requirements identified by interviewees included packaging returns, waste returns, emissions reporting (including for CRC) and reporting requirements associated with environmental permits. Reporting about producer responsibility obligations and waste generated (e.g. waste transfer notes) were considered the most significant requirements by BAMA. BACS noted the Environment Agency's recent consultation on pollution inventory reporting as an example of the Government seeking to reduce reporting requirements. Duplication of reporting to Government did not appear to be a major issue for respondents. However, some commented that the environmental reporting requirements of product retailers can be significant and may overlap with Government reporting requirements.

On the question of whether it was clear why data were gathered by Government, one respondent commented *“If there is a clear link between an environmental benefit and the data required then that is OK. You’re never going to love all this reporting, but if you can see a clear rationale then you’ll understand why you have to comply”*.

One respondent noted that while electronic methods for submitting information would generally be preferable, there are significant costs to business in putting these systems in place, and smaller businesses may not have such well integrated IT systems, so reporting could remain onerous. One large business would *“love”* a consolidated list of annual data reporting requirements, so that businesses could be aware upfront of what they needed to do.

4.4.6 Compliance assurance

Compliance assurance is primarily carried out by inspections and audits conducted by the Environment Agency, HSE, and local authority environmental health officers. The Environment Agency and HSE coordinate activities for REACH to avoid placing conflicting demands on business and to ensure that the body with the best specialist skill targets the highest risk activities.

Respondents generally considered inspections and audits to be necessary to assure compliance with environmental regulations, and argued that inspection should be more risk-based, streamlined and coordinated. Several respondents reported positive relationships with the Environment Agency and HSE, finding them helpful and supportive, although some concerns were raised about inconsistencies in decisions made.

4.5 Case study: Non-ferrous metals and surface treatment

4.5.1 Industry characteristics

Under the Environmental Permitting Regulations (England and Wales) 2010 (Schedule 1 Part 2) the processing and treatment of metals is divided into three sections: ferrous metals (e.g. iron and steel works), non-ferrous metals, and surface treating metals and plastic materials (*The Environmental Permitting (England and Wales) Regulations 2010*). Non-ferrous metals are used to take advantage of their desirable properties such as low weight (e.g. aluminium), high conductivity (e.g. copper), non-magnetic properties or resistance to corrosion (e.g. zinc). Non-

ferrous metal regulated activities include production of non-ferrous metals from ore, concentrates or secondary materials by metallurgical, chemical or electrolytic activities, and melting of specified metals above specified capacity thresholds.

Surface treatment of metals and plastics can change their surface properties for decoration and reflectivity, improved hardness and wear resistance, corrosion prevention and as a base to improve adhesion of other treatments such as painting or photosensitive coatings for printing. Surface treatment therefore plays an important role in extending the life of metals, and in increasing equipment safety or reducing its consumption of other raw materials (European Commission, 2006). Currently, surface treatment is particularly important in the automotive industry and transportation, packaging, building and construction, microelectronics and printing (European Commission, 2006), and surface treatment of thin sheet steel (with tin) remains an activity of importance to the food and drink and packaging industries. The surface treatment sector can include operations in both the ferrous and non-ferrous sub-sectors, but is treated by the Environment Agency as a separate activity in its own right.

In the UK primary non-ferrous metal production is undertaken at a very small number of sites, with the majority of business activity focused on manufacturing metal products (e.g. cars, packaging, extrusions) and recycling. There are approximately 26,000 enterprises in the UK manufacturing fabricated metal products, of which nearly all are SMEs or micro-businesses (Office for National Statistics, 2012). According to the Surface Engineering Association (SEA, a trade association for a range of surface treatment processes) there are around 600 surface engineering companies in the UK that offer processing skills to component manufacturers, most of which are SMEs and specialize in specific processes (Surface Engineering Association, 2013). In addition, a number of larger companies have in-house surface engineering capability, and in total SEA members represent £1 billion of annual sales and employ over 10,000 people in the UK (Surface Engineering Association, 2013). The Environment Agency regulates around 65 non-ferrous metal sites and 110 surface treatment sites, while a significant further proportion of these businesses are regulated by local authorities (Environment Agency, 2013b).

4.5.2 Environmental regulatory framework

Important potential environmental impacts of non-ferrous metals production include emissions to air (e.g. of dust, metal compounds, dioxins, volatile organic chemicals), energy consumption, and solid waste production, although their significance varies considerably between types of process and metals produced, and controls put in place (European Commission, 2001). For surface treatment of metals and plastics the main potential environmental impacts relate to energy and water consumption, the consumption of raw materials, emissions to surface and groundwaters, solid and liquid wastes and the site condition on cessation of activities (European Commission, 2006).

Environmental obligations are likely to have a significant impact on businesses in the non-ferrous metals and surface treatment industries, reflecting their potentially high environmental impact. The Non-Ferrous Alliance (NFA), a trade association we spoke to for this research, argued that regulation will always be needed to ensure businesses meet their environmental obligations, and that it is not realistic to deregulate. Instead the focus should be on ensuring that regulation can be easily understood, with minimum burden, not to the disadvantage of UK businesses, and sensibly administered to resolve issues.

The NFA explained that for a number of significant processes undertaken by members the potential for improving energy or waste efficiency is limited by their physical or chemical properties, so efficiency improvement is only likely through major technological innovations. For NFA members the rate at which technology can be changed is often dependent on the commercial lifecycle of existing equipment, which may be between 7 and 18 years. They argued that regulators need to show flexibility in requiring compliance with Best Available Technique Reference Documents (BREFs) to reflect these commercial constraints. It should be noted, however, that under the EU Industrial Emissions Directive (2010/75/EU) the time allowed to achieve new Best Available Techniques is set in the Directive (European Commission, 2013c). The NFA also stressed the importance of risk-based rather than hazard-based regulation, and expressed concern that EU regulation tending towards hazard-based regulation could lead to some manufacturing processes becoming impossible in the EU in coming years, even

though hazardous materials could be handled to reduce risks to an acceptable level. The NFA also expressed concern that increasingly stringent carbon legislation in the UK could push energy intensive industry overseas.

The SEA told us that *“Businesses now spend more time in ensuring they are compliant than they do in trying to develop and grow. Environmental regulatory obligations are having a negative impact on investment decisions, particularly the uncertainty associated with the REACH regulations. Arbitrary threshold[s], such as in the Environmental Permitting Regulations, dissuade companies from expanding their operations.”*

As illustrated below, the non-ferrous metals manufacturing and surface treatment sectors mainly report to the Environment Agency which is responsible for regulating some part of the majority of the sector’s key environmental objectives through permits and authorisations. The Environment Agency generally inspects data recorded during ongoing monitoring of the regulated activity on-site during integrated inspections. Other key regulators are local authorities which inspect ongoing site records and inspect compliance with permits for lower risk sites, and the Health and Safety Executive (HSE).

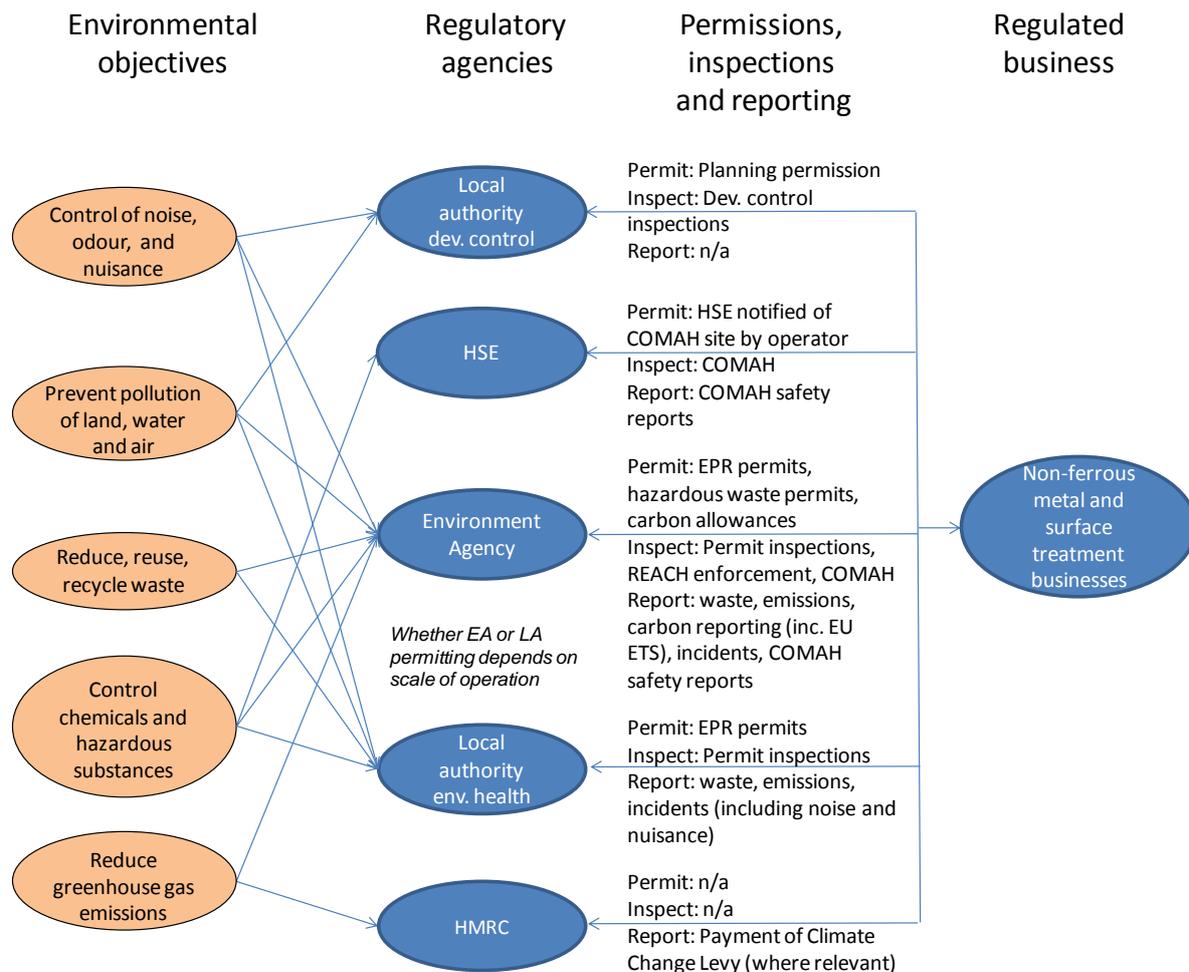


Figure 4-3: Summary of environmental regulatory framework for non-ferrous metals and surface treatment

4.5.3 Legislation

Important items of legislation for these sectors include the Environmental Permitting (England and Wales) Regulations 2010 (as amended), EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006 (as amended) and REACH Enforcement Regulations 2008, Control of Major Accident Hazards (COMAH) Regulations 1999 (as amended), Persistent Organic Pollutants Regulations 2007, the Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011, the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended), Climate Change Act 2008 (including the CRC Energy Efficiency Scheme), the EU Emissions Trading Directive 2003/87/EC, and the Waste (England and Wales) Regulations 2011 (as amended). The metal manufacturing sector is an energy-intensive industry and some operations

are subject to the Climate Change Levy (CCL) (Department of Energy and Climate Change, 2013a) (introduced by the Finance Act 2000). Businesses in energy-intensive industries may qualify for a discount in CCL payments if they are signatories of a Climate Change Agreement (CCA) (Department of Energy and Climate Change, 2013b). Umbrella Climate Change Agreements (CCAs) have been arranged for various parts of the metals sector including foundries, metal forming, metal packaging, non-ferrous metals, steel and surface engineering (Department of Energy and Climate Change, 2011).

The SEA told us that the most important items of legislation for the surface engineering sector are the Environmental Permitting Regulations, EU REACH Regulations, Control of Major Accident Hazards (COMAH), EU Regulation of Persistent Organic Pollutants, controls of ozone-depleting substances, control of substances hazardous to health, and measures under the Climate Change Act.

The NFA argued that the clarity of legislation could be improved so that businesses could understand immediately what they were required to do, but at the moment saw the need for guidance to interpret the meaning of legislation into plain English.

The NFA raised particular concerns about the increasing use of brownfield sites for residential development leading to conflict between new residents and existing businesses over local noise and air pollution. The NFA argued that recent cases of no-win-no-fee law firms taking businesses to court on behalf of local residents were undesirable, and that instead problems should be resolved in such a way that businesses would implement a managed improvement plan rather than risk being put out of business by punitive damages being awarded.

4.5.4 Guidance

Guidance on the applicable environmental regulation for the metals manufacturing sector is available to businesses through various websites including the sector specific regulation guidance pages on the Business Link web pages⁵, the Environment Agency and www.gov.uk. The Environment Agency currently provides

⁵ <http://www.businesslink.gov.uk> content has now moved to www.gov.uk

information specifically about non-ferrous metals and surface treatments (Environment Agency, 2013c).

The NFA noted that the EA website has improved and contains some very good guidance, but that it could still be difficult to find. They emphasised the importance of businesses keeping on top of regulatory obligations as they change (e.g. for COMAH) for which short simple accessible guidance is required. They highlighted guidance developed by the EA for its own officers to explain the meaning of regulatory 'legalese' in plain English, which they considered to be very good, and argued that this kind of information needs to be available for all regulations. The NFA highlighted the case of REACH data sheets which contain important information produced by manufacturers for the safe management of chemicals, but can be long (perhaps 100 pages would be typical for a plant handling 10 chemicals). They argued that this presents a significant challenge for the successful communication of risks to employees.

The SEA told us that for their surface engineering members, environmental obligations are often not very clear, and that in their view regulations have been designed for large multi-national businesses rather the SMEs that make up much of their membership. This reportedly leads to a great deal of frustration and uncertainty about what is required. While they thought that Netregs was helpful, they reported that typically their members do not use Government guidance material because it is too general and not targeted at their sector, and not specific enough for SMEs. Instead the SEA reported that members often rely on organisations like theirs, or the EEF, to make them aware of obligations.

The NFA reported that in some cases (e.g. with Defra) consultation about regulatory change has been very effective, ensuring that industry can genuinely affect the outcome, but in other cases the dialogue has been poor.

The NFA thought that a web-based tool that provided sector-specific information on environmental obligations would be ideal, and preferable to having to phone someone up. They also expressed concern at the idea of environmental guidance being absorbed into www.direct.gov.uk (now www.gov.uk) arguing that instead the EA should focus on improving the structure, access and content of their website.

4.5.5 Information obligations

Businesses have to report to multiple organisations and may be required to report information on emissions to air, water abstraction, discharge to water, waste transfer, dust and noise monitoring and breaches or non-compliances with permits. Businesses may also need to report on energy efficiency and greenhouse gas emissions for production plant.

The NFA commented that for a lot of processes businesses need to employ someone full time to keep on top of obligations and deal with the bureaucracy of providing information, and reported some duplication in reporting for energy use, raw materials use and waste production. The SEA told us that for their surface engineering members there is significant duplication in information reporting to Government, citing duplication between information required by the Environment Agency and DECC for energy consumption.

The NFA thought that reporting should be through an approach based on templates and electronic submission, while noting that auditing would be required to ensure it is correct. They also highlighted that reporting publically some environmental data (e.g. on carbon emissions) could expose commercially sensitive information leading to predatory pricing.

4.5.6 Compliance assurance

Non-ferrous metal and surface treatment businesses are inspected primarily by the Environment Agency or local authority environmental health officers for environmental issues, and potentially the HSE (e.g. for COMAH). Businesses can adopt the Environment Agency's MCERTS certification scheme for emissions measurement to give the EA confidence in the monitoring of emissions that they undertake (Environment Agency, 2013d).

The NFA reported very positive and constructive relationships with Defra officers and the EA sector lead. However, the NFA also reported very mixed feelings among members about inspectors at an operational level. Experienced expert inspectors are highly valued by members, but relationships with inexperienced inexpert inspectors could be quite negative. The NFA thought that the knowledge and expertise of inspectors could be improved through inspectors with different levels of expertise

visiting sites together, and through an exchange of staff between the regulator and industry (within a manageable time commitment). The NFA thought the best approach to compliance assurance would be based on requiring and auditing environmental management systems of regulated businesses. They thought that auditing could be undertaken by Government or private sector assurance organisations, but that Government must retain effective enforcement powers.

The SEA suggested that the Government should require that all businesses above a certain size become members of a trade association (as is reportedly the case in other European countries) which would allow the trade body to operate a compliance scheme, and enable the Government to obtain necessary performance information via the trade body.

4.6 Case study: Biofuels manufacturing for transport

4.6.1 Industry characteristics

Biofuel is a term used to describe liquid, solid or gaseous fuels produced from organic matter, which can be used for heating, energy generation and transportation. The three key types of biofuel used in transportation are biomethane, biodiesel and bioethanol. Biomethane is typically produced from purified gases from bacterial anaerobic digestion of waste materials (such as agricultural manure and slurry, food waste and sewage sludge) or non-waste feedstocks grown for the purpose (such as miscanthus or maize crops) (Environment Agency, 2013e). Biodiesel can be used as a substitute for diesel fuel in road vehicles, and can be produced using either chemical or physical processes from waste or virgin cooking oil (Environment Agency, 2013f). Bioethanol is produced from the fermentation of sugar or starchy crops, and can be used as a substitute for petrol in road transport vehicles (Environment Agency, 2013g). This case study focuses on environmental regulation relating to the manufacture of biofuels from feedstocks. Additional regulations apply to the growing of crops for biofuels which are not addressed here.

Biofuels have the potential to provide a renewable source of fuel while delivering a reduction in greenhouse gas emissions. There is a risk, however, that unregulated production may cause social and environmental damage and lead to a net increase in carbon emissions. This is particularly true if produced from cultivated feedstocks grown on land which previously held high carbon stocks such as forest or peatland. As well as this direct impact, there is also potential for indirect effects if competing land uses are displaced by biofuel production (Department for Transport, 2013a).

Biomethane can be produced from anaerobic digestion in small-scale systems (e.g. on farms, or by businesses with large amounts of food waste) and in large-scale systems (e.g. treating municipal food waste diverted from landfill, or manures and slurries from several farms) (Environment Agency, 2013e). Biodiesel can be produced on a small scale for personal use or for small businesses, up to large scale production in large chemical plants. There are approximately 75 permitted biodiesel installations across England, although many of these are not operational at present

due to economic conditions⁶. Bioethanol production is typically a large scale industrial process, currently undertaken at a small number of sites in the UK, although new sites are planned⁷.

4.6.2 Environmental regulatory framework

Potentially hazardous chemicals (e.g. methanol) are used in the manufacture of biofuels, which can cause significant air and water pollution and land contamination. Harmful by-products such as glycerol are also produced from some processes (Business Link, 2012a). Therefore, the main environmental objectives when manufacturing biofuels at any scale are centred around appropriate waste management and handling and storage of chemicals, solvents and oils so as to prevent pollution to air, land and water, and preventing the spread of disease if animal by-products are being used (Business Link, 2012b).

As outlined in Figure 4-4, businesses manufacturing transport biofuels interact with a wide range of Government bodies. The Environment Agency is responsible for regulating manufacturing processes through the Environmental Permitting Regulations. Other key regulators are the Health and Safety Executive (HSE), HM Revenue and Customs (HMRC) and the Animal Health and Veterinary Laboratories Agency (AHVLA) which address health and safety, collection of duties, and control of animal disease in the movement and use of animal by-products respectively.

The Renewable Transport Fuels Obligation (RTFO) Order which came into force in 2008 is the principal legislation in the UK specifically for the regulation of biofuels produced commercially for transport in the UK (Department for Transport, 2012). The RTFO obligates fossil fuel suppliers to produce evidence showing that a percentage of fuels for road transport supplied in the UK comes from sustainable renewable sources or that a substitute amount of money is paid. The RTFO Unit at the Department for Transport (DfT) issues certificates that permit the sale of verified renewable biofuels by fuel suppliers who supply at least 450,000 litres of fuel per year (Department for Transport, 2013a). Owners of biofuel at the duty point are awarded one Renewable Transport Fuel Certificate (RTFC) per litre of biofuel

⁶ As advised by Environment Agency

⁷ As advised by Environment Agency

(Department for Transport, 2013a). In December 2011, the RTFO Order was amended to implement the sustainability criteria of the Renewable Energy Directive (RED), the principal EU regulation on biofuels which commits Member States to a target whereby 10% of all land transport fuels should come from renewable sources by 2020. This introduced mandatory sustainability criteria which biofuels must meet for those fuels to be eligible for Renewable Transport Fuel Certificates including requirements to ensure that they deliver greenhouse gas savings, that the cultivation of their feedstocks did not damage areas of high carbon stocks or high biodiversity, and to encourage the use of waste materials (Department for Transport, 2013a). The amendment also introduced double rewards for some types of fuel, including fuels derived from waste materials like used cooking oil.

The Hydrocarbon Oils Duties Act 1979 requires oils duty be paid to Her Majesty's Revenue and Customs (HMRC) on motor and heating fuels produced, imported or used in the UK. The duty has historically been payable at varying rates dependent on the type of fuel favouring biofuel use, although from 1st April 2012 this no longer applies (H. M. Revenue and Customs, 2013).

The Renewable Energy Association (REA), the trade association we spoke to for this research, considered the policy framework to have a "massive" effect on the strategic decisions made by biofuel businesses that they represent. For example the overall policy objectives for increasing the use of biofuels by 2020 fundamentally influence their investment decisions, and without Renewable Transport Fuel Obligation (RTFO) mandate transport biofuel businesses cannot operate.

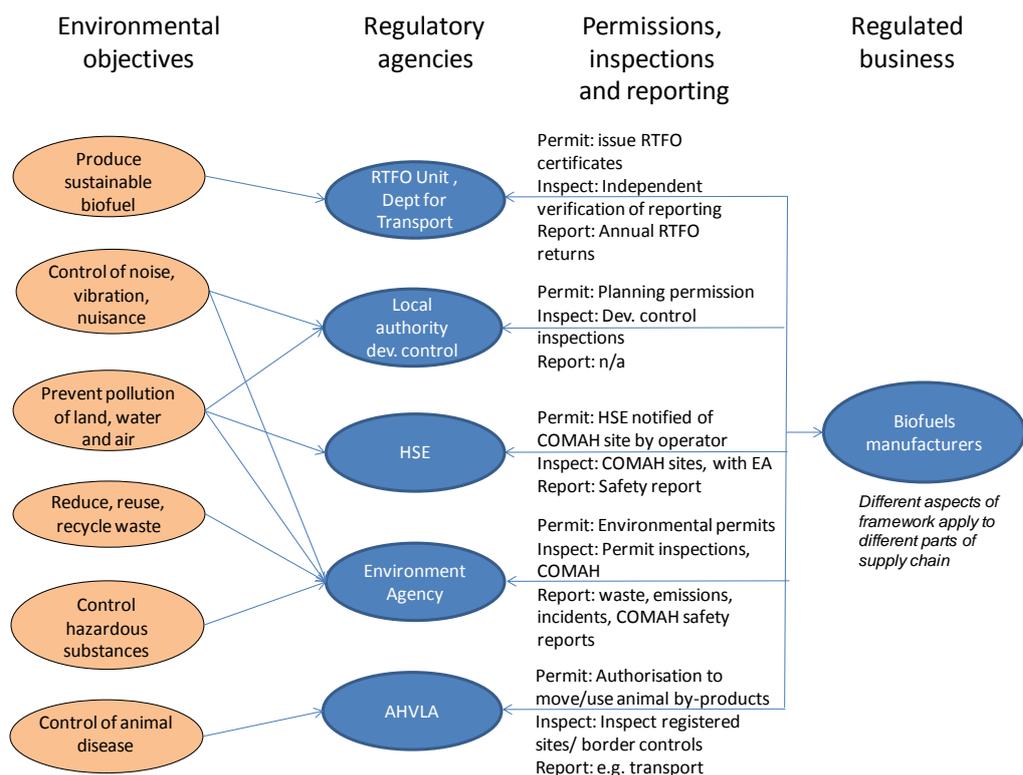


Figure 4-4: Summary of environmental regulatory framework for biofuels manufacturing

4.6.3 Legislation

Important items of legislation for production of biofuels include the Environmental Permitting (England and Wales) Regulations 2010 (as amended), the Waste (England and Wales) Regulations 2011 (as amended), the Control of Major Accident Hazards (COMAH) Regulations 1999 (as amended), the Control of Pollution (Oil Storage) Regulations 2001, the Renewable Transport Fuels Obligation (RTFO) Regulations 2007 (as amended), the Hydrocarbon Oils Duties Act 1979 and associated regulations, and the Animal by-Products (Enforcement) (England) Regulations 2011 (as amended).

The storage of waste and its recovery through anaerobic digestion to produce biomethane and digestate is regulated by the Environment Agency under the Environmental Permitting Regulations, depending on the scale of production and compliance with standards (Environment Agency, 2012b, 2013e; WRAP, 2009). Biodiesel production is also regulated by the Environment Agency under the Environmental Permitting Regulations, depending on the scale of operation. Small

scale production (below 5,000 litres p.a.) is exempt from regulation. Production of biodiesel for commercial purposes is a regulated chemical activity; small to medium sized operations may qualify for “low impact status”, reducing fees and charges, whereas large scale production may require a bespoke permit (Environment Agency, 2013h). The Biodiesel Quality Protocol developed by the Environment Agency and WRAP clarifies when quality biodiesel ceases to be waste and waste management controls are no longer required, provides users with confidence in the quality of biodiesel produced and sets standards and describes best practice for its use to protect human health and the environment (WRAP, 2009). Bioethanol producers must comply with the Pollution Prevention and Control (England and Wales) Regulations 2000 for chemical installations and obtain a permit under the Environmental Permitting Regulations from the Environment Agency (Environment Agency, 2013i).

The REA commented that the biofuels industry has been formed from agriculture and oil businesses, so people working in the sector have had to familiarise themselves with legislation designed for both sectors, which has been a steep learning curve and can create the perception of there being a significant amount of regulation.

4.6.4 Guidance

Guidance on the applicable environmental regulation for the biofuel manufacturing sector is available to businesses through various websites including the sector specific regulation guidance pages on the DfT (Department for Transport, 2012) and the Environment Agency (Environment Agency, 2013j) web pages. Business Link⁸ also includes information on best practice. There is also guidance documentation specifically on the RTFO available from the DfT (Department for Transport, 2013b) which also encourages stakeholder engagement for planning and implementation of the RTFO (Department for Transport, 2013c), which the trade association we spoke to thought was very positive. The HMRC website offers guidance on duty requirements (H. M. Revenue and Customs, 2013).

⁸ <http://www.businesslink.gov.uk> content has since been migrated to www.gov.uk

The REA commented that the RTFO guidance provided by DfT provides the starting point for members seeking to understand their obligations, and whilst “copious” it is clear once it has been read. Ensuring compliance with RTFO is typically a full time job for a person in a large or medium size business, but would probably be one among a number of responsibilities for a responsible person in a small business. Businesses reportedly use the trade association to gain clarification of their environmental obligations, as well as discussing issues among colleagues from other businesses.

4.6.5 Information obligations

Biofuels manufacturers have to report to a variety of agencies. They are required to report information on duty of care requirements with regard to any feedstock which may be classed as waste (including separate records for any animal by-products used), the volumes of fuel produced and records to demonstrate compliance with any environmental permits.

Duplication of reporting had not been raised as an issue with the REA. However, they raised concerns about the lack of public access to information contained in the RTFO returns, which have not been made public since December 2011. This information is very valuable to the sector to allow it to understand RTFO compliance, and whether it needs to take action to tackle any compliance problems that may be highlighted.

4.6.6 Compliance assurance

Biofuel manufacturers may be inspected by the Environment Agency and HSE acting together as the COMAH Competent Authority, the Environment Agency under the Environmental Permitting Regulations (depending on the scale of operations), HSE under the Health and Safety at Work Act and the AHVLA. HMRC excise officers monitor bioethanol plants to ensure appropriate duties are paid. Compliance with RTFO requirements can be assured through participation in existing environmental assurance schemes, such as Red Tractor, which the trade association we spoke to considered to be a good approach that avoids duplication of compliance requirements on businesses. RTFO returns must be independently verified.

The REA highlighted a case concerning waste cooking oil from UK registered tourist vessels where it had proved very difficult to establish which agency or Government body was responsible for the decision to ban its use for conversion into biodiesel, which had resulted in the closure of a biodiesel business. No agency seemed willing to take responsibility for the decisions, resulting in the trade association and the affected business being passed from one agency to the next, illustrating a lack of joined-up thinking across Government. To help address this problem, they thought that the Environment Agency should be more frequently involved in cross-Government discussions on biofuel regulation led by DfT.

4.7 Case study: Electronic product manufacturing

4.7.1 Industry characteristics

The design, manufacture, assembly, distribution and support of electronic products make a significant contribution to the UK economy. In use they enable numerous labour-saving devices and high-speed communications and information processing, and are fundamental to health, energy, defence, transport, entertainment and business technology, among many other applications. The value of the global electronics market is estimated to be \$2 trillion per year. Semiconductors account for \$275bn revenue worldwide, with growth predicted at 6% to 8% annually. Over 250,000 people in the UK are involved in the design, production and distribution of electronic products, employed by 11,000 companies. In the UK a large proportion of electronics employers are SMEs, with 91% of companies employing fewer than 50 people and only 2% employing 200 people or more (Skills Funding Agency, 2013).

4.7.2 Environmental Regulatory Framework

The key environmental obligations for the electronics industry relate to the efficient use of energy at a product and organisational level, prevention of emissions to land, water and air, the management of chemicals and hazardous materials, the improvement of product energy efficiency (and associated labelling) and the end of life treatment of waste electronic equipment. The same environmental regulations cover all electrical and electronic equipment (EEE) and related products, such as batteries, electric lighting, cables, computers and electrical appliances (Department for Business Innovation and Skills, 2013c). Manufacturing processes related to the

production of electronic equipment are primarily regulated under the Environmental Permitting Regulations.

Intellect UK, the trade association we spoke to for this research, considered environmental regulation to have quite a significant impact on decision making among members. Some members have found benefit in reducing waste, and others have identified opportunities for new business as a result of environmental legislation. Carbon policy was also highlighted as an important factor influencing business decisions, including through its effect on energy prices.

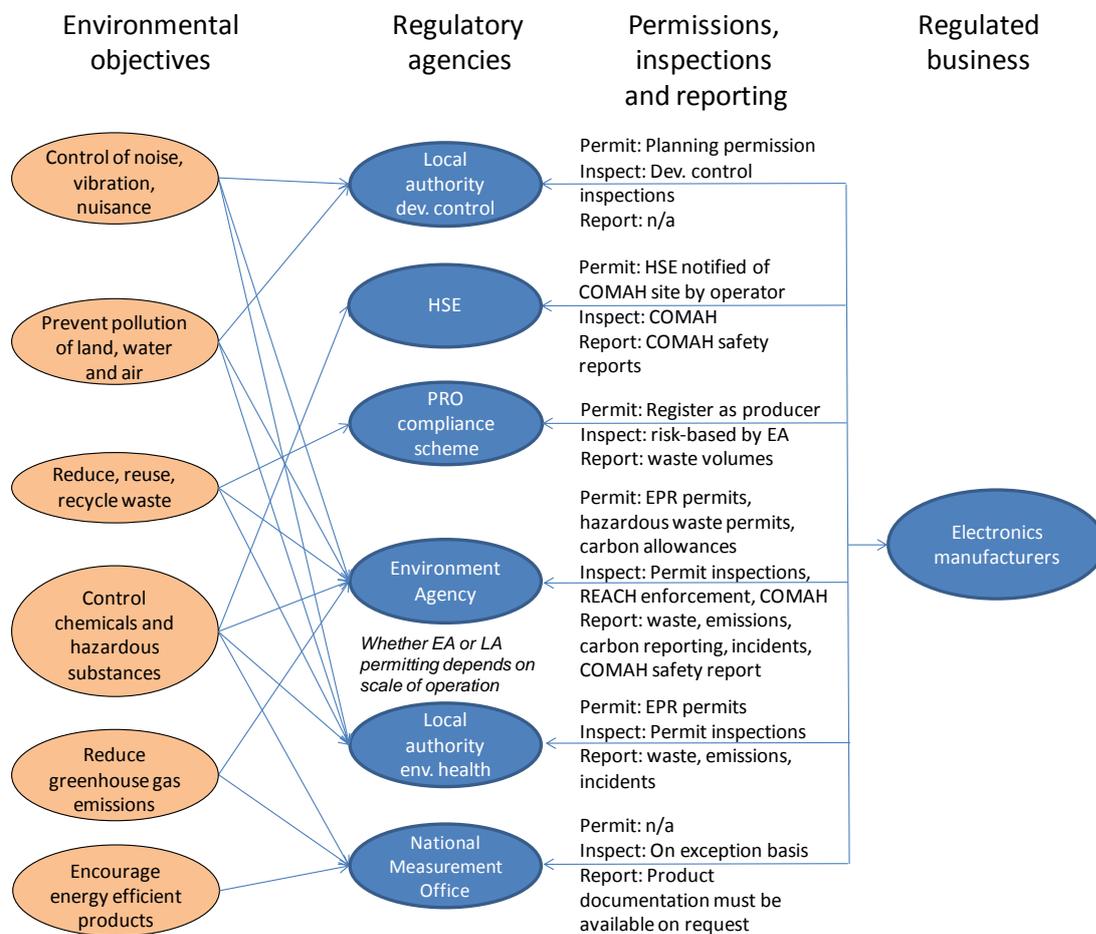


Figure 4-5: Summary of environmental regulatory framework for electronic product manufacturing

4.7.3 Legislation

Important pieces of legislation that apply to the sector include the Environmental Permitting Regulations (England and Wales) 2010 (as amended), the Waste Electrical and Electronic Equipment (WEEE) Regulations 2006 (as amended), the

Waste Batteries and Accumulators Regulations 2009, the Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (as amended), the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Regulations 2008 (as amended), Ecodesign for Energy-Related Products Regulations 2010 (as amended), EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006 (as amended) and REACH Enforcement Regulations 2008 and the Waste (England and Wales) Regulations 2011 (as amended).

Intellect UK also emphasised the importance of legislation targeting reduction of emissions of greenhouse gases, which they considered to also be part of “environmental regulation” from the perspective of their members. Intellect UK have identified approximately 220 items of legislation relevant to their members, and commented that it is complex to understand as members undertake a wide range of manufacturing processes. Overall, they thought it was very difficult to identify environmental obligations, and that regulations that might be considered “environmental” were often considered separately (e.g. waste, emissions and energy). They also commented that the system is complex for businesses that operate across borders of the UK devolved administrations.

They have found that typically environmental obligations are managed by their members alongside health and safety obligations. Larger organisations tend to have resources dedicated to understanding obligations and therefore know what they are, whereas smaller businesses may not have dedicated resource and may find out about obligations only when a compliance problem arises.

4.7.4 Guidance

Guidance on the applicable environmental regulation for the electronics manufacturing sector is available to businesses through various websites including the sector specific and general manufacturing regulation guidance pages on the Business Link website⁹ and the National Measurement Office website (Department for Business Innovation and Skills, 2013d). Defra and Environment Agency web

⁹ <http://www.businesslink.gov.uk> content has since been migrated to www.gov.uk

pages also provide guidance on relevant regulations but are not targeted specifically at the sector.

The influence of businesses on each other along supply chains was also thought to play a significant role in informing them of their obligations. Consultants are also used by some members, particularly on specialist subjects such as packaging waste obligations.

Intellect UK expected larger members to come directly to the trade association to keep up to date with changes to environmental obligations, and expected smaller businesses to use websites as their first source of information. The trade association itself tends to use the Defra website as it is focused on policy developments, using the Environment Agency less frequently as it is focused on compliance and enforcement. Navigating the Defra website was reportedly difficult, but content is generally clear and well structured once found. They thought the Carbon Reduction Commitment guidance was still too long and did not address some key issues for members. Overall the trade association found their experience of dealing with government varied significantly between departments and agencies, with some good and bad experiences, and said they found it difficult to know where to start when engaging with government.

They thought a single website tailored to the sector covering relevant regulations, upcoming consultations, and permits for businesses would be very useful, as would 1 page summaries that explained what legislation is coming in, what it is aimed at, what levels of funding are coming in and where they are coming from.

4.7.5 Information obligations

Each operator must sign up to WEEE and/or battery compliance schemes through which they are required to report on the amount of electronic equipment or batteries they place on the market. Operators also need to report the amount of packaging placed on the market via the National Waste Packaging Database. These regulations additionally place a requirement on the producer to pay for the recovery and recycling of products they place on the market. As a potential user of chemicals, the operator may also have REACH reporting requirements in the form of notifications.

An electronic manufacturer must retain a pack of technical documentation to prove they are conforming to the Ecodesign, RoHS, WEEE and batteries regulations which often require external sampling or testing. This documentation is not required for reporting to regulators but kept on site and must be available for inspection.

Intellect UK reported that members had found REACH registration problematic, and had also encountered intellectual property and awareness problems as this relatively new area of legislation had started to affect the sector. They also noted that the producer responsibility obligation regime was under review separately from this research, so opportunities for improvement in this area were not discussed in detail.

4.7.6 Compliance assurance

The industry is principally regulated by the Environment Agency and local authorities. The Environment Agency conducts a number of process installation audits and inspections using a risk based approach to assess compliance with environmental permit conditions. Local authorities perform similar roles for those facilities that have a less-significant impact. Desk-based audits are regularly carried out by the Environment Agency in relation to producer responsibility returns and risk based on-site visits may be required to justify quantities of WEEE/batteries/packaging placed on the market. The National Measurement Office requires that manufacturers hold documentation for Ecodesign (National Measurement Office, 2013a) and RoHS (National Measurement Office, 2013b) compliance, which must be produced on request.

Intellect UK reported that relations between their members and regulatory agencies were often not positive, although noted that it was rather like *“going to the dentist”*, that is necessary but not expected to be pleasant. They were unsure of the experience of smaller businesses as they are not well-represented among members. They thought that a combination of spot-checks, and use of self- and third-party certification should be used to assure environmental performance. They believe that communication is improving up and down supply chains and companies are seeking increasing levels of assurance. If an electronics company says its complying it is likely to be as the reputational and supply chain pressures are significant, although consumers (e.g. of TVs) are often more concerned about safety than environmental performance.

4.8 Conclusions

These high-level case studies illustrate a number of characteristics of regulatory frameworks in practice. It is apparent that for these sectors businesses typically are required to fulfil a large number of environmental regulatory obligations, originating from multiple laws and implemented through multiple government agencies. Understanding these obligations requires expertise and resources, which in large companies are likely to be found in specialist teams, though for smaller businesses may be concentrated in a few people alongside other responsibilities. Problems identified by respondents included those arising from incoherence in obligations and processes between regulatory regimes, lack of clarity in requirements and definitions, and difficulties in finding information about obligations through multiple government channels. While in some cases respondents found government officials easy to contact and helpful, others' experiences were less positive. Various proposals for improving regulatory frameworks were made, including to the design of statute (e.g. to clarify definitions and remove duplicative or conflicting provisions), to the responsibilities ascribed to implementing agencies (e.g. to unify inspection regimes, or to make greater use of 3rd party assurance schemes), and to the design of regulatory processes and information provision (e.g. improving the design of information provided through websites, consolidating reporting requirements, making data submission electronic).

5 CASE STUDY: INSTRUMENT SELECTION AT DEFRA

5.1 Introduction

This chapter presents a case study based on 28 semi-structured interviews with 33 Defra policy makers examining the choice of policy and regulatory instruments available for their use and the decision-making processes they adopt to choose between them, to meet Objective 3 of this research programme. This chapter was written for this PhD thesis by the author under normal PhD supervision conditions. It was published subsequently in *Science of the Total Environment* (Taylor et al., 2013), with supervisors acknowledged as co-authors.

5.2 Abstract

Better regulation seeks to extend existing policy and regulatory outcomes at less burden for the actors involved. No single intervention will deliver all environmental outcomes. There is a paucity of evidence on what works, why, when and with whom. We examine how a sample (n=33) of policy makers select policy and regulatory instruments, through a case study of the Department for Environment, Food and Rural Affairs (Defra), UK. Policy makers have a wide range of instruments at their disposal and are seeking ways to harness the influence of non-governmental resources to encourage good environmental behaviour. The relevance of each influence varies as risk and industry characteristics vary between policy areas. A recent typology of policy and regulatory instruments has been refined. Direct regulation is considered necessary in many areas, to reduce environmental risks with confidence and to tackle poor environmental performance. Co-regulatory approaches may provide important advantages to help accommodate uncertainty for emerging policy problems, providing a mechanism to develop trusted evidence and to refine objectives as problems are better understood.

5.3 Defra's role in environmental policy and regulation in the UK

Around the world policy makers, who design and implement policy and regulation, face the challenge of choosing among a range of policy and regulatory instruments to achieve their governments' environmental and economic objectives, pursuing "clean" or "dirty" development paths as their economies grow (Esty & Porter, 2005). The term "regulation" is used here in its broadest sense to include all forms of social

control, including those that harness wider social forces beyond government, including the influence of businesses and other actors in society (Gunningham & Sinclair, 1999). “Instrument” is used to refer to a component part that makes up regulation, such as licensing, taxes or public information campaigns. Instruments include traditional direct regulation typically based on licensing and inspection, economic instruments such as taxes and subsidies, approaches intended to change behaviour through better information provision, approaches negotiated between government and industry, relying on industry self-regulation, and seeking to increase knowledge and capacity. Variants exist within each of these broad categories (Table 5-1).

Table 5-1: Typology of policy and regulatory instruments (Taylor et al., 2012)

Type	Variant
Direct “command and control” regulation	Ambient pollution requirements
	Input restrictions and output quotas
	Non-transferable emissions licences
	Technology controls
	Zoning/ location controls
Economic instruments	Taxes and subsidies
	Tradable rights
	Payments
Information based instruments	Targeted information provision
	Naming and shaming/faming
	Registration, labelling and certification
Co-regulation and self-regulation	Voluntary regulation
	Covenants and negotiated agreements
	Private corporate regulation
	Private professional regulation
	Self-regulation
	Civic regulation
Support mechanisms and capacity building	Research and knowledge generation
	Demonstration projects and knowledge diffusion
	Network building and joint problem solving

Direct (“command and control”) regulation has been associated with significant improvements in environmental conditions in industrialised nations. However, concern that direct regulation may inhibit innovation and international competitiveness has led governments to seek alternative approaches to achieving

environmental objectives (see, e.g. UK Department for Business Innovation and Skills, 2013d). Governments have sought to improve the implementation of regulation using a risk-based approach, targeting regulatory effort towards the greatest risks (e.g. Gouldson et al., 2009; Pollard et al., 2008, 2004; Hampton, 2005). Commentators have also observed a shift from “government” to “governance” as governments seek to harness the influence of wider social forces to influence the behaviour of individuals and businesses (Gouldson, 2008; Jordan et al., 2005) by sharing responsibilities for managing public risk and associated costs. In practice, instruments rarely operate in isolation; instead forming a complementary mix that influences behaviour through different levers across multiple actors.

In Europe, the European Commission has a long-established programme for regulatory reform across member states and in recent years has sought to further the ambitions of the “better regulation” agenda towards “smart regulation” (European Commission, 2010). The Organisation for Economic Co-operation and Development (OECD) similarly has promoted regulatory reform across its members (OECD, 2008). Emerging economies experiencing rapid industrialisation and economic growth are also tackling the challenge of designing effective regulatory frameworks to deliver sustainable development. For example, China has recently announced its Plan for Energy Conservation and Emission Reduction for the 12th Five-Year Plan Period (Ministry of Environmental Protection People’s Republic of China, 2012), which includes strengthened pollution controls and reduction targets for specific sectors, as well as the promotion of environmental management labels for vehicles.

In England, the Department for Environment, Food and Rural Affairs (Defra) develops environmental policy and regulation across multiple policy domains. Regulation is implemented by a network of regulatory agencies including the Environment Agency (EA) and regulators in local government. Programmes of work that drive regulatory reform have been pursued by successive United Kingdom of Great Britain and Northern Ireland (UK) governments over recent decades. The current “Red Tape Challenge” (Cabinet Office, 2013a) seeks to reduce regulatory burdens through a process in which policy makers, politicians and the public scrutinise existing legislation to identify “*what should be scrapped, what should be saved and what should be simplified*”. Simultaneously, the UK government is aiming to reduce government spending while devolving more decision-making to a local

level, including through voluntary civic action (Department for Communities and Local Government, 2011).

Policy makers and regulators face the challenge of selecting suitable instruments to encourage green growth, reduce regulatory burdens, support wider government fiscal and social objectives, and maintain or improve environmental quality. However, they are hampered in their pursuit of “evidence based policy” (Solesbury, 2001) by a lack of evidence on which policy and regulatory instruments work, why, when and with whom (Taylor et al., 2012). Our research seeks to help address this gap by answering the following research questions for a sample of policymaking practitioners: (i) What types of policy and regulatory instrument can policy makers choose between?; (ii) Which factors influence the effectiveness of these instruments in practice?; (iii) How do policy makers select instruments to deliver better policy and regulation?; (iv) What does this imply for the skills and tools required by policy makers?

Answers to these questions are likely to set a richer context for the Red Tape Challenge programme for environmental policy and regulation and inform a route map by which a revised mix of interventions, of lower burden, can be designed and defended.

5.4 Method

5.4.1 Rationale

The research used a case study approach (Summerill et al., 2010; Yin, 2009) using semi-structured interviews with policy makers to gather qualitative data. This interview approach allows open discussions to reveal nuances of policymaking practice without straying too far from the research objectives. Cycles of coding were used to elicit results from these data.

5.4.2 Selection of interviewees

The case of a single government department (Defra) was studied. Defra has primary responsibility for English environmental policy development across a wide range of policy domains, and may be considered a critical case (Yin, 2009) for testing theories of environmental policy practice. Interviewees (Table 5-2) were senior policy makers selected to provide insight into the practices within their policy domain. It should be

noted that policy makers in UK government often circulate between policy domains during their career, so some interviewees drew on wider experience. In line with Yin's (2009) rationale for single case study research, the aim was not for statistical generalisation, rather, to determine whether established theory provides correct propositions for this critical case, or whether alternative explanations are more relevant, challenging or extending theory.

Table 5-2: 33 policymakers were interviewed in 28 interviews across a range of policy domains

Policy domain	Number of interviewees
Exotic animal disease control	1
Climate change adaptation planning	1
Sustainable Consumption and Production	2
Local environmental control	2
Farming Regulation Task Force	2
Biodiversity	1
Food	2
Marine strategy	1
Common fisheries policy	1
Peat and Soils	1
Contaminated Land	1
Food and Environment Research Agency (FERA)	1
Noise	1
Chemicals	3
Marine licensing	1
Livestock and livestock products	1
Cross-cutting	1
Water in the environment	1
Water quality	1
EU negotiation coordination	1
Landscape and forestry	1
Crops and Agricultural Products	1
Flood risk management	2
Animal welfare	1
Waste management	2

5.4.3 Collection of data

Semi-structured interviews (33 individuals in 28 meetings) were conducted to collect narrative during September and October 2011, and lasted between 30 minutes and 1 hour. Interviews were conducted using open-ended questions, structured around

research questions examining the range of policy and regulatory interventions available to policy makers, their experience of effective and ineffective policy and regulation in practice, and the factors influencing instrument selection and effectiveness. Prior to each interview, interviewees were provided with a briefing note explaining the purpose of the research and assuring their anonymity, listing the questions to be addressed during the discussion and presenting a typology of policy and regulatory instruments established through a prior literature review (Taylor et al., 2012; summarised in Table 5-1). Interviews were recorded with permission using a digital voice recorder and transcribed verbatim. Relevant documentation concerning the policy and regulation within policy areas was obtained, and was supplemented with direct observation, conversation and collection of field notes.

5.4.4 Data analysis

Data analysis was performed through a systematic process of coding, annotation and memoing using NVIVO 9™ Computer Assisted Qualitative Data Analysis Software (CAQDAS) (Bazeley, 2007; Miles & Huberman, 1994). A stepwise approach (Figure 5-1) was used for coding narrative data to identify descriptions of characteristics of or interactions between actors (e.g. policy makers, regulators, businesses) that affect instrument selection or effectiveness, and recurring concepts (e.g. cost, fairness, risk) used to explain the choice of policy instruments.

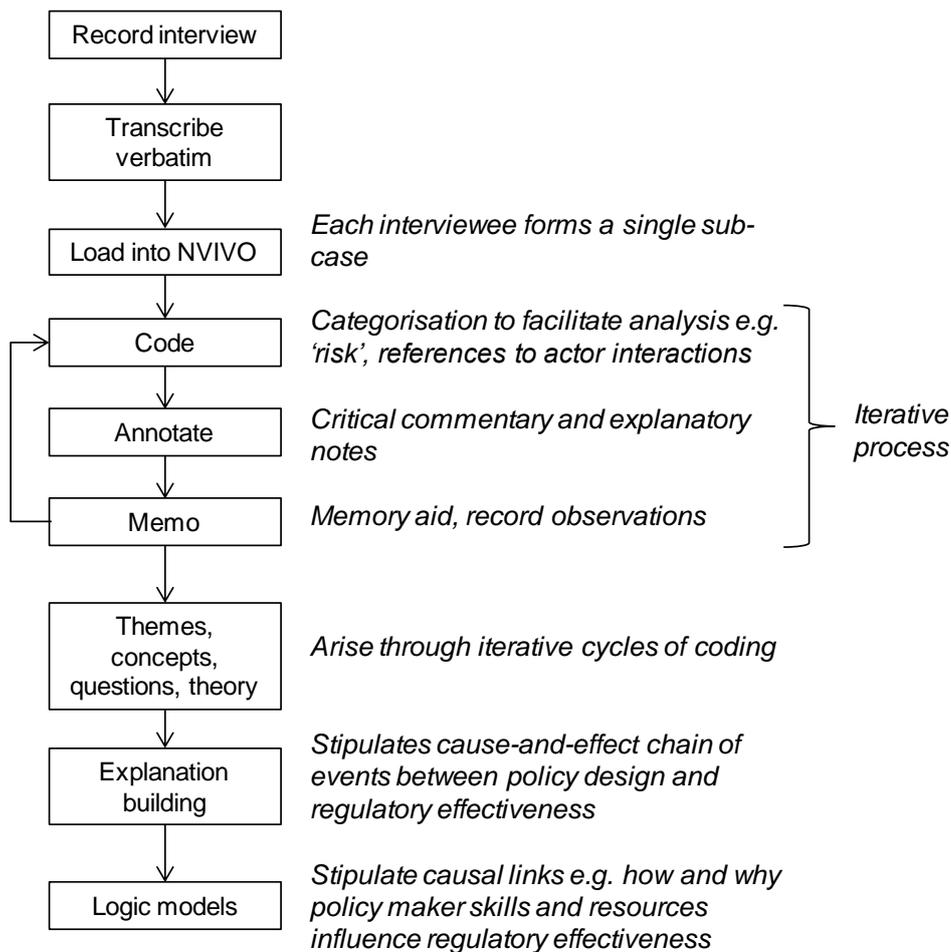


Figure 5-1: Analysis approach, after Summerill et al. (2010)

This coding approach was used to ensure that a representative range of interactions and explanatory concepts referred to by interviewees was captured, providing a well-grounded data set to inform inductive theory development. The coding was then reduced to a set of explanatory themes. The development of these themes reflects the “theoretical sensitivity” (Kelle, 2005) of the researchers, informed by a literature review undertaken prior to the interviews (Taylor et al., 2012). Comparison between the themes identified through the literature review and the themes reduced from the interview data have been used to corroborate the relevance of existing theory to the interviewee’s explanations of policy and regulatory instrument selection in practice. The results of this analysis are reflected in the text.

5.5 Results and discussion

Table 5-3 summarises respondents’ opinions on the range of policy and regulatory instruments they can choose from, with reference to the typology of instruments

provided during the interviews. Table 5-4 lists factors identified by policy makers that influence the effectiveness of instruments and how many respondents discussed them, and summarises the benefits and limitations of these factors. Figure 5-2 illustrates the actors and interactions policy makers consider during instrument selection. Table 5-5 lists other factors affecting the choice of instruments, the number of respondents who discussed them, and summarises respondents' views on these factors.

5.6 Typology of instruments available to policy makers

Interviewees were asked to comment on the typology of instruments provided at Table 5-6 (including revisions applied following interviews). In general, policy makers felt the typology provided an accurate summary of the range of interventions available, and were able to identify examples of different variants used in practice by reference to it (Table 5-3).

Table 5-3: Summary of respondent opinions on instrument typology

Number of interviewees	Summary of opinions	Detailed comments and illustrative quotes
14	Considered typology to be representative of options available to policymakers, or raised no objections	<i>"I think you look like you've covered, yes, all the different categories in quite a useful way"</i> <i>"I'm sure some of them would probably span more than one category but I imagine that they're fairly comprehensive one way or another"</i>
15	Provided proposals for refinements	Include "codes of practice" (3) Include "insurance" (3) Include "do nothing" (1) Other clarifications (10)
3	No comment	One person in group responded on behalf of others present
1	Questioned logic of existing structure	Thought the categorisation and naming of instruments should be further refined. Highlighted the example of "voluntary regulation", which is a term generally used to describe an overall regulatory strategy rather than to specify a type of instrument (like "taxes and subsidies" or "technology controls") as it has been used in the typology.

Several respondents commented that the typology would be a useful prompt for policy makers considering options for regulatory reform. One respondent was concerned that if the typology was used as an instrument selection check-list by

policy makers, it could constrain their creativity and openness to new ideas. It was also clear from the discussion that the presentation of instruments in a list fails to communicate the reality of instruments working in an interrelated mix.

The policy areas covered during interviews were primarily concerned with the management of risks to the environment (e.g. biodiversity loss, unsustainable consumption of natural resources) and risks to humans arising from environmental conditions (e.g. flood damage, losses from animal disease, health risks arising from pollution). Defra also has responsibility for the regulation of economic performance of some sectors (e.g. the water industry), but economic regulation was rarely discussed. In one case the interviewee felt the typology was not very relevant for their policy area because it concerned environmental rather than economic regulation.

The typology of instruments, including recommended amendments (highlighted in Table 5-6), may be considered to be a useful *aide-mémoire* for discussions about regulatory reform for environmental risks, and a workable structure for organising evidence about regulatory practice. However, it was also apparent the process of instrument selection in practice is not formalised, and is complex and nuanced. Analysis of discussions revealed a range of considerations that policy makers take into account when developing or changing environmental policy, including:

- the suitability of instruments to tackle different types of market failures and to manage public risks;
- the extent to which instruments harness the influence of industry, civil society and government actors to maximise their impact;
- the design of instruments to provide necessary degrees of flexibility and to reinforce each other in the overall policy mix;
- the alignment of instruments with wider social and political requirements.

Respondents also commented on the evidence and skills required for effective policymaking. These findings are discussed in detail below.

5.7 Selecting instruments to tackle market failures and manage public risks

5.7.1 Use of economic concepts (e.g. market failure) to explain instrument selection

When discussing reasons for choosing particular instruments, 12 respondents explicitly referred to economic concepts (public goods, information failures, market failures, externalities, property rights, polluter pays principle) as reasons for public intervention, or reasons why a particular instrument had been selected. These economic concepts were used in discussion about sustainable consumption and production, noise, waste management and food and agriculture.

Under UK government guidance, government intervention may be justified to tackle market failures, government failures, or to manage public risks (H. M. Treasury, 2003). Experience suggests that different instruments are appropriate for different forms of market failure (Perman et al., 2003). For example, market failures due to asymmetries of information may be tackled through interventions that improve the availability of information, such as mandatory business performance reporting through company accounts, or labelling schemes to improve information available to consumers. These results indicate that models of instrument performance from the environmental economics literature (e.g. Perman et al., 2003) form part of policy makers' conceptualization of policy problems and rationale for instrument selection.

5.7.2 Use of risk concepts to explain instrument selection

23 of 33 interviewees discussed risk concepts extensively when discussing the selection of appropriate instruments, notably in the context of contaminated land, soil erosion, animal and plant disease control, climate change adaptation planning, chemicals regulation, flood risk management, reservoir safety and investment in infrastructure. Risk characteristics raised that reportedly influence the choice of instruments are summarised below (parenthesised numbers throughout indicate the number of respondents who commented on a theme).

Spatial characteristics (13): risks that vary spatially were argued to require approaches that include local assessment of risks (e.g. flooding, land contamination, diffuse pollution, biodiversity, chlorofluorocarbons (CFCs), river pollution), and may

require national coordination or international agreements where impacts cross administrative boundaries;

Impact and likelihood of risk (13): higher impact risks were argued to require more certain regulatory measures to control them, normally assumed to be achieved through direct regulation (e.g. reservoir safety, chemicals, pesticides, air pollution, drinking water quality, release of invasive species);

Who is affected by risk (6): where the impact of a risk is constrained to the person or business causing the risk, it was generally argued that government need not intervene. However, where risks caused by one party impose impacts on others (e.g. the introduction of animal or plant disease) or where risks to society remain unmanaged (e.g. risks arising from climate change not managed by private sector organisations) it was argued that government intervention may be justified.

Number and variety of actors and mitigation actions (3): for problems involving multiple actors and risk mitigation actions (e.g. soil management, climate change adaptation planning, diffuse pollution) more complex regulatory approaches using a range of interventions targeted at different actors was reported to often be necessary;

Understanding of risk (6): risks that are not well understood (e.g. with respect to their sources in the case of diffuse pollution, with respect to impact in the case of land contamination and nanotechnology) may require different regulatory approaches compared to well understood risks. Interviewees discussed adopting a “precautionary approach” or seeking to establish a better evidence base before direct regulation is adopted as potential strategies to deal with a lack of knowledge about risks.

Persistence and irreversibility (3): some environmental risks may have impacts that persist in the environment for many years, or are irreversible (e.g. some chemicals, invasive species), in which case stronger controls to reduce residual risk were reported to be appropriate;

Speed of action required (3): where rapid government action is required to control the spread of animal disease after an outbreak, direct regulation was argued to be required, alongside planning and skills development to improve emergency

response. Flood management also requires measures (e.g. emergency planning, flood alerts) to enable a rapid response.

An extensive literature exists on the relationship between characteristics of risks and the forms of regulation that are appropriate to manage them (e.g. Pollard et al., 2004). In concert, these results indicate that theories and concepts emerging from both economics (e.g. Perman et al., 2003) and risk analysis (e.g. Kaplan, 1997; Short, 1984) are used by policy makers at Defra to conceptualize explanations for instrument selection, but to varying degrees by different interviewees. This could indicate, among other things, that economic and risk management theory are of varying relevance in different policy domains, or that expertise in risk analysis and economics is not spread evenly among policy makers, or reflect a deliberate avoidance of technical terminology to aid communication clarity.

5.8 Harnessing the influence of industry, civil society and government

Interviewees described a wide range of actors, characteristics of actors, and influences between actors that influence the effectiveness of instruments in practice. Table 5-4 shows the number of interviewees who discussed particular actor characteristics or interactions and provides a summary of how these factors reportedly affect the effectiveness of environmental policy and regulation.

Table 5-4: Summary analysis of impact of factors influencing achievement of environmental policy and regulatory objectives

Factor influencing effectiveness (number of interviewees referring to factor)	Potential benefits to achieving environmental objectives from policymaker perspective	Potential limitations to achieving environmental objectives from policymaker perspective
Industry motivations and attitudes towards compliance (28)	Leading businesses may pursue positive environmental behaviour independently, e.g. in pursuit of corporate social responsibility objectives.	Policy objectives may conflict with business objectives, undermining regulatory effectiveness. Deliberate non-compliance undermines regulatory effectiveness.
Individual motivations, capabilities and attitudes towards compliance (26)	Pro-environmental attitudes of public may influence other actors.	Direct regulation often infeasible as not possible to enforce. Bounded rationality may inhibit behaviour change; “behavioural interventions” may be required.
Influence of conditions along supply chains (23)	Can extend policy influence beyond national boundaries. Powerful influence in some sectors (e.g. food retail, government procurement).	Businesses unlikely to enforce standards to extent of limiting supply. Higher procurement standards may be expensive for government.
Regulator capability (23)	Can prove more credible than central government in providing advice and guidance to influence behaviour change. Can provide expertise to address localised problems.	Lack of capability or resources directly limits effectiveness.
Industry capability (20)	Greater capability may reduce need for government intervention.	Lack of capability reduces regulatory effectiveness.
Strength of public buying decisions and other public influences (19)	Considered very powerful in some sectors where public concern is high, and retailers compete on basis of environmental claims (e.g. food).	Sensitive to loss of trust in environmental claims or low levels of public concern. Consumers may become confused as environmental claims proliferate.

Factor influencing effectiveness (number of interviewees referring to factor)	Potential benefits to achieving environmental objectives from policymaker perspective	Potential limitations to achieving environmental objectives from policymaker perspective
Regulatory threats, of harder regulatory regime or enforcement action (14)	Can motivate action to avoid harder regulation, or to avoid punishment.	Impact may be undermined by lack of political will to regulate. Credibility and therefore impact may be undermined by lack of enforcement resources. Measures may not bring about behaviour change despite being easy to inspect and enforce (e.g. "tick box" exercises).
Industry capacity to self-regulate (10)	Self-regulation may reduce the need for government involvement.	Self-regulation may not be viable in large diverse industries.
Scrutiny of business environmental performance by NGOs and media (7)	Can publicise successes and failures. Can have stronger influence than government in some policy domains.	May lack focus on lower-profile policy objectives. Objectives or activities may conflict with government objectives.
Investor and insurer influence on businesses (7)	Can act directly on business financial drivers.	External investor influence not relevant for privately owned businesses. Investor risk perceptions may lead to lack of investment. Insurer risk perceptions may lead to lack of private insurance provision.
Politicians extolling better environmental performance (5)	Can catalyse action. Can publicise positive initiatives.	May misdirect effort.

Commentators argue that modern environmental regulation has been characterised by a shift from government (the State) to governance (formalised management, irrespective of actor), with policy makers increasingly seeking to harness the influence of non-governmental actors to strengthen the effectiveness of interventions (see, e.g. Lange & Gouldson, 2010; Jordan et al., 2005; Gunningham, 2009). It is clear from these results that policy makers believe the effectiveness of policy and regulation is affected by a wide range of social and political forces as summarised in Figure 5-2. The extent to which these factors are relevant varies between policy domains. For example, UK supermarkets driven by consumer preferences are considered powerful influencers of environmental behaviour in their supply chains. However, in other domains (e.g. local pollution control) consumer choice appears less relevant, where instead direct regulatory intervention and co-regulation feature more prominently.

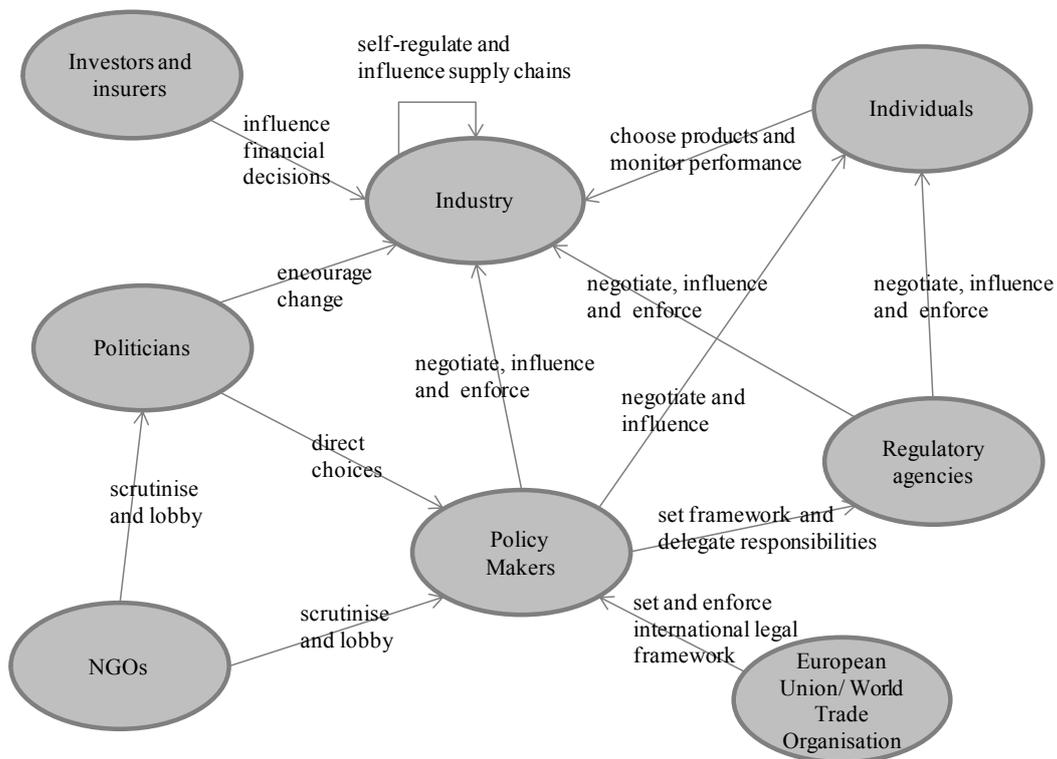


Figure 5-2: Actors and interactions policy makers consider during instrument selection

5.9 Design objectives for policy and regulatory frameworks

5.9.1 Coherent mix of instruments

27 respondents discussed the interaction between instruments in a “mix” as being an important factor in their selection and effectiveness in practice.

Instruments work in a complementary mix (14): respondents highlighted various examples of mixes in action. For example, the regulation of grass-burning uses direct regulation combined with a voluntary code; the Landfill Tax has worked in conjunction with the Landfill Allowance Trading Scheme (LATS; now discontinued) and infrastructure investment subsidies to improve waste management; and various instruments are used to reduce flood risk including development control and public awareness building.

Instruments interfere with each other (6): in some policy areas (e.g. fisheries policy and agriculture) respondents explained that existing regulatory frameworks needed to be simplified, to make them simpler and easier for regulatees to understand.

Instruments enable other instruments (7): cases of individual instruments enhancing the impact of existing instruments included introducing recognised standards in carbon footprinting and sustainable production, which could then be used to enable further measures such as procurement standards or differential taxation.

Instruments preclude other instruments (4): in other cases the existing regulatory framework can prevent the addition of new instruments, for example if existing direct regulation prevents additional direct regulation, or the scope for additional tax measures may be constrained by the existing tax system.

Policy makers need to work to coordinate design (12): Defra policies interact with other departments’ policies, for example with the Department for Communities and Local Government (CLG) and Department of Energy and Climate Change (DECC) on standards for domestic boilers, or with CLG for planning policy that can affect future incidents of noise and nuisance (a Defra

responsibility). While some coordinated policy was thought to have worked well, it remains a challenge in other areas.

Regulators need to work together to coordinate implementation (2): coordination is also required at the level of regulatory interventions. For example, the Environment Agency is a statutory consultee for planning applications managed by local authorities to assess flood risk impacts. Better coordination of inspections for farmers is an objective that has arisen from the Farming Regulation Task Force.

While early commentators tended to focus on the relative merits of individual instruments to tackle environmental problems, in recent years attention has turned to the design of complementary instrument mixes (Howlett & Rayner, 2007). The need for such mixes is widely recognised among the policy makers interviewed here. While the Tinbergen Rule would suggest that one instrument is needed for each policy target (Braathen, 2007), policy makers did not explicitly refer to the application of this rule in policy design. Policy makers report some successes in working together to coordinate the design of mixes across policy areas and departments, but for more complex policy areas understanding the existing mix in full remains a significant challenge.

5.9.2 Flexibility

21 respondents discussed ways in which instruments need to exhibit flexibility to remain effective as environmental and economic conditions vary spatially and temporally, and discussed ways in which this flexibility can be accommodated in design.

Incorporating flexibility to industry characteristics (7): respondents referred to the need to vary rules according to different industry characteristics. For example, the local pollution control regime has guidance for 80 different sectors. The use of licensing based on Best Available Techniques allows regulators to be flexible to specific business circumstances.

Incorporating flexibility to environmental variation (4): interviewees identified examples where local environmental conditions vary, for example in

fisheries, in land contamination, or in countryside biodiversity. As local environmental conditions vary, appropriate regulatory interventions also need to be varied.

Reducing regulation according to risk of business (6): at present, the Environment Agency can vary inspection charges and frequency depending on their assessment of the environmental risks posed by specific businesses. A similar approach described as “earned recognition” is under consideration in farming, reducing government regulation if other inspection regimes are in place (e.g. under supermarket animal welfare schemes).

Using case law to refine regulation (2): One respondent described how in animal welfare, case law has been used to define acceptable treatment of animals, rather than attempting to define rules to cover all cases in statute which would have proved infeasible. In contrast, another respondent described the case of contaminated land, where case law has not proved an effective route to clarify legislation. In this case, UK legislation sets a test of “significant possibility of significant harm” to identify when land should be considered contaminated, and provides for statutory guidance to explain what this means. However, before 2012 statutory guidance did not provide this clarification, leaving regulators, businesses and other stakeholders uncertain over the definition and therefore the need for action. No cases went to court to provide case law to clarify the definition, partly reflecting fear among stakeholders of the implications of a single case decision for the management of other potentially contaminated sites. A clarification of statutory guidance by government has instead been necessary, giving greater legal certainty and creating conditions that might enable case law to further refine the test in future.

Modifying policy and regulation over time - flexibility vs certainty (11): policy makers discussed how policy can be changed over time as conditions change. In the case of the Courtauld Commitment, the flexibility afforded by this co-regulatory approach was seen by two respondents as advantageous, allowing objectives to change as government and industry understanding of environmental impacts improved. However, clear unchanging regulation was

also reportedly advantageous, allowing businesses to make long term investment decisions. One respondent considered the Landfill Tax to have worked well because it provides long term certainty on the increasing cost of landfill. Balancing flexibility with clear long term signals is a challenge for policy makers. As one respondent put it:

"And it's that balance....there was a report from the Advisory Committee on Business and the Environment in the late 90s and that said businesses want both certainty and flexibility. I quote that back at business from time to time and they say yes that's right. One minute they'll be asking for one and the next they'll be asking for the other."

These results indicate that accommodating flexibility while providing clarity and certainty for businesses is a significant challenge for Defra policy makers. Some considered the flexibility afforded by co-regulation to be a significant advantage of this approach. Extending the use of "earned recognition" is an active area of policy development, particularly in farming.

5.10 Social, legal and political preferences and constraints affecting instrument selection

In addition to the factors affecting effectiveness and instrument design considerations highlighted above, respondents discussed a range of other considerations that influence the choice of instruments. The frequency of these factors being raised is described in Table 5-5. A lower number of coding occurrences cannot be interpreted as reflecting a lower level of importance being placed on that factor by Defra corporately. For example, the relatively low frequency of explicit discussions of "ethics" does not indicate a low level of concern about ethics at Defra; only that ethical considerations were explicitly prioritised in discussion in a relatively small number of policy contexts.

Table 5-5: Summary analysis of other factors affecting choice of instruments

Other factors affecting choice of instruments	Summary of respondent views
Cost (31)	Achieving cost-effective regulation was a central theme in all discussions. Benefit-risk trade-offs were discussed in regulation of contaminated land, soil erosion, animal and plant disease control, climate change mitigation planning, chemicals, flood risk management, reservoir safety and investment in infrastructure (e.g. for recycling). Benefit-cost tradeoffs were discussed in regulation of catchment sensitive farming, animal welfare, payments for ecosystems services (e.g. water companies paying land owners to prevent water pollution and agri-environment schemes), footpaths, forestry management, energy efficient products, waste reduction and resource efficient production.
European Union (EU) and World Trade Organisation (WTO) compliance (27)	The EU, and to a lesser extent the WTO, play a significant role in the choices made by policymakers in the UK, and policy makers, Non-Governmental Organisations (NGOs) and industry seek to influence policymaking at the EU level. While many policymakers feel constrained by the existing stock of EU regulations, others identified scope for flexibility in how EU rules are implemented nationally and believed that future EU policy design would make more use of approaches not solely based on direct regulation.
Industry and public preferences (19)	Views of industry and public reportedly influence the choice of regulatory approach through both direct formal engagement channels (e.g industry advisory panels, statutory consultation processes), and indirectly through political influence (at a local, national and international level).
Political preferences (17)	Politicians reportedly play an active role in policymaking, often working directly with policymakers. The current government's preference for non-regulatory policy approaches featured in narratives of approximately one third of policy makers interviewed.
Fairness (12)	Interviewees raised fairness as an important characteristic of environmental policy or policymaking, primarily because regulations that are considered unfair are less likely to be accepted by stakeholders, who will make demands for change. Regulated industries reportedly value a "level playing field", where businesses that comply with standards are not placed at a disadvantage by non-compliant businesses.
Impact on innovation (5)	One respondent emphasised that the use of Best Available Technique requirements in licensing should not limit innovation. Instead regulators should be flexible in licensing to ensure the intended environmental outcomes are achieved, whilst allowing the use of innovative technologies. Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) regulation includes stimulating innovation within the EU chemicals industry as one of its three objectives.

Other factors affecting choice of instruments	Summary of respondent views
Ethics (3)	One respondent argued that some supermarkets have identified that their customers want them to behave ethically, and that they therefore offer Fairtrade products. One believed that water companies had pursued ecosystem-based approaches to improving water quality for both cost and ethical/ corporate social responsibility reasons. In the case of animal welfare, ethical considerations were considered to be central to how government policy has been designed and implemented; thinking has moved on from treating animals as property to treating animals as sentient beings.

In addition to its effectiveness in achieving environmental objectives, environmental policy and regulation will also be assessed in terms of its economic/financial and social impacts (Department for Business Innovation and Skills, 2011), and these considerations were reflected in policy makers' narratives. Given the strong emphasis placed by commentators on the importance of technological innovation to address social and environmental challenges and the potentially deleterious effect of direct regulation on innovation (e.g. Gunningham & Sinclair, 1999), it is perhaps surprising that innovation was not discussed more frequently by policy makers. However, technology innovation is perhaps less relevant in some Defra policy areas than it is in the areas where it was mentioned, notably those concerned with production and use of technology such as REACH and pollution control.

5.11 Impact of the state of knowledge upon instrument selection

27 respondents referred to the role that evidence (or the lack of evidence) plays in instrument selection and the strategies adopted to enable effective policy and regulation under conditions of uncertainty.

Research and policy evaluation (23): many policy areas identified government research as an important mechanism for increasing society's capacity to understand and manage environmental risks. Some policy makers expressed confidence in the quality of evaluation evidence available for regulation in their policy areas, whereas others found evidence to be lacking.

For some, policies had not been in place long enough to show their impact. In others, measurement of impact was considered to be very challenging.

Evidence may be contested (7): interviewees noted cases where evidence of harm may be contested, which can reduce regulatee's willingness to comply with regulation based on the evidence.

Strategies for dealing with uncertainty - gradual policy development (7): interviewees discussed how the impetus for government action on some issues gradually increases over time, so the initial government response to an emerging issue may be limited to seeking further information or producing a position statement. For example, one respondent highlighted the gradual hardening of smoking regulation over time as public attitudes and evidence have evolved. Another characterised the development of global cooperation on illegal fishing as follows: *"...my experience of that was that you get like a zeitgeist effect. You know government is doing something on illegal fishing, Sainsburys and Marks and Spencers and Waitrose get interested...someone on TV...internationally...an NGO does it; and we all feed each other so you get that movement together...is it business already doing it or is it government? Probably in the real world these things feed off each other"*

Strategies for dealing with uncertainty - adopting a precautionary approach (4): respondents described the regulation of nanomaterials, aspects of chemical regulation under REACH, and of land contamination as "precautionary", where hazards are known to exist but the risk is unknown. Respondents described a case by case approach to assessing the controls required for specific nanomaterials and chemicals. In land contamination, site-specific assessments need to be undertaken effectively, requiring a suitable regulatory framework and measures to inform the decisions of individual regulators through knowledge sharing and capacity building.

Strategies for dealing with uncertainty – co-regulation (6): respondents noted that co-regulatory approaches can be beneficial where evidence is lacking or contested. For example, some voluntary programmes for improving the sustainability of products have initially focused on establishing an agreed

evidence base and building buy-in from businesses, so that then improvement targets can be agreed. A new “catchment based approach” for regulating water pollution and use reportedly shares similar features, where evidence is shared and solutions brokered between stakeholders within a river catchment, to create a collective understanding of issues and ownership for changes required.

According to commentators, the quality and availability of evidence on which to base policy and regulatory design is expected to be a central concern for policy makers seeking to implement “evidence based policy” (Solesbury, 2001). Jones (2007) has identified a range of policy responses to uncertainty, ranging from simply acknowledging uncertainty through to “adaptive management”. It is clear that for the policy makers interviewed, the quality and availability of evidence to inform policymaking has a direct impact on the choice of regulatory instruments deployed. Evidence may however be lacking, or contested. In some cases, a gradual approach to developing policy as evidence develops has been adopted, whereas in others where hazards are known to exist but risks are unclear, a precautionary approach has been selected. Policy makers have argued that their capacity to gradually develop consensus around accepted evidence and thereby bring about behaviour change is an important advantage of co-regulatory approaches (notably for improving the sustainability of products and in catchment based planning).

5.12 Capabilities for effective policymaking

Nineteen respondents alluded to skills and processes that affect the effectiveness of the regulatory reform process. Some emphasised the difficulties in understanding the operation of the human and environmental systems to be influenced and highlighted a lack of tools to improve understanding. Unintended consequences of government intervention can result, which then need to be addressed. As one interviewee put it: *“...you do some research on a problem, you find what you think is a solution, you come up with the policy instruments. Others think the same thing, everyone’s prepared to go for it. You go for it. You’ve got to find out if it works or not and what the unintended consequences were because otherwise, you know, there’s a*

reputational risk if you want to suggest something else next time. You then need to follow up to see if there are unintended consequences that... make things worse because you either need to stop using the policy instrument or you need a mitigating one."

Two interviewees highlighted the Defra policy cycle (Collier et al., 2010) as an iterative process from which to learn (Figure 5-3). One interviewee argued that adopting a cautious, incremental approach to regulatory reform may well be a sensible strategy to deal with uncertainty and unintended consequences. This approach to policy making had been described in a 1970s public policy article *"the art of muddling through"*, and the interviewee felt that that description of policymaking *"very often still holds"*.

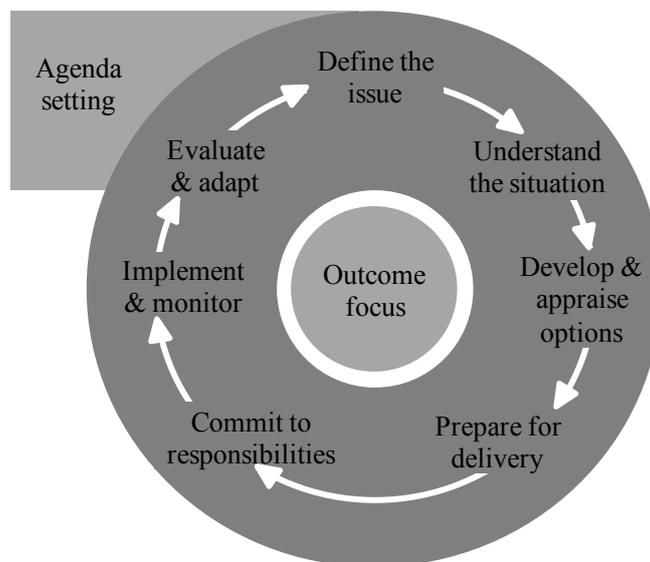


Figure 5-3: Defra's policy cycle (Collier et al., 2010)

Three respondents argued that policy makers and regulators would need new skills in order to establish community- or industry-led regulatory approaches in line with current political priorities. One commented: *"the more you're taking a voluntary or big society or working with industry approach, the more you need to be able to have the softer skills and working with people. The really challenging thing is trying to get people to believe it's in their interest to actually be doing this particularly if they don't think it is in their interest...part of it is being able to*

admit when government doesn't necessarily have all the answers which I think is a bit of a culture shock for some people."

Seven interviewees discussed the need to think broadly and laterally when considering the design of new policy. Working across policy domains to share experience and ideas was thought to help encourage creative thinking. One interviewee felt that the list of policy options provided for the interview was useful because it provided a more detailed explanation of variants than is often discussed and could act as a useful prompt, although another thought it was perhaps too detailed and could discourage policy makers from thinking imaginatively about options. For this interviewee, good policymaking required the policy maker to *"look at each in case with its merits, think broadly, rule nothing out and use your nouse."*

While various processes and procedures (e.g. regulatory impact assessment) have been introduced to improve the quality of decision-making for regulatory reform, some commentators argue that good policymaking and regulation remains a craft (notably, Sparrow (2000)). This analysis illustrates the wide range of skills and processes that policy makers need to bring to bear in the process of instrument selection, particularly as new forms of regulation that depend more heavily on business and civic actors are introduced.

5.13 Better instrument selection for environmental regulatory reform

This analysis reveals the complexity of the challenge faced by policy makers in their efforts to reform environmental regulation. Policy makers' choices of policy and regulatory instruments are influenced by the suitability of instruments to tackle the intended policy objectives and targeted environmental risk characteristics, the range of policy instruments used previously in practice, the strength of factors enabling instrument effectiveness in the policy context, instrument design characteristics delivering coherence and flexibility, and a range of social, legal and political factors. Policy makers' state of knowledge about these decision inputs, and their capabilities in effective policymaking, mediate the final choices made (Figure 5-4).

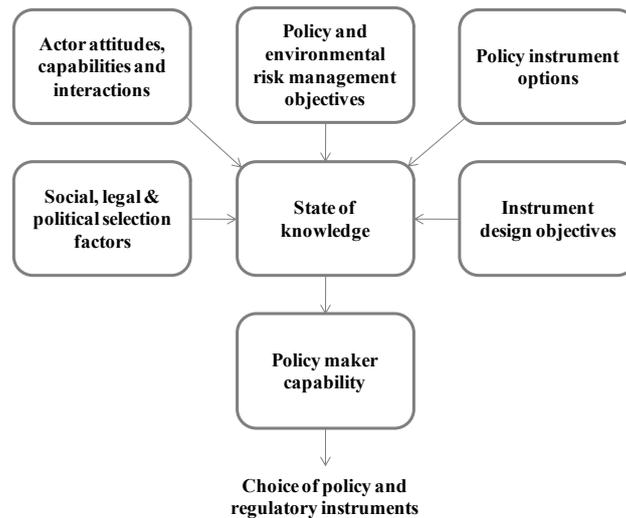


Figure 5-4: Summary logic model of instrument selection emerging from this research

It is apparent that to suggest that the task of the policy maker is simply to select the right intervention from the list using a stable set of rules would be a gross simplification of reality and would reflect outmoded faith in the role of “decision support systems” popular in earlier decades. Policy makers must *inter alia* seek to understand the current experience of the regulated, attempt to predict how actors will respond in a particular context to particular interventions, and search out opportunities to use existing actors and relationships to achieve their objectives. A piece-meal approach to regulatory reform based on analysis of instruments in isolation is likely to prove inadequate. An approach based on industry engagement (e.g. Farming Regulation Task Force) may provide a method to highlight cumulative burdens and also the coherence of policy mix.

Policy maker expertise in both economic and risk analysis is necessary, and an exchange of concepts between specialists may prove beneficial. Policy makers also expressed considerable interest in the insights provided by behavioural economics, reflecting recent interest across UK government (e.g. Dolan et al., 2010). This research suggest that behavioural research (or “insights”) can inform all regulatory design, so to see behavioural interventions as a separate class of regulation is to underplay the breadth of their application. However understanding of how they can be applied is at an early stage, and their

relevance to business regulation remains unclear. Further understanding of the subtleties of regulatory practice, including the use of threats, knowledge exchange, and the role of credibility will help address this gap.

Policy makers may be assisted in their task by cross-government regulatory reform programmes, such as the Red Tape Challenge (Cabinet Office, 2013a). Specifically, such programmes can bring to bear resources and political influence to change the complex network of interactions that affect environmental behaviour. They can also include well-publicised programmes of public consultation to seek views on where and how regulatory reform could reduce burdens on business and the public. The Red Tape Challenge programme includes a public website that lists all current legislation and invites businesses and the public to “*fight back*” to help “*free up business and society from the burden of excessive regulation*” by identifying “*what should be scrapped, what should be saved and what should be simplified*” (Cabinet Office, 2013a). The tone of publicity for the review programme has raised concern among pro-environmental groups (see, e.g. The Royal Society for the Protection of Birds (RSPB, 2012)). A regulatory reform programme driven simply by a public vote on which regulations to change or remove would risk removing elements from this network of influences in ways that undermine cumulative environmental protection in detrimental ways, unanticipated by voters. However, the Red Tape Challenge programme also incorporates other elements of public and industry engagement, political scrutiny and policymaking by expert practitioners (Cabinet Office, 2012); elements which this analysis suggests are all essential for effective policymaking. While the long term impact of the recently completed environment element of the Red Tape Challenge review (Defra, 2012) cannot yet be assessed, the Environmental Data Services (ENDS) Report summarises opinion among stakeholders that initial fears of a “*bonfire of environmental law*” appear to be “*overstated*”, with recommendations focusing on merger and simplification of existing rules (ENDS, 2012).

Table 5-6: Refined version of instrument typology (modifications emphasised in grey)

Type	Variant	Description	Example applications
Doing nothing	-	Government chooses not to act as policy objectives will be achieved without government intervention.	-
Direct "command and control" regulation	Ambient pollution requirements	The regulator specifies required maximum levels of ambient pollution, allowing flexibility to polluters to decide how to achieve that level. In the EU, ambient targets have been set within EU directives, which members states tackle through their national policy mix	Water quality targets, air pollution targets
	Input restrictions and output quotas	Restrictions are applied in the use or output of products. If a material or practice is considered to be sufficiently harmful its use may be restricted or banned entirely, with penalties enforced for violations of the ban. Where banned materials remain in use, their disposal will need to be carefully controlled.	Restrictions in pesticide or fertiliser use, restrictions in production of potentially harmful chemicals
	Non-transferable emissions licences	Typically a regulator issues a non-transferable licence, in the UK often referred to as a permit, to a business that gives authorisation to operate according to specified environmental performance requirements, for example maximum permitted levels of emissions. The regulator monitors the operation to ensure compliance, and may enforce penalties for non-compliance. Conditional exemption from regulation (e.g. exemption from inspections in response to good performance) can also act to incentivise behaviour change.	Controls on emissions to air and water, controls on waste production and disposal

Type	Variant	Description	Example applications
	Technology and process controls	The regulator sets environmental performance objectives and specifies or agrees appropriate processes or abatement technologies with industry. Variations of standards include application of “best practicable environmental option” (BPEO), “best practicable means” (BPM), “best available techniques not entailing excessive cost” (BATNEEC) and “best available technique” (BAT) (Gray et al., 2007).	Mandatory use of catalytic converters in road vehicles, use of specific pollution abatement technologies, application of process standards (e.g. for animal housing and husbandry)
	Zoning/ location controls	Human impacts on the environment in a particular area can be controlled through spatial controls, which can be used to mandate practices in a given area, locate polluters away from people and sensitive ecosystems, to prevent clustering of harmful activities, or (less commonly) to move people away from sources of harm.	Low emissions zones in urban areas, building development controls, national parks and conservation areas, controlled fishing zones, marine conservation areas, nitrate vulnerable zones
Economic instruments	Taxes and subsidies	Environmental taxes and subsidies operate by changing the market price of a good or service, reducing or increasing the quantity demanded and supplied in the market	Taxes on emissions to air, land, and on resource use. Subsidies to support renewable energy
	Tradable rights	Tradable rights systems work by specifying a quantity of allowances, eg to abstract water or to emit carbon, which can then be traded amongst users. The system is designed to create an opportunity cost of using an allowance, and therefore also creates benefits from not using an allowance. Trading allows market actors to find the allocation of allowances that maximises the cost-effectiveness of using the allowance	Individual tradable quotas for fisheries, water abstraction rights, emissions trading eg for CO ₂ , SO _x , discharge to water
	Payments	Conditional payments may be made to incentivise a particular activity. “Payments for Environmental Services” (PES) involve beneficiaries (state or private) paying ecosystem managers for the benefits delivered by those ecosystems.	Agri-environment payments, conservation payments, deposit return payments

Type	Variant	Description	Example applications
	Insurance	A business or individual may pay a premium to an insurer who in exchange will provide a payment should an event take place. Government may assign liability for damage to people or the environment creating the need for insurance (e.g. mandatory third-party insurance for vehicle drivers, environmental liability insurance), and may seek to ensure that the commercial insurance market is able to provide insurance for risks in lieu of government compensation.	Flood insurance, Livestock disease insurance
Information based instruments	Targeted information provision/ education	Information is made available by public or private bodies to enable businesses or individuals to make better-informed decisions that impact upon the environment.	Training programmes, advisory bodies (eg UK Carbon Trust and Energy Savings Trust)
	Naming and shaming/faming	Information is made available describing the environmental performance of businesses, through for example a publicised inventory of toxic emissions, with the intention of incentivising better environmental behaviour through avoided damage to or enhancement of corporate reputation.	Emissions inventories, public accolades and prizes, adverse publicity associated with prosecutions
	Registration, labelling and certification	Typically information describing the environmental performance of the businesses delivering a product or service is made available to consumers using a product label, enabling consumers to choose products with better environmental performance.	Food labelling, electrical product labelling
	Codes of practice	A set of rules or conventions describing good practice. May be used to clarify good practice to accompany mandatory rules.	Heather and Grass Burning Code
Co-regulation and self-regulation	Voluntary regulation	A group of businesses, often organised through a trade association, chooses to apply environmental performance standards as a condition of membership of an industry group.	Responsible Care Initiative in chemicals industry

Type	Variant	Description	Example applications
	Covenants and negotiated agreements	In this approach government makes an agreement with target businesses to achieve particular standards, which forms a contract and may incur sanctions if the contract is not met. This may be enforced through inspection by non-government regulators.	Packaging reduction agreements, recycling agreements, pollution reduction agreements
	Private corporate regulation	Businesses may choose to apply environmental standards both within their organisation and along their supply chain, so that the purchasing business is effectively acting as a regulator of suppliers' performance. Government may enforce procurement standards that then propagate along supply chains.	Food retailer sustainability programmes, government procurement requirements
	Private professional regulation	A professional body acts to apply standards through conditions of membership.	Membership of professional bodies
	Self-regulation	Businesses may choose unilaterally to apply environmental performance standards, for example by adopting an externally monitored standard such as ISO14001 or EU EMAS, or as a feature of corporate social responsibility commitments.	Environmental management systems, unilateral commitments to good performance
	Civic regulation	Civic organisations, for example conservation charities or local community groups, may apply pressure to businesses to improve environmental performance through scrutiny of their behaviour and publicising good or bad performance.	Activities of NGOs and community groups
Support mechanisms and capacity	Research and knowledge generation	Governments or other actors may undertake research to increase knowledge that informs better environmental decision making.	Funding of university research

Type	Variant	Description	Example applications
building	Demonstration projects and knowledge diffusion	Governments may choose to invest in demonstration projects to demonstrate feasibility, raise awareness and reduce risks of new technologies or processes. This investment could be managed through a specially designed investment institution, such as the UK's Green Investment Bank.	Carbon capture and storage, sustainable agriculture practice, eco-homes and buildings
	Network building and joint problem solving	Initiatives designed to encourage people to exchange ideas and learning to improve environmental performance.	Discussion groups, conferences, networking events

5.14 Conclusions

This research has gathered new evidence of the factors that influence which instruments are effective in delivering their intended environmental outcomes in which circumstances, and why this is the case. It also provides insight into the realities of policymaking by practitioners, and the skills and tools required for the regulatory craft.

- (1) The refined typology of instruments (Table 5-6) provides a comprehensive summary of policy and regulatory instruments from which policy makers may choose, but does not express how instruments work together in a mix. The typology may prove most useful as a stimulus for policy makers considering options for regulatory reform and provide a framework for organising evidence of what works, when and why;
- (2) The effectiveness of instruments in practice was reported to be influenced by a wide range of interactions between government, industry and civil actors, and by their respective motivations and capabilities. The relevance and strength of these factors varies from one policy context to the next, so the feasibility of using a given instrument depends on the policy context. The design of instruments, particularly with respect to their coherence in a mix with others and their flexibility to accommodate variations in actor and environmental characteristics, was also reported to influence their effectiveness;
- (3) Interviewees generally considered direct regulation to be necessary in circumstances where high impact public risks occur. The scope for the use of alternative approaches to direct regulation reportedly depends significantly on the strength of supply chain relationships, the capacity of the regulated sector to self-regulate, the strength of political commitment to regulation, and the exposure of businesses to public and NGO scrutiny. For some sectors regulated by Defra conditions for effective co- and self-regulation reportedly exist. However in others the scope for self-regulation may be more limited. One emerging advantage of a co-

regulatory approach over law-based direct regulation is reportedly the ability to accommodate changes in direction as knowledge about the nature of environmental problems improves.

- (4) Policy makers described iterative approaches to policy and regulatory design, taking place under conditions of significant uncertainty and influenced by social, legal and political factors. The accounts of practitioners highlight their need for a wide skill set to design effective policy, including social science expertise in economics and risk analysis, organisational design, and softer skills in negotiation, openness to new ideas and alertness to new opportunities for alternative approaches. Hard rules to direct optimal instrument selection appear very difficult if not impossible to define; at best “*rules of thumb*” can be identified. The recurring factors identified that influence instrument selection (Figure 5-2, Table 5-4 and Table 5-5) could form the basis for a more systematic approach to analysing instrument mixes for regulatory reform, although its utility for policy makers remains untested.

The analysis presented here is limited to the perspective of government policy makers. Regulated businesses and regulatory agencies have first-hand experience of the nuances of regulatory interactions, analysis of which would complement this research. Further qualitative research will examine and contrast these perspectives.

6 CASE STUDY: UK INDUSTRY AND ENVIRONMENTAL REGULATION AND REFORM

6.1 Introduction

This chapter presents a multiple-case study based on 30 semi-structured interviews with 34 senior decision makers from businesses and industry bodies, examining factors affecting the effectiveness and efficiency of environmental regulation in practice, from the perspective of businesses affected by regulation in the UK, to meet Objective 4 of this research programme. This chapter was written for this PhD thesis by the author under normal PhD supervision conditions, and is presented here in a format suitable for future publication.

6.2 Abstract

Governments seeking to encourage economic growth and protect the natural environment can pursue reform programmes that improve the efficiency and effectiveness of environmental regulation. Improvements can address many themes, including the selection of the best policy and regulatory instruments (e.g. direct, economic, voluntary) to adopt. This qualitative study examines the preferences and priorities for environmental regulatory reform expressed by 30 UK businesses and industry bodies from 5 industry sectors. While some argue for the wider adoption of voluntary approaches, others prefer direct regulation to tackle poor performance and provide a level playing field. Respondents seek regulatory frameworks that are coherent, balance clarity, prescription and flexibility, are enabled by positive regulatory relationships, administratively efficient, targeted according to risk magnitude and character, evidence-based and that deliver long-term market stability for regulated businesses. Anticipated differences in performance between instruments could be undermined by poor implementation, so participants argue for greater industry involvement in regulatory reform to identify problems and solutions. Results support the need for policy makers and regulators to tailor an effective mix of instruments for a given sector, and for regulatory reform that tackles the details of implementation and major integrative challenges for government.

6.3 Instrument selection and regulatory reform

Governments seeking ways to encourage economic growth face choices about the level of environmental protection they seek, and the policy or regulatory instruments they adopt to achieve these objectives. Societies create and enforce rules to protect the environment, which governments can codify into laws and statute enforced by government agencies. Alternatively, rules may be created and enforced by other social actors, for example in the form of agreements between businesses along supply chains. These different forms of governance for environmental protection are described here as “regulation” in its broadest sense (after Gunningham & Sinclair, 1999), to include both the influence of government and the influence of other social actors on business behaviour. The term “instruments” is used to describe different component parts of regulation, such as licences or taxes. A range of policy and regulatory instruments is available to policy makers and regulators, including direct “command and control” regulation, economic instruments, information based instruments, co-regulation, encouraging self-regulation, and knowledge creation and capacity building (Taylor et al., 2012) (Table 6-1).

Table 6-1: Instruments available to policy makers

Type	Variant
Direct “command and control” regulation	Ambient pollution requirements
	Input restrictions and output quotas
	Non-transferable emission licences
	Technology controls
	Zoning/ location controls
Economic instruments	Taxes and subsidies
	Tradable rights
	Payments
Information based instruments	Targeted information provision
	Naming and shaming/faming
	Registration, labelling and certification
Co-regulation and self-regulation	Voluntary regulation
	Covenants and negotiated agreements
	Private corporate regulation
	Private professional regulation
	Self-regulation
	Civic regulation
Support and capacity building	Research and knowledge generation
	Demonstration projects/ knowledge diffusion
	Network building and joint problem solving

Instruments are often compared (e.g. Gunningham, 2009) on the basis of their effectiveness in achieving intended environmental outcomes (e.g. protecting environmental water quality, reducing atmospheric pollution, reducing resource consumption), and the efficiency with which they do so. While direct regulation has been associated with significant improvements in environmental performance in developed nations, it has been criticised for poor efficiency compared to alternative approaches that offer greater flexibility to businesses on how to achieve environmental objectives. Governments have used these alternatives to harness the effect of social forces that influence business and citizen behaviour beyond direct government control, such as consumer choice, or the influence of businesses on each other along supply chains. Commentators have described this as a shift from “government” to “governance” (Jordan et al., 2005), while calling for the careful design of

coherent instrument mixes (Braathen, 2007; Gunningham & Sinclair, 1999; Howlett & Rayner, 2007). A growing literature examines the performance of different types of instrument, typically founded in economics, though we contend that ex-post evaluations assessing instrument effectiveness in achieving environmental objectives are often lacking (Taylor et al., 2012).

Regulation should be risk-informed, so that scarce resources are targeted for maximum impact. Risk analysis scholars have examined governments' characterisation and prioritisation of different strategic risks, (e.g. public exposure to engineered nanomaterials, the spread of foot and mouth disease, and flooding (Prpich et al., 2011)), and regulatory agencies' risk-based regulation of different industries, businesses and sites (Gouldson et al., 2009). A substantial literature examines the enforcement and compliance strategies of government agencies, including advice and persuasion, rules and deterrence, criteria strategies, responsive, smart, risk-based or meta-regulation (Gunningham, 2011), which have been described as a regulatory "craft" (Sparrow, 2000, 2008), while research examining the role of personal interactions between regulators and the regulated is far more limited (e.g. Pautz & Wamsley, 2012; Sevä & Jagers, 2013; May & Winter, 1999; Sparrow, 2008).

To optimise the performance of regulation, the Organisation for Economic Co-operation and Development (OECD) recommends that governments (i) commit to a "whole-of-government" policy for regulatory quality; (ii) adhere to principles of open government; (iii) establish oversight institutions; (iv) integrate early regulatory impact assessment and consider means other than regulation; (v) review the stock of regulation; (vi) report regulatory performance; (vii) have consistent policy covering role and functions of regulatory agencies; (viii) ensure effectiveness of regulatory agencies and the legal system; (ix) apply risk assessment, management and communication strategies; (x) promote coherence; (xi) foster regulatory management capacity and (xii) cooperate internationally (OECD, 2012). To implement such principles, governments have pursued broad reform programmes encompassing all policy areas. For example, the Dutch Administrative Burden Reduction Programme, considered a

world leader by the World Bank Group (Ladegaard et al., 2007), included a 25% burden reduction target, linked regulatory reform to the budgetary cycle and established an independent monitoring body (Actal, 2013). In the USA, Executive Order 13576 (Obama, 2011b) committed the government to ongoing improvement in efficiency, eliminating “wasteful, duplicative of otherwise inefficient programs”. In the UK, the Red Tape Challenge (Cabinet Office, 2013a) is a rolling programme seeking to reduce burdens by improving or removing regulation. The UK government has a stated preference (Department for Business Innovation and Skills, 2013a) for the use of alternatives to direct regulation across all policy areas and requires that alternatives are considered by policy makers when creating or reforming regulation (Department for Business Innovation and Skills, 2013e).

Governments have also specifically targeted environmental regulation for reform, often seeking to improve policy integration. The Swedish Environmental Code consolidated fragmented regulation, implemented new processes and institutions and provided a platform for further improvement (OECD, 2004). EU reforms intended to improve integration include the Integrated Pollution Prevention and Control (IPPC) Directive for controlling emissions from installations through integrated permitting, leading to the Industrial Emissions Directive (European Parliament, 2010), and the consolidation of chemicals regulation under the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) Regulation (European Commission, 2013d).

Regulatory reform has targeted *inter alia* legal and institutional coherence, the practices of regulators, removing excessive bureaucracy (“red tape”) and improving process efficiency, and the use of alternatives to direct regulation. However, better evidence for what instruments work when, with whom and why is required. The business community is one source of evidence, and governments seek insight from its members on how regulatory frameworks can be improved. Given the potential costs of regulation for businesses, observers may be concerned that businesses will simply argue for less regulation, undermining environmental protection, and greatly limiting the scope for

alternative approaches that place greater responsibility for environmental protection in their hands. This research explores how businesses may respond to this engagement in regulatory reform, which may be contrasted with previous research examining the perspectives of policy makers (Taylor et al., 2013). It asks 1) What arguments are made for the suitability of different forms of regulation? 2) What other priorities for regulatory reform are emphasised? and 3) What do these responses imply for future regulatory reform programmes?

6.4 Methodology

A multi-case study approach was adopted, based on semi-structured interviews with senior business representatives, and executive representatives of industry organisations with close understanding of the perspectives of their sector. The case study approach is appropriate for testing and extending theory, where each case is analogous to an individual experiment (Yin, 2009). The use of semi-structured interviews allowed respondents to reveal their opinions and for explanations to be elicited (Miles & Huberman, 1994). Respondents were presented with a typology of instruments based on prior research (Table 6-1, with additional explanation), invited to comment on its completeness, to provide examples of implemented regulation that worked well or less well and explain why, and comment on the need for regulatory reform (Appendix A.2). Five case study industries were selected to span a wide range of environmental regulations and types of environmental risk: (i) Construction and construction products; (ii) Food and agriculture; (iii) Personal care products; (iv) Waste management and (v) Water collection, treatment, supply and management (Table 6-2). This selection is not intended to be representative of all industries in the UK; rather it provides a range of contexts in which theories concerning environmental regulation can be developed and tested, in pursuit of a theory-building research strategy. The sectors selected illustrate both product based and operational site based regulation; sectors with large and small businesses; environmental risks arising from waste, emissions to air, ground and water; and dispersed and point source pollution.

Table 6-2: Case study respondents drawn from 5 industries

Industry sector	Interviewee organisation type ¹⁰	Number of interviews
Construction and construction products	Trade association	2
	Business - large	3
	Business – small/medium sized	1
Food and agriculture	Business/Trade association	1
	Trade association	3
	Business - large	2
Personal care products	Trade association	4
	Business - large	1
	Business – small/medium sized	2
Waste management	Professional body	1
	Trade association	1
	Business - large	3
	Business - small	1
Water collection, treatment, supply and mgmt	Business/ Trade association	1
	Business - large	3
	Drainage board (public body)	1
	Total:	30

The research was undertaken with the support of the Department for Environment, Food and Rural Affairs (Defra), England, with interviews conducted between January and June 2013. Organisations that had previously contributed to a Defra regulatory reform programme (Defra, 2013a) were invited to participate under a covering letter from the Department, explaining the research was being undertaken independently. Respondents were supplemented with organisations selected for their complementary perspectives, including recruitment through a personal care products trade show, and membership of a waste industry professional association. Thirty-four interviewees from 30 organisations were interviewed. Interviewees were typically policy leads in trade associations, senior managers or heads of environmental compliance in businesses.

Interviews were recorded and transcribed verbatim, except in one case where written notes were taken and validated with the respondent. Transcripts and

¹⁰ Here, small/medium-sized is defined as having 249 employees or fewer, and large as having more than 249 employees.

written notes were coded iteratively using NVIVO™ Computer Assisted Qualitative Data Analysis Software (CAQDAS) (Bazeley, 2007) to structure emerging explanatory themes (Miles & Huberman, 1994), while recognising the author’s “theoretical sensitivity” (Kelle, 2005) to prior research (Taylor et al., 2012, 2013).

6.5 Results and discussion

6.5.1 Refinement of typology of instruments

Respondents were first invited to comment on the completeness of a typology of instruments developed from a literature review of the prior art (Taylor et al., 2012). Their comments are summarised in Table 6-3, and suggest that with refinement this typology of instruments, not previously constructed or available for this audience, provides a sound basis for consideration of the full range of instruments available to policy makers and regulators.

Table 6-3: Comments on typology

View on typology	Number of interviewees	Comments and example quotes
Looks comprehensive	18	e.g. <i>"It is comprehensive. I think there's no obvious error of omission there, in terms of the list that you've put forward."</i>
Suggested additions	4	Add "Registration/notification" and "Licences" (1) Add "Guidance Notes" and "Codes of Practice" (1) Add "Public Funding Initiative (PFI)" (2)
Other comments on typology	8	Not clear whether guidance is guidance or rules (1) Instruments encouraging growth should feature (1) Tend to talk about EU Directives, EU Regulation and UK Regulation (1) Should mention derogations (1) Instruments can be hybrid e.g. Economic and Information Based elements (1) Not clear how Environmental Impact Assessment fits in (1) Proposed refinement to descriptive wording for “ambient pollution targets” (1) Typology only a little familiar (1)
No comment	4	Did not directly answer question (1) Other interviewee in interview answered (3)
Total:	34	

6.5.2 Industry views on the suitability of regulatory instruments

Respondents' views on the suitability and performance of different forms of regulation were diverse (Table 6-5). Respondents from 18 organisations did not show a clear preference between instrument types, instead seeing merits in a purposeful mix of different types depending on circumstances. Seven expressed considerable scepticism about the effectiveness of voluntary and self-regulation, often arguing that direct regulation was necessary to tackle poor environmental performance of businesses within their sector, nationally or internationally, to achieve a "level playing field". Five respondents strongly favoured voluntary approaches over additional direct regulation for their flexibility and goodness of fit to industry characteristics, while some expressed concern that further direct regulation would risk undermining their international competitiveness, pushing SMEs out of business entirely.

While case study organisations considered the choice of regulatory instrument to be an important aspect of regulatory design, other areas for improvement that typically apply to all instrument types were also emphasised (Figure 6-1).

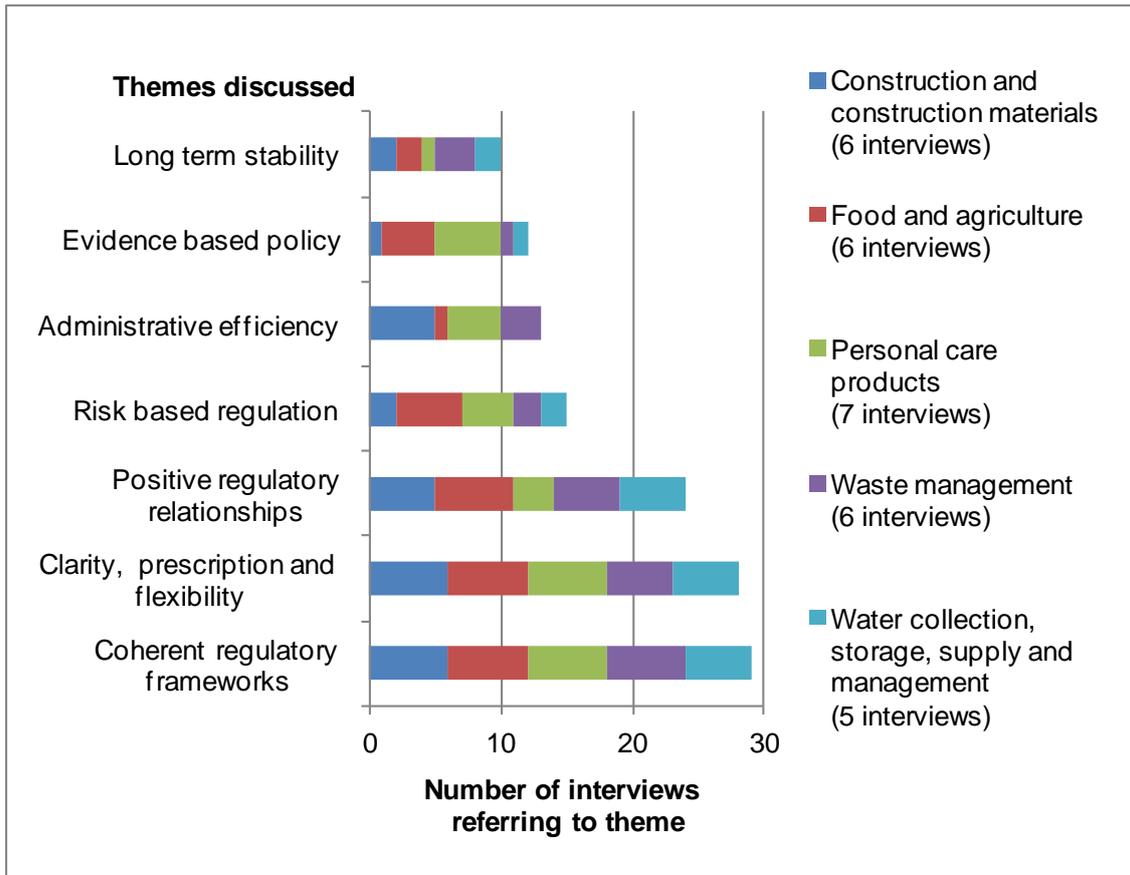


Figure 6-1: Themes in addition to instrument selection discussed by interviewees

6.5.2.1 Coherent regulatory frameworks

Instruments can enable or support each other in a complementary mix, according to respondents. For example, construction site waste management plans (SWMPs, now phased out) were thought to have encouraged builders to pay closer attention to construction waste streams, enhancing the impact of the Landfill Tax (*The Landfill Tax (Amendment) Regulations 2013. SI 2013/658*), and have also become incorporated into other broader construction standards. The Building Regulations (*The Building (Amendment) Regulations 2013. SI 2013/1105*) were argued to have enabled the development of many supporting instruments, including third-party inspections and product labelling. Third party auditing of environmental performance has been relied upon to allow reduced government inspection in good performing poultry farms (Defra, 2013b).

Respondents emphasised the need for tailored interventions to cater for big and small businesses, and environmentally leading and poor performing businesses within a sector. The need to target a mix of instruments to tackle critical points in supply chains was emphasised; for example, to ensure that good environmental performance is designed into construction projects from the outset. For waste recycling, respondents discussed the need for a mix of instruments (including direct regulatory, economic and voluntary) along waste streams, to increase producer responsibility to minimise waste and encourage re-use, to provide coherent messages to consumers about what can be recycled, to improve the consistency of recycling facilities between local authorities, to assure the performance of recycling facilities and to provide confidence in standards of recycled materials. For the water industry, influencing the upstream behaviour of individuals and businesses, for example in pesticide use or in disposal of household products and pharmaceuticals down drains, was considered important alongside regulating the water quality standards achieved by water companies downstream, with the potential to reduce water treatment costs.

Several respondents complained of inconsistent or overlapping environmental requirements set by national state bodies in various policy areas, including between planning permissions and environmental permits for quarrying, in carbon reduction policies for construction, and in carbon reduction, waste treatment and water quality requirements for water companies. One respondent from the minerals industry argued that the primacy of the local development planning system to make judgements that take into account all local competing and influencing matters had been significantly undermined by environmental permits and licenses from other areas of legislation. Similar issues of incoherence were reported from international inconsistencies in requirements, for example for the labelling of chemicals, or methods for carbon reporting set by different countries. Overlapping requirements can arise among those set by industry; for example, for farms supplying multiple food retailers, each with their own set of standards. While some examples of coherent policy were highlighted

(e.g. environmental permitting of industrial installations, including waste incinerators; and building regulations), perceived incoherence in the regulatory framework was typically attributed to the failure of government to work together internationally, nationally or locally to reconcile conflicting policy objectives, or by deciding to implement new regulatory regimes rather than incorporate new requirements into existing frameworks (e.g. planning regulations and environmental permitting, in the view of some respondents).

These results provide evidence for complementary instrument mixes, that achieve environmental outcomes, as anticipated by commentators (Gunningham & Sinclair, 1999). However, incoherence has also been highlighted, particularly where new regulations have been layered across existing regimes both nationally and internationally, echoing recent UK and Canadian research (Rayner & Howlett, 2009; UKELA, 2012). While governments have pursued various initiatives to improve integration (e.g. OECD, 2004; Gray et al., 2007), for these respondents there is scope to go further, which is likely to require better national and international integrated governance structures (Rayner & Howlett, 2009).

6.5.2.2 Clarity, prescription and flexibility

Respondents discussed the need for clarity in various aspects of the design of regulatory instruments. Clear objectives were expected to lead to well-designed instruments whose performance could be assessed easily. Some respondents welcomed instruments that are clear in their requirements for what regulatees needed to do. For example, one respondent from the farming industry believed the Voluntary Initiative on pesticide use (Defra, 2006) was effective because requirements for spraying are clearly explained and readily applied. Two respondents from the construction industry agreed that the Oil Storage Regulations (*The Control of Pollution (Oil Storage) (England) Regulations 2001. SI 2001/2954*) were effective because requirements for storage bunding were easily communicated and checked. One also highlighted the need for clear explanation of requirements for construction workers, including developing

illustrated, relatively long guidance materials to communicate requirements effectively. Respondents also sought clarity in definitions that delineate the boundaries of who is affected by regulations. One respondent described the introduction of permits for the operation of waste incinerators, which were clear in what operations were in scope and what would be required, enabling businesses to ensure compliance was achieved. In contrast, the definitions of what is meant by “waste”, when deposition of material in the ground may be considered to be landscape “restoration” or waste “disposal”, and what constitutes “incidental” contamination of inert waste or organic waste were all highlighted as points of contention leading to uncertainty about compliance requirements.

However, other respondents called for greater flexibility and less prescription in regulatory instruments. Flexibility may be required to accommodate local environmental conditions, for example to allow local assessment of optimal biodiversity conservation measures rather than standard requirements based only on land area set aside from use, local protection of soil, or local assessment of land contamination where naturally occurring contamination may exceed national standards. In personal care products, flexibility was argued to be required to ensure expert judgement by qualified toxicologists could still be applied in deciding safe levels of ingredients according to a scientific risk assessment for the specific intended use in a particular product, rather than attempting to cover all possible compositions and use scenarios in legislation. The need for flexibility to accommodate innovation in rapidly changing waste management technologies, or improvements in water treatment plant operations was also emphasised. In the latter case, regulations based on achieving outcomes rather than controlling inputs were called for. Where instruments have clear high level objectives but room for interpretation on how these should be achieved, regulatory agencies may choose or be required to provide clarifying guidance, which reportedly can allow the scope of regulations to creep beyond that originally intended (if guidance becomes treated as regulatory

requirement), and lead to inconsistency in regulatory decisions, both being unwelcome among respondents.

These results illustrate how understanding and applying regulations impose costs on businesses (Heyes, 2009). To reduce these costs, regulators have been encouraged to ensure that rules are clearly articulated and easy to understand (Dutch Ministry of Justice, 2004; Hampton, 2005). Instruments that afford flexibility to businesses to decide how to achieve objectives have also been recommended to encourage innovation and improve cost-efficiency, for example through “performance based standards” (Coglianese et al., 2002) or within voluntary agreements (Bressers & de Bruijn, 2005). However, this greater flexibility may not be appropriate for firms with less resource to expend on designing measures to achieve compliance (Coglianese et al., 2002; Fairman & Yapp, 2005). These results reinforce the need for the level of prescription and flexibility in regulation to be tailored *inter alia* to the capability of the target audience within businesses; prescription will be necessary and welcome in some cases, but in others a performance based approach may prove more appropriate. Policy makers and regulators should take account of prescription and flexibility in a broad risk-based assessment of appropriate interventions that ensures that current risks to the environment are adequately managed, while enabling innovation towards better environmental performance.

6.5.2.3 Positive regulatory relationships

Respondents described how the quality of the relationship between regulator and regulatee affects how regulatees are likely to respond. For example, a farmer described improvements in the relationship with local environmental regulators since they have become more open to discussing farmers needs as well as environmental protection objectives, commenting

"If you've got somebody that you can talk to there's at least a chance you're going to talk to them. But if you've got somebody that's not going to listen to you, you go and carry on and do your own thing".

Other respondents emphasised the importance of regulators building positive relationships with the farming community to increase their ownership of environmental problems and engagement in solving them.

Water industry respondents described close working relationships with regulators and government officials on long term environmental planning issues, and welcomed opportunities to work together to take the sector forward. One commented

"Having a positive and pro-active relationship works well, as working together is as much about leadership principles as technical issues. Key to this is involvement and open dialogue from the outset, as this then engenders ownership and responsibility. What benefits all parties most is a mature relationship, and everything that goes with that maturity, rather than a parent and child relationship."

Respondents valued easy access to regulators to enable conversations to clarify requirements. However, where respondents believed regulators lacked understanding of their industries or found decision making to lack transparency or accountability, this appeared to undermine working relationships. Several respondents complained of a lack of consistency between decisions made by individual officers, between officers in different regions, and in one case in regulatory officials from different countries, leading to additional effort being expended to resolve decisions. Inconsistency was often linked to a lack of clarity in regulations leaving too much scope for interpretation, and was most apparent to nationally operating businesses.

While a significant body of research examines regulatory compliance and enforcement strategies (Gunningham, 2011), relatively little research has focused on the nature of the relationship between regulatory officers and the regulated, although recent work in the USA (Pautz & Wamsley, 2012; Pautz, 2009, 2010b) has provided some empirical support for the observation (Lange & Gouldson, 2010) that mutual trust is necessary for modern forms of environmental governance. Results here suggest that trust may be undermined

by regulatees' perceptions of inconsistency or lack of understanding among regulators, but that constructive working relationships have also been successfully established.

6.5.2.4 Administrative efficiency

The designs of regulatory administrative systems were highlighted by several respondents as an important cause of difficulty and irritation. For example, the CRC Energy Efficiency Scheme, a hybrid instrument that originally incorporated an emissions trading system and performance league table, was thought by one respondent to have been effective in raising awareness of the costs of energy among managers, while two other respondents thought that it had been over-complex and that a simple tax would prove more effective. Regarding trading schemes, one respondent commented

"They do seem to get terribly bogged down in definitional issues and trading arrangements and different exchanges and buy out clauses. To the extent where in almost all of the cases that I have worked on, the businesses affected end up saying, "Just give us a tax. We have to employ people just to try and account for our [trading scheme] exposure, or whatever."...I must admit, as a policy person, I always liked the idea of trading schemes as a good thing and I thought it was good that the UK tended to do more of that than other countries. But it does seem, in practice, it gets very hard."

Some respondents engaged in the planning system and the regulation of farming highlighted issues of unnecessary bureaucracy and "box ticking". Several respondents from the personal care products industry commented on the design of the EU Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) regulation, expressing the view that while the underlying principle of the regulation was good, the regulation is not well designed and in implementation it has become excessively bureaucratic, although views on the severity of this problem varied. According to one respondent, similar issues can arise with voluntary approaches, commenting

"I also tend to find, certainly at government and trade association level, perhaps with the company level, voluntary agreements seem to be just as time consuming and bureaucratic as traditional regulation. Whereas, obviously, the idea is that they are much more, sort of, light touch."

Three respondents from the waste industry saw potential in the use of modern information technology to improve regulatory efficiency, by making permit applications as "point and click" as possible, enabling information sharing with regulators through a web portal, and by developing a mobile phone app that could tell consumers whether particular materials could be recycled in their area.

These results support other research indicating that both direct regulation and alternatives can impose significant administrative costs on participants (Dinica et al., 2007; Krarup & Ramesohl, 2002; Sovacool, 2011). While these costs need to be weighed against the wider social benefits of regulation, for participants in this study poor implementation of administrative systems was a significant cause of concern. Recent government initiatives have sought to improve the ease with which regulatees can find out about and report on regulation (Defra, 2013a; Netherlands Government, 2013), and greater adoption of service design techniques such as "customer journey mapping" (Heapy & Parker, 2006; Macdonald et al., 2011) could prove beneficial, though is under-researched.

6.5.2.5 Risk based regulation

Respondents from all case study areas discussed the role of risk analysis in regulation, at various levels. Risk based regulation was discussed at the level of individual regulated sites. One respondent argued that the environmental permitting regime for industrial installations was successful as it provided for the determination by the regulator of the most appropriate emission limits on a site-specific basis. Respondents from the water industry argued that there was scope to better target permit requirements on discharges from different types of source according to environmental risk associated with their design and local

environmental conditions. The need for risk-based inspections was highlighted by several respondents. In farming, the “earned recognition” approach (Defra, 2013b), which reduces government inspections for good performing sites with other third party inspections in place, was welcomed. However, one respondent argued that inspection was not generally risk based and instead tended to target the larger farms that often performed well, while neglecting smaller farms that needed more support to improve compliance levels. Meanwhile, a waste management respondent applauded the efforts of regulators to target effort against waste criminals, a major source of environmental risk, using proactive evidence gathering and action.

Some questioned whether the relative prioritisation of government policy areas was risk based, arguing for example that regulatory effort should focus on the preservation of habitats rather than specific species, on food waste and other elements of sustainable consumption and production rather than carrier bags, and questioning whether the level of regulation for the water and waste industries were proportionate to their associated risks. In the personal care products sector, risk assessment of chemical components and mixtures is a central concern of direct regulations such as REACH as well as voluntary codes such as the International Fragrance Association (IFRA) standards. One respondent expressed concern that REACH was tending towards hazard rather than risk based regulation, resulting in regulatory effort from both industry and government not necessarily focusing on the chemicals that presented the greatest risk. Uncertainty surrounding the impact of nanomaterials on the natural environment was highlighted by another respondent.

These results highlight several forms of risk based regulation, including strategic risk analysis by policy makers (Prpich et al., 2011), risk-based prioritisation of substances for regulation (Egeghy et al., 2011), and risk-based interventions by regulatory agencies (Gouldson et al., 2009). While in some areas risk-based regulation appears to have been used to good effect, in others respondents argued for a continued need for more effective implementation.

6.5.2.6 Evidence-based policy

Gathering and brokering of scientific evidence featured in many interviews. One trade association described their role in gathering and sharing evidence to gradually persuade local authorities and recycling businesses to recycle their members' products, to meet their producer responsibility obligations. Another trade association described current work to gather evidence on the carbon impact of their members' products, in anticipation of future scrutiny. Respondents from the personal care products industry discussed the central role that should be played by evidence of environmental and health risks in the regulation of chemicals. In general, where evidence of the beneficial environmental impact of regulation was considered lacking, respondents anticipated that businesses would be less willing to comply with it than when a compelling evidence base had been presented. One respondent from the farming industry argued that farmers would feel more strongly motivated to tackle environmental problems when evidence was provided of local impacts, a view echoed by another who emphasised the importance of scientific evidence to support the regulation of pesticides.

Some respondents thought that the UK government should review more systematically the effectiveness and efficiency of regulation, with one commenting

"Businesses, private companies always put a lot of effort in to that process of doing project review and a post project assessment. Did you achieve what you set out to achieve, its good business management? I don't think we have the same rigour with the decisions which are made by government on policy making and regulation."

These results support the theory that normative motivations for compliance with regulation are significant among businesses (May, 2005; Winter & May, 2001) and link this motivation to the need for policy to be demonstrably evidence-based (Solesbury, 2001). They also illustrate the role that regulatory actors can

play in developing and brokering evidence to motivate action (Davies et al., 2010).

6.5.2.7 Long-term stability

Respondents from the waste management, construction materials and water industries emphasised the importance of long-term stability in the regulatory framework to enable businesses to invest in new operational infrastructure with confidence. The Landfill Tax, which has provided a predictably escalating price for putting waste to landfill for more than a decade, was considered by several to have been very effective in discouraging landfill and providing businesses with the confidence to invest in alternative waste treatment infrastructure. In the case of construction materials, the Building Regulations were argued to have provided long-term certainty in the overall objectives of government, for example regarding Zero Carbon Homes, while positively encouraging innovation through triennial reviews of accompanying product standards. In contrast, the respondent representing the views of suppliers to the water industry argued that the five-yearly review of water industry plans by regulators resulted in a cycle of “boom and bust” which raised the overall costs of water supply to consumers.

These results echo finance industry calls for a “long, loud and legal” policy framework to encourage investment in renewable energy, where long-term stability has been found to be a critical factor for policy effectiveness (Bürer & Wüstenhagen, 2009; Held et al., 2006).

6.5.3 Cross-sectoral analysis

The small number of respondents from each sector does not justify more widely generalisable conclusions about whole sector preferences for different forms of regulation. However, respondent responses (Table 6-5, summarised in Table 6-4) hint at industry- and business-specific characteristics that may influence these preferences.

Table 6-4: Comparison of views across sectors

Sector	Summary of views expressed by respondents
Construction and construction products	Direct regulation argued for by large constructors concerned that (smaller) competitors and supply chain participants will not adopt voluntary approaches, leading to reputational risks and an unlevel playing field. Beyond-compliance behaviour driven by customer (including government) demands among large constructors. Construction materials respondents concerned primarily about coherence of land management regulations. For construction materials, direct regulation can provide clear easily implementable rules and provide a framework within which other types of instrument, including industry led approaches, have flourished.
Food and agriculture	Direct regulation necessary in some circumstances to protect public good, but must be deployed with care to avoid undermining competitiveness. Large retailers driven more by consumer demand for good environmental performance beyond compliance, which in turn exerts pressure on supply chain. Voluntary approaches strongly favoured by respondents arguing sector is already heavily regulated by both government and supply chain, and expressing fears of direct regulation leading to economic disadvantage in international competition.
Personal care products	Views were mixed, reflecting varying characteristics along supply chains. Direct regulation via permits argued by some as optimal for industrial plants, and necessary to provide an international level playing field. Sectoral track record of voluntary activity (e.g. on HFCs, fragrance safety) demonstrates scope for self-regulation in some circumstances.
Waste management	Direct regulation has provided the platform on which the industry has developed and has generally provided stability for investment planning. Enforced direct regulation is required to tackle a minority of small poor performing operators, alongside earned recognition for larger more reputable operators. Voluntary approaches appropriate for tackling resource efficiency and producer responsibility objectives, where direct regulation would be very complex; but has proved unsuccessful in other areas.
Water management, collection, treatment and supply	Direct regulation provides stability for investment planning, and necessary controls for some high risk activities. Within this framework greater flexibility to voluntarily try out new approaches and earned recognition would be welcomed, accommodated by good relationships with regulators. Regulation that accommodates local decision making and accountability necessary for flood management.

These results suggest that the structure of the business sector, the capability and attitude towards compliance of its members, the degree of national and international competition and the degree to which regulations are tailored to the sector all play a part in shaping industry attitudes towards different types of intervention. However, further research is required to test whether these

preferences are representative of industry sectors as a whole (e.g. as undertaken by Lüthi and Wüstenhagen for photovoltaic project developers (Lüthi & Wüstenhagen, 2012)).

6.5.4 Involving the business community

Twenty-one respondents argued for the involvement of businesses in the design of state environmental regulatory frameworks from an early stage of their development. In general this was expected to ensure that the design would be informed by a “real world” view of how implemented regulations would work in practice, a perspective which they sometimes considered lacking among policy makers. As one respondent put it

"So, that's why you get this disparity, I believe, of the real-life world because it's great that you sit in your office...typing some text as a regulation, but I really do believe that sometimes people need to get out in the real world, out of their office and, probably, out of their comfort zones and go and see things, what they mean and understand why maybe industry or whoever is complaining."

By ensuring this view was provided in regulatory design, respondents expected that businesses would be able to contribute innovative ideas on how to meet environmental objectives, and fewer problems would later emerge and consume business and government time to resolve. Several examples were provided across different sectors where this was considered to have worked well, but other examples of poor decisions being made due to a lack of industry engagement were also highlighted. Business involvement was expected to help to ensure that where new regulation affects many different business sectors, some of which may not be obvious (e.g. the water industry being affected by waste regulation), that the impact on all sectors is taken into account. Respondents also highlighted risks of business involvement, including loss of government independence, the possibility that design is unduly influenced by large businesses who have the capacity to implement more complex regulations than SMEs who could be disadvantaged as a result, and that businesses asking repeatedly for clarification of requirements could lead to over-prescription by

policy makers. Effective cooperation between government and business reportedly requires mutual trust, which can be built through government demonstrating that it has listened to industry recommendations, even if ultimately they are not implemented, and by active open engagement by officials and politicians who are willing to participate in open debate.

Researchers have found that voluntary agreements provide governments the opportunity to better understand and design interventions (Menanteau, 2003; Rezessy & Bertoldi, 2011). However, other stakeholders including NGOs may not welcome a closer relationship between industry and government, fearing regulatory capture (Pautz, 2010c) or loss of influence (Bomberg, 2007). The UK government has published best practice guidance for regulators to assess the impact of regulatory change (Department for Business Innovation and Skills, 2013f) placing significant emphasis on early business engagement, aspects of which are addressed through the Environment Agency's Regulated Business Forum and account management approach (Environment Agency, 2013k).

While it can be anticipated that respondents would welcome these measures, some of the concerns they raise regarding policy integration may require more profound reform, which may challenge the "integrative capacity" (Rayner & Howlett, 2009) of the UK government to realign existing regulatory frameworks.

6.5.5 Role of trade associations

Trade associations were described actively engaging in the development and implementation of environmental regulation, seeking to influence government policy development in the interests of members, providing regulatory advice to members, and working with government agencies to develop guidance tailored to industry characteristics. Often trade associations have established technical committees that draw on member businesses to provide expert input to regulatory reform discussions with government. Trade associations have also sought to educate politicians, the media and general public about the environmental performance of their sectors. For example, one personal care products trade association described committing resources to informing the

media about members' products to help ensure debates about safety and environmental impact are informed by scientific evidence. Respondents described cases where trade associations have been able to establish environmental standards (e.g. British Retail Consortium packaging standards) and codes of practice that are followed by members (e.g. the Chemical Industries Association Responsible Care Programme), or to act as coordinating bodies for voluntary agreements with government (e.g. the National Farmers Union, among others, for the Campaign for the Farmed Environment). However, respondents noted that the ability of trade associations to fulfil this role may be limited by a number of factors, including competition law, whether they were able to establish standards that operated across national boundaries for businesses operating internationally, whether their members are sufficiently similar in size, and/or in business activities undertaken, and/or levels of performance to have closely aligned common interests, and the skills and resources of their staff. Several respondents noted that SMEs may not be members of trade associations so would not be reached by industry-wide voluntary initiatives through this route.

Trade associations around the world have played a central role in negotiating environmental agreements with governments on behalf of members (Bailey & Rupp, 2005) and in sectoral self-regulation (Lenox & Nash, 2003; Nash & Ehrenfeld, 1997). In the UK today they are expected to help educate members and coordinate sectoral action (Department for Business Innovation and Skills, 2013f; Macdonald et al., 2011). Respondents' views support this role for some trade associations, but highlight that their capacity to do so depends significantly on the breadth of their membership and the structure of the industry they represent. Where sectors include a large number of SMEs who are not trade association members, it seems likely that policy makers and regulators will have to pursue alternative routes to influence business behaviour.

6.6 Conclusion

Participants in this research generally saw pros and cons for all types of regulation and described how instruments work together in a mix, rather than generally favouring voluntary regulation as might have been anticipated. This is consistent with previous research emphasising the need for policy makers and regulators to choose instruments that are tailored to specific industry or business circumstances at a given point in time (Gunningham & Sinclair, 1999).

However, instrument selection is only one aspect of regulatory reform sought by respondents. In addition, the results suggest that policy makers and regulators should also examine whether regulatory frameworks are coherent, balance clarity, prescription and flexibility, are enabled by positive regulatory relationships, are administratively efficient, targeted according to risk, evidence-based and delivering long-term stability for regulated businesses. Failure to address these concerns, which apply across the range of regulatory instruments, appears to have the potential to significantly undermine the effectiveness of environmental regulation, perhaps even to the extent that the expected benefits of careful instrument choice could be lost through poor implementation, as has been found to be the case by others (Testa et al., 2013).

Respondents argued for the early involvement of businesses in the design of regulation, particularly to provide a “real world” view of the realities of regulation and to provide ideas about how to achieve environmental objectives. However, this involvement presents significant challenges for government. Judging by issues raised by respondents, politicians and bureaucrats will receive a very broad range of reform proposals across multiple dimensions of the existing regulatory framework, which they must then analyse and prioritise, as has indeed been the case for the recent UK Farming Regulation Task Force (Macdonald et al., 2011). Where regulations affect multiple industry sectors regulatory reform becomes especially complex. While governments have designed regulatory reform institutions that provide mechanisms to identify and

prioritise problems and drive change (e.g. Ladegaard et al., 2007; UK Department for Business Innovation and Skills, 2013b), the complexities highlighted by this research support the need for better approaches to analyse regulatory networks, the results of which will likely challenge the “integrative capacity” (Rayner & Howlett, 2009) of governments to fully address issues that emerge.

Table 6-5: Attitudes towards different types of regulation expressed by respondents

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
A.1	Construction and construction materials	Trade association (materials)	Seeks improvements in coherence of planning and permitting, and in performance of the regulator. Sees limited scope for self-regulation in sector.			X
A.2	Construction and construction materials	Large construction business	Direct regulation necessary to provide level playing field with competitors. Concerned that voluntary measures would not be taken up by competitors, though own voluntary beyond-compliance performance driven by customer demands.			X
A.3	Construction and construction materials	Large construction business	Direct regulation necessary to create a level playing field with competitors. Is pursuing beyond-compliance environmental performance in response to customer demands.			X
A.4	Construction and construction materials	Advisor to materials businesses	Focused on need to improve coherence of direct regulation, in particular between environmental permitting and planning for quarrying.			X

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
A.5	Construction and construction materials	Large materials business	Focused on need to improve coherence of direct regulation, particularly between environmental permitting and planning. Argued that the primacy of the local development planning system to provide operators' licence to operate has been significantly undermined by other environmental regulatory instruments. In favour of voluntary approaches to regulation in preference to prescriptive regulation, because existing regulation has become overly imposing on businesses.		X	
A.6	Construction and construction materials	Trade association (materials)	Direct regulation that clearly articulates objectives should be set at a high level, providing long-term clarity on intention and process of getting there. High level direct regulatory framework can accommodate a variety of instruments e.g. subsidies, standards, co-regulatory guidance development to help achieve it.			X
B.1	Food and agriculture	Trade association (farming)	Critical of fit of direct regulation to farms; supportive of earned recognition. Sees potential in greater use of co-regulatory/ industry-led initiatives, and greater use of advice and knowledge transfer.		X	

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
B.2	Food and agriculture	Advisor to large agricultural businesses	Legislative threat likely to be important to motivate voluntary action among farmers. Some voluntary approaches have worked well; effectiveness depends on clarity of requirements and presence of regulatory threat.			X
B.3	Food and agriculture	Trade association (retail)	Direct regulation sometimes necessary to provide a level playing field, to stimulate investment, or where consumer preferences are not driving change. Voluntary agreements can achieve quick results and are adaptable, but struggle to attract smaller businesses, and do not provide a level playing field to reward better performance.			X
B.4	Food and agriculture	Large food manufacturer	Less regulation and more cooperation and communication between regulators and industry is required to allow businesses to flourish, for example through voluntary codes of practice. Food retailers will not tolerate poor environmental performance among food producers, so naming and shaming of poor performers is very effective. Industry must take on burden of self-regulation as government regulatory resources diminish.		X	

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
B.5	Food and agriculture	Trade association (drinks)	Industry is already heavily regulated; more regulation could push SMEs out of business. International regulation should be aligned through “equivalence” rather than “harmonisation”. Generally supportive of voluntary forms of regulation in preference to mandatory requirements, except that these are sometimes necessary in the interest of the coherence of international trade.		X	
B.6	Food and agriculture	Medium arable farm	Direct regulation may be necessary, but must maintain international competitiveness. Voluntary approaches can work, if there is a market driver, and should be explored first.		X	
C.1	Personal care products	Trade association	In principle, voluntary schemes are preferable, but in practice, especially with competition law issues, they can be difficult to put in place. Sectoral voluntary approaches have worked when science was clear and regulation was anticipated. No major complaints about direct regulation, though some implementation is over complex and hazard not risk based. Direct regulation should be used to create international level playing field.			X
C.2	Personal care products	Trade association	Direct regulation has been effective, though needs to provide international consistency and level playing field. Sector has successful track record of voluntary approaches, partially in response to consumer pressure.			X

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
C.3	Personal care products	Trade association	Supportive of well-designed outcome-based command and control legislation. Although aware of some success with voluntary approaches, concerned that not all companies would act without regulation.	X		
C.4	Personal care products	Advisor to cosmetics businesses	Strong preference for risk-based direct command and control regulation or economic instruments. Sceptical of effectiveness of self-regulation, doubting that businesses in other countries will comply (e.g. due to lack of understanding, or litigious culture).	X		
C.5	Personal care products	Small cosmetics manufacturer	Expect environmental improvement to involve more cost or more work, so direct regulation necessary unless objectives aligned to customer demands. Doubt businesses (particularly SMEs) will adopt voluntary approaches unless driven by customer environmental demands, which in UK cosmetics are weak.	X		
C.6	Personal care products	Trade association	Some direct regulation has been beneficial e.g. REACH has resulted in better evidence sharing, though some complain of costs and complexity. Believes self-regulation of fragrance industry has worked well, providing beyond-compliance assurance.			X

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
C.7	Personal care products	Large fragrance business	Glad that direct regulation has phased out hazardous chemicals previously in use, though seeks improvements in clarity and coherence. Argues self-regulation of fragrance industry has worked well.			X
D.1	Waste management	Trade association (waste management)	Argues industry development has been driven by direct regulation. Still suffers from sub-legal behaviour, so sector typically argues for more enforcement. Voluntary approaches can be OK when there a small number of large businesses, but difficult to include long tail of SMEs.			X
D.2	Waste management	Large waste management business	Direct regulation has provided platform for sector development. Supportive of earned recognition for large operators. Sector has on occasion demonstrated lack of maturity to take up voluntary measures.	X		
D.3	Waste management	Large waste management business	Supportive of direct regulation, though calls for better coherence for incentivising infrastructure development. Not in favour of increased self-regulation as less scrupulous operators will ignore.	X		
D.4	Waste management	Large waste management business	Supportive of greater earned recognition within permitting system for large operators. Scope for greater use of self-regulation among large operators but not appropriate for SMEs, who may be operating outside law.			X

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
D.5	Waste management	Waste management professional body	Industry is defined by regulation, and calls for regulation to be properly enforced. Role for voluntary agreements for resource efficiency and producer responsibility.			X
D.6	Waste management	Small waste management business	Supportive of principle of direct regulation and calls for greater enforcement to provide level playing field. Self-regulation not appropriate as too many likely to ignore rules in pursuit of profit.	X		
E.1	Water collection, treatment, supply and management	Large water company	Direct regulation positive and provides useful stability for investment. Supportive of greater opportunities to try out new approaches voluntarily rather than being forced by regulation.			X
E.2	Water collection, treatment, supply and management	Large water company	Generally argues that existing regulation is sensible and appropriate, with some need for improved implementation and regulatory relationships to allow room to innovate to achieve desirable outcomes.			X

Case study ref	Case study sector	Case study organisation type	Summary of views on different types of regulation	Strongly sceptical of voluntary forms of regulation	Strongly supportive of voluntary forms of regulation	No general preference for or against voluntary forms of regulation
E.3	Water collection, treatment, supply and management	Water industry supply chain business & trade association representative	Direct regulation appropriate due to high environmental risks associated with water industry. Good regulatory relationships better than threats of prosecution. Sceptical about scope for self-regulation and voluntary approaches.	X		
E.4	Water collection, treatment, supply and management	Large water company	Direct regulation has improved standards in some areas (e.g. discharges) though in others improvement is primarily driven by financial incentives (e.g. energy efficiency). Improvements lie in implementation of direct regulation. Not clear how self-regulation would fit in with existing regulatory framework.			X
E.5	Water collection, treatment, supply and management	Drainage board (public body)	Emphasised value of local institutions directly accountable to land owners to manage flood risk, enabling innovation. Critical of layering of environmental regulation onto flood risk management responsibilities without additional funding, and of meaningful accountability of national government bodies.			X
			Totals:	7	5	18

7 DISCUSSION

7.1 Introduction

The aim of this chapter is to evaluate existing evidence and theory in light of the data gathered from the research presented in Chapters 4, 5 and 6, and to develop recommendations for future regulatory reform programmes based on this extended body of evidence, to meet Objective 5 of this research programme.

The central novelty of this work is the compilation, validation and refinement of a new typology of regulatory instruments for policy end-users; the examination of the critical case of instrument selection at Defra, revealing the realities of policy making in practice; and a novel multiple-case study of senior business representatives' views on regulation, revealing perceptions of positive and negative regulatory impacts, some counter-intuitive findings about preferences for voluntary and direct regulation, and the nuances of regulatory practice at ground level.

Firstly, the range of regulatory interventions available is discussed (Section 7.2). Then discussion turns to factors affecting the effectiveness of regulation (Section 7.3); government and business preferences for types of regulation (Section 7.4); the use of evidence in the process of regulatory reform (Section 7.5); business participation in regulatory reform (Section 7.6); and government capability in regulatory reform (Section 7.7). Finally, implications for future regulatory reform are proposed in Section 7.8.

7.2 Typology of regulatory interventions

Defra policy makers generally found the typology of instruments developed from a review of the prior literature (Table 2-1) to be an accurate summary of the range of interventions available, while proposing some refinements (Table 5-3). They thought the typology would serve as a useful prompt when considering options for regulatory reform. However, they thought that the typology would not help policy makers analyse mixes of instruments, and one respondent

considered it of limited relevance to economic as opposed to environmental regulation (Section 5.6). Case study business and trade association respondents also generally considered the typology to be comprehensive or proposed amendments within the overall structure (Table 6-3). A consolidated version of the typology, incorporating amendments suggested across all 67 respondents consulted for this research is presented in Table 7-1. Modifications proposed by Defra respondents are underlined. Those proposed by business and trade association respondents are underlined and italicised.

Table 7-1: Consolidated typology of instruments

Type	Variant	Description	Example applications
<u>Doing nothing</u>	-	<u>Government chooses not to act as policy objectives will be achieved without government intervention.</u>	-
Direct "command and control" regulation	Ambient pollution requirements	The regulator specifies <u>allowable</u> levels of ambient pollution, allowing flexibility to polluters to decide how to achieve that level. In the EU, ambient targets have been set within EU directives, which members states tackle through their national policy mix. <u>Where emissions are from multiple sources (or "assets" in the context of the water industry) this approach allows the optimisation of operational performance across those sources to attain the desired environmental outcome.</u>	Water quality targets, air pollution targets
	Input restrictions and output quotas	Restrictions are applied in the use or output of products. If a material or practice is considered to be sufficiently harmful its use may be restricted or banned entirely, with penalties enforced for violations of the ban. Where banned materials remain in use, their disposal will need to be carefully controlled.	Restrictions in pesticide or fertiliser use, restrictions in production of potentially harmful chemicals
	Non-transferable emissions licences	<u>Typically a regulator issues a non-transferable licence, in the UK often referred to as a permit, to a business that gives authorisation to operate according to specified environmental performance requirements, for example maximum permitted levels of emissions. The regulator monitors the operation to ensure compliance, and may enforce penalties for non-compliance. Conditional exemption from regulation (e.g. exemption from inspections in response to good performance) can also act to incentivise behaviour change. For some activities obtaining a "registration" that the activity is being undertaken may be all that is required. "Derogations" may be applied to relax rules in specific circumstances.</u>	Controls on emissions to air and water, controls on waste production and disposal

Type	Variant	Description	Example applications
	Technology and process controls	<u>The regulator sets environmental performance objectives and specifies or agrees appropriate processes or abatement technologies with industry. Variations of standards include application of “best practicable environmental option” (BPEO), “best practicable means” (BPM), “best available techniques not entailing excessive cost” (BATNEEC) and “best available technique” (BAT) (Gray et al, 2009).</u>	<u>Mandatory use of catalytic converters in road vehicles, use of specific pollution abatement technologies, application of process standards (e.g. for animal housing and husbandry)</u>
	Zoning/ location controls	<u>Human impacts on the environment in a particular area can be controlled through spatial controls, which can be used to mandate practices in a given area, locate polluters away from people and sensitive ecosystems, to prevent clustering of harmful activities, or (less commonly) to move people away from sources of harm.</u>	<u>Low emissions zones in urban areas, building development controls, national parks and conservation areas, controlled fishing zones, marine conservation areas, nitrate vulnerable zones</u>
	<u>Environmental impact assessment (EIA) requirements</u>	<u>An environmental impact assessment is required to be undertaken which must be approved by a regulator before a development project is permitted to proceed (e.g. under EU EIA Directive).</u>	<u>EIA requirements for roads, forestry, fisheries, waste management sites</u>
	<u>Other types of licence</u>	<u>A regulator issues a licence that permits the holder to undertake an activity that would otherwise be illegal.</u>	<u>Wildlife licences, providing authorisation to disturb or harm wildlife</u>
Economic instruments	Taxes and subsidies	Environmental taxes and subsidies operate by changing the market price of a good or service, reducing or increasing the quantity demanded and supplied in the market	Taxes on emissions to air, land, and on resource use. Subsidies to support renewable energy

Type	Variant	Description	Example applications
	Tradable rights	Tradable rights systems work by specifying a quantity of allowances, e.g. to abstract water or to emit carbon, which can then be traded amongst users. The system is designed to create an opportunity cost of using an allowance, and therefore also creates benefits from not using an allowance. Trading allows market actors to find the allocation of allowances that maximises the cost-effectiveness of using the allowance	Individual tradable quotas for fisheries, water abstraction rights, emissions trading eg for CO ₂ , SO _x , discharge to water
	Payments	Conditional payments may be made to incentivise a particular activity. "Payments for Environmental Services" (PES) involve beneficiaries (state or private) paying ecosystem managers for the benefits delivered by those ecosystems.	Agri-environment payments, conservation payments, deposit return payments
	<u>Insurance</u>	<u>A business or individual may pay a premium to an insurer who in exchange will provide a payment should an event take place. Government may assign liability for damage to people or the environment creating the need for insurance (e.g. mandatory third-party insurance for vehicle drivers, environmental liability insurance), and may seek to ensure that the commercial insurance market is able to provide insurance for risks in lieu of government compensation.</u>	<u>Flood insurance, Livestock disease insurance</u>
	<u>Public-private partnerships/ Private Funding Initiative (PFI)</u>	<u>Under a typical PFI deal, the public sector enters into a long-term contractual arrangement with private sector companies, which undertake to design, build, operate (and often maintain) an asset (National Audit Office, 2011).</u>	<u>Provision of waste management infrastructure</u>
Information based instruments	Targeted information provision/ education	Information is made available by public or private bodies to enable businesses or individuals to make better-informed decisions that impact upon the environment.	Training programmes, advisory bodies (eg UK Carbon Trust and Energy Savings Trust), <u>non-statutory guidance provided by government</u>

Type	Variant	Description	Example applications
	Naming and shaming/faming	Information is made available describing the environmental performance of businesses, through for example a publicised inventory of toxic emissions, with the intention of incentivising better environmental behaviour through avoided damage to or enhancement of corporate reputation.	Emissions inventories, public accolades and prizes, adverse publicity associated with prosecutions
	Registration, labelling and certification	Typically information describing the environmental performance of the businesses delivering a product or service is made available to consumers using a product label, enabling consumers to choose products with better environmental performance.	Food labelling, electrical product labelling
	<u>Codes of practice</u>	<u>A set of rules or conventions describing good practice. May be used to clarify good practice to accompany mandatory rules.</u>	<u>Heather and Grass Burning Code</u>
Co-regulation and self-regulation	Voluntary regulation	A group of businesses, often organised through a trade association, chooses to apply environmental performance standards as a condition of membership of an industry group.	Responsible Care Initiative in chemicals industry
	Covenants and negotiated agreements	<u>In this approach government makes an agreement with target businesses to achieve particular standards, which forms a contract and may incur sanctions if the contract is not met. This may be enforced through inspection by non-government regulators.</u>	Packaging reduction agreements, recycling agreements, pollution reduction agreements
	Private corporate regulation	<u>Businesses may choose to apply environmental standards both within their organisation and along their supply chain, so that the purchasing business is effectively acting as a regulator of suppliers' performance. Government may enforce procurement standards that then propagate along supply chains.</u>	Food retailer sustainability programmes, government procurement requirements
	Private professional regulation	A professional body acts to apply standards through conditions of membership.	Membership of professional bodies
	Self-regulation	Businesses may choose unilaterally to apply environmental performance standards, for example by adopting an externally monitored standard such as ISO14001 or EU EMAS, or as a feature of corporate social responsibility commitments.	Environmental management systems, unilateral commitments to good performance

Type	Variant	Description	Example applications
	Civic regulation	Civic organisations, for example conservation charities or local community groups, may apply pressure to businesses to improve environmental performance through scrutiny of their behaviour and publicising good or bad performance.	Activities of NGOs and community groups
Support mechanisms and capacity building	Research and knowledge generation	Governments or other actors may undertake research to increase knowledge that informs better environmental decision making.	Funding of university research
	Demonstration projects and knowledge diffusion	Governments may choose to invest in demonstration projects to demonstrate feasibility, raise awareness and reduce risks of new technologies or processes. This investment could be managed through a specially designed investment institution, such as the UK's Green Investment Bank.	Carbon capture and storage, sustainable agriculture practice, eco-homes and buildings
	Network building and joint problem solving	Initiatives designed to encourage people to exchange ideas and learning to improve environmental performance.	Discussion groups, conferences, networking events

As detailed in Section 2.6 this typology was developed from the typology proposed by Gouldson et al. (2008), combined with the top-level categorisation used by the UK government (Department for Business Innovation and Skills, 2013a) and direct regulatory instruments described by Perman et al. (2003). This research has consolidated, validated and extended this prior literature to develop a refined typology to inform policy making.

The original version of the typology described in Table 2-1 has been adopted by practitioners since its publication in 2012 (Angus & GHK-ICF, 2013; Giddens & Booth, 2013). In these applications the typology has been further expanded, for example to show greater detail in interventions deployed by regulatory officers. This typology should therefore be seen as a basis for further development as new forms of intervention are devised by scholars and practitioners. It would however seem beneficial to adhere to a broad classification to help develop a common language and evidence base for all those who are involved in researching and implementing new forms of regulation.

7.3 Factors affecting effectiveness of regulation

The following sections discuss the various factors emphasised in this research that affect the effectiveness of regulation in practice.

7.3.1 Characteristics of the regulated

Defra policy makers emphasised the importance of the motivations and capabilities of regulated individuals and businesses on the effectiveness of a given regulatory intervention (Table 5-4). While they anticipated that in some circumstances leading businesses would pursue positive environmental behaviour independently, where environmental objectives conflicted with business objectives businesses were expected to do only the minimum to comply, or indeed to pursue deliberate non-compliance with legal requirements. In some sectors (e.g. UK food) policy makers expected demands for good environmental performance to be propagated along supply chains, potentially beyond national boundaries and so reaching further than national direct

regulation. Members of the public could influence business environmental behaviour through their own purchasing decisions, although this relied upon public understanding of and concern for environmental performance of particular products, which is not guaranteed. Similarly, case study business and trade association respondents described business environmental performance being driven by customer demands, legal requirements and financial considerations (e.g. production costs), and in some sectors described deliberate non-compliance and illegal behaviour (Table 6-5).

There is an extensive literature examining what motivates businesses to pursue good environmental behaviour. While multiple motivations are identified, broadly speaking these can be grouped into legal compliance, business profitability (including contributory factors such as staff motivation, product innovation), reputational and moral/ethical motivations. For example, Masurel (Masurel, 2007) identifies five clusters of motivations of entrepreneurs who invest in environmental measures, grouped around (i) market (e.g. satisfying customer needs, attracting new customers through reputation); (ii) employment (e.g. motivating and protecting employees); (iii) regulations (e.g. obeying the law and obtaining subsidies); (iv) social responsibility (satisfying moral duty, pursuing actions valued by society) and (v) internal management (serving order and cleanliness and leading to cost savings). Meanwhile Ditlev-Simonsen and Midttun (Ditlev-Simonsen & Midttun, 2011) identify ten theories from multiple academic disciplines for why businesses pursue social and environmental corporate responsibility: (i) profit maximisation; (ii) shareholder value maximisation; (iii) to satisfy different stakeholders; (iv) to build a strong cluster to provide a favourable business context for the company; (v) to build positive reputation and brand; (vi) to develop innovative products; (vii) to resemble other companies; (viii); ethical/moral desire to do the right thing; (ix) under managerial discretion and (x) to contribute to sustainable development. Dangelico and Pujari (2010) examine why companies integrate environmental sustainability into products and operations finding that this can improve efficiency in the use of resources and return on investment, increased sales, development of new

markets, improved corporate image, product differentiation and enhanced competitive advantage. They find evidence that regulations are not simply constraints or compliance requirements, but may also offer opportunities for risk minimisation, preservation of revenues or reputation, or new business opportunities. The factors believed to influence business behaviour presented in Table 5-4 and Table 6-5 are consistent with these theories, though legal compliance, business profitability and reputational motivations tended to dominate moral/ethical motivations. However, the strength of these factors seems to vary significantly between sectors, so a strong influence in one industry sector (e.g. the potential for cost savings, or for gaining new customers) may be much weaker in another.

Defra respondents noted that groups of businesses may or may not be able to organise themselves to deliver forms of self-regulation, anticipating that large diverse industries would find this more challenging than those with a small number of large players (Table 5-4). Business and trade association respondents noted that while some trade associations had successfully coordinated positive environmental behaviour among members, their ability to do so effectively depends on, among other things, whether their members are sufficiently similar to one another, and their international reach (Section 6.5.5).

Drawing on club theory, Prakash and Potoski (Prakash & Potoski, 2007) have reviewed theory and evidence for the relationship between program design and effectiveness for voluntary environmental programmes, noting variable levels for effectiveness in practice and a lack of consolidated evidence to explain why this is the case. They propose a theoretical framework that emphasises the need for such programmes to mitigate two collective action problems; attracting firms to participate, and ensuring firms adhere to programme obligations. Programmes with weaker measures to enforce membership obligations on members may attract a larger membership as they are easier to join, be cheaper to run, but bring about a relatively small performance improvement per member. Programmes with stronger enforcement of standards may correspondingly attract a smaller number of members, require more resources for standards

enforcement, but bring about a greater improvement in performance per business and therefore confer greater reputational benefits to members. The findings presented in this thesis are consistent with this theory, in so far as participants expect greater effectiveness of voluntary programmes when there are a small number of members who are sufficiently similar to benefit from reputational benefits held in common. However, Prakash and Potoski point out that the aggregate benefit of the programme depends on both the number of members and their individual levels of improvement, so a large weakly enforced programme may be more beneficial than a small strongly enforced programme. Echoing conclusions elsewhere, Prakash and Potoski argue that the design of voluntary programmes must be tailored to the policy context and for different types of firm to maximise their overall performance, or they may deliver no more than “greenwash”.

Together, these results provide new evidence that reinforces the need for regulatory interventions in the UK to be carefully tailored to the motivations and capabilities of the target industry sector, and to individual businesses within that sector, to maximise their effectiveness. Tailoring can occur at several levels. For example, laws may be established specifically for particular industries (e.g. legislation for agri-environment schemes in farming), or regulators may pursue particular strategies for different industry sectors and individual businesses within a single regulatory regime, such as the Environmental Permitting regime in the UK. However, tailoring may also lead to the regulatory framework becoming difficult to navigate and appearing inconsistent to the regulated, and more costly to apply for government. A careful balance must therefore be struck between optimising the design of regulation for specific sectors and maintaining an overall regulatory framework that can be readily understood by regulated businesses and cost-effectively applied. Trade associations or other industry-led bodies may be able to provide governance for environmental activity within a sector, with the potential to provide approaches well-tailored to sectoral characteristics (e.g. the Red Tractor scheme in the farming sector). However, the willingness or ability of trade associations to establish such models of

governance cannot be assumed, and will depend on among other things the structure of their membership and their international reach.

7.3.2 Characteristics of regulators

Defra respondents argued that regulatory officers interacting directly with regulated businesses could provide credible local advice and guidance, tailored according to local conditions, which could bring about better environmental performance among the regulated. However, their capacity to fulfil this role would be constrained by the skills and expertise of individual officers and the resources available to allow them to reach target businesses, and the credibility of the threat of regulatory sanctions that they might impose for non-compliance (Table 5-4). Business and trade association respondents reported that relationships with regulatory officers based on mutual trust (providing businesses have demonstrated that they are trustworthy through reliable environmental performance), enabled businesses to try out innovative approaches to achieving environmental objectives, but that trust could be undermined when regulators failed to demonstrate understanding of their businesses, or were inconsistent in decision-making (Figure 6-1 and Section 6.5.2.3).

Together these results provide strong evidence for the importance of the skills and knowledge of regulatory officers for the effectiveness of direct regulation in the UK context, adding to a quite limited body of research examining the practice of front-line officers in environmental regulation (e.g. Pautz & Wamsley, 2012; Sevä & Jagers, 2013; May & Winter, 1999). These skills form part of Sparrow's "regulatory craft" (Sparrow, 2000, 2008), and their significance for respondents of the research presented in this thesis supports his argument that regulator capability can significantly alter the effectiveness of regulatory operations without change to the overarching macro-level policy framework. Views of respondents reinforce the significance of trust in modern governance models (Lange & Gouldson, 2010), and the need for regulators to adapt their regulatory strategy according to the characteristics of the businesses they seek

to regulate (Gunningham, 2011). This body of research underlines the need for governments to carefully manage the skills and resources of regulatory bodies in the face of shrinking budgets to maximise the effectiveness of direct regulation that can still be provided. Training and managed professional development for new recruits and a focus on retaining expert knowledge within regulatory organisations as staff change will be key.

7.3.3 Characteristics of regulatory design

This section discusses important aspects of regulatory design that have been emphasised in this research.

7.3.3.1 Coherent regulatory frameworks

Most Defra policy makers discussed the importance of establishing a coherent mix of regulatory instruments to maximise their overall effectiveness, explaining that instruments can be mutually reinforcing or enabling, but could also interfere with each other and add complexity for regulatees. They noted that government bodies need to coordinate policy design both nationally and locally to achieve coherence, and thought this had worked well on occasions, but not always (Section 5.9.1).

Business and trade association respondents also emphasised the need for coherent mixes of instruments, for example to target different points in material flows along supply chains or through the natural environment. Some noted that this could require direct regulation to provide an overarching framework within which other forms of regulation (e.g. voluntary standards) would operate. In the cases where they considered regulatory frameworks to be incoherent, this was primarily blamed on the failure of local, national or international governmental bodies to coordinate policy design, with a lack of focus on the impact of the cumulative regulatory framework on affected businesses (Figure 6-1 and Section 6.5.2.1).

Over recent years, new forms of policy assessment intended to improve the design of policy and regulation, including with respect to their integration, have

been advocated by governments and studied in the academic literature (Turnpenny et al., 2008). Turnpenny et al. (2008) have examined attempts by the EU, UK, Germany and Sweden to implement integrated policy assessment, to assess the expected impact of change to policy or regulation before it is implemented, considering dimensions of integration with respect to: policy paradigms (e.g. economic growth, sustainable development), scope of impacts (e.g. social exclusion, environmental damage), policy goals, the policy-making process, stakeholder involvement, addressing trade-offs, learning from experience and use of evidence. They found that in practice, policy integration has proved challenging in all countries examined, and argue that improving integration likely depends on “micro-level” changes to the skills and resources of the people performing the assessment, as well as changes to the “meso-level” organisational contexts, and the “macro-level” stakeholder networks, administrative and legal contexts in which they work. In the UK “regulatory impact assessment” (RIA), or latterly “impact assessment”, is a process adopted across government departments intended to ensure that the impacts of major changes to regulation are assessed across economic, social and environmental dimensions. Examining a sample of regulatory impact assessments over the period 2004-2007, Russel and Turnpenny (2009) conclude that this process alone proved insufficient to bring about integration, particularly with regard to sustainable development policy objectives. More recently, Fritsch et al. (2013) have examined impact assessments across multiple policy areas in the UK and EU between 2005 and 2010, finding a steady improvement in their quality, although EU impact assessments have outperformed UK in the assessment of social and environmental impacts alongside economic impacts.

Scholars have gradually moved from examining the comparative theoretical performance of different types of instrument to analysing and optimising instrument mixes in practice (e.g. Rayner & Howlett, 2009). The perspectives of respondents for this research underline the importance of understanding instrument mixes in practice to enable the design of better regulation in the UK

and internationally. However, this seems likely to require both improvements in the policy analysis capability of government and in the capacity of institutions within which they work to enable coordinated policy design. While regulatory impact assessment appears to be making some progress in this respect for major new regulations, work is still required to improve the integration of the existing body of policy and regulation. To address business concerns of a lack of coherence of regulatory frameworks, assessment may need to focus more explicitly on this dimension of integration from the perspective of businesses, alongside the other dimensions of integration identified by Turnpenny et al. (2008). It may also be the case that a lack of integration results from the piecemeal development of items of legislation in response to issues with high political priority at different points in time. Improving integration may therefore require an approach to policy development that can accommodate new political priorities within an overarching stable and coherent framework. The EU Water Framework Directive (European Commission, 2013a), which draws together seven previous areas of legislation to provide a more coherent and effective approach, could offer useful lessons for improving the coherence of other areas of legislation.

7.3.3.2 Flexibility

Defra policy makers saw the need for regulatory instruments to incorporate flexibility to varying industry characteristics (e.g. technologies employed), to local variations in environmental conditions, and to the environmental risks posed by individual businesses. Policy and regulation needed to be flexible over time to accommodate changes in economic or environmental conditions (e.g. as the scale of a particular environmental problem such as landfilling waste increases or decreases) or changes in understanding of environmental risks or solutions (e.g. as business and government understanding of the market dynamics and environmental impacts of packaging waste improve), and some considered providing flexibility and also a relatively certain regulatory framework for businesses to be a significant challenge (Section 5.9.2).

For business and trade association respondents, flexibility was often discussed with related concepts of clarity and prescription in regulations. For some respondents (e.g. in the construction industry) regulations and rules that did not spell out what businesses needed to do to comply were expected to create additional work to understand, interpret and communicate to staff, and were therefore less welcome than clear prescriptive rules. However for others, for example in the water industry for complex water processing plant, clear outcome-based objectives that afford greater flexibility to businesses in how to achieve objectives were preferred (Figure 6-1 and Section 6.5.2.2). Respondents from the waste management, construction and water industries discussed their preference for long-term stability in policy to provide predictable conditions for investment, and noted models (e.g. UK building regulations) that can accommodate some flexibility in requirements over time within a relatively stable framework (Figure 6-1 and Section 6.5.2.7).

Policy makers and regulators are encouraged to provide clear rules that are easy to understand (Dutch Ministry of Justice, 2004; Hampton, 2005). Flexibility can also be desirable, and could be accommodated through “performance based standards” (Coglianese et al., 2002) or voluntary agreements (Bressers & de Bruijn, 2005), but this flexibility may not be appropriate for businesses lacking skills or resources to design responses (Coglianese et al., 2002; Fairman & Yapp, 2005). These results highlight the need for policy makers to tailor the design of regulations and rules to the capability of target businesses, rather than assuming that either more or less prescription is always preferable.

These results also echo finance industry calls for a “long, loud and legal” policy framework to encourage investment in renewable energy, where long-term stability has been found to be a critical factor for policy effectiveness (Bürer & Wüstenhagen, 2009; Held et al., 2006). The results also raise the possibility that regulatory reform could be a cause of unwelcome unpredictability for businesses, as well as an opportunity for improvement. Governments can strive to provide long-term stability for businesses. For example, the Landfill Tax was frequently highlighted during the course of this research as an instrument that

has provided a strong long-term incentive that has transformed the UK waste industry. Regulatory and legislative reform can be planned out over multiple years (e.g. REACH (European Commission, 2013d) has been implemented in phases starting in 2007) to provide relatively predictable changes that businesses can plan for. However, ultimately government must retain the flexibility to change strategy as social, economic or environmental conditions change and so cannot guarantee policy stability.

7.3.3.3 Administrative efficiency

Business and trade association respondents highlighted the need for efficient administrative systems through which regulatory instruments are implemented, for example for applying for permits, obtaining emission rights or reporting on environmental performance. Poorly designed administrative systems, some of which appeared to have little relevance to achieving environmental objectives (“box ticking”) were reported in some cases, and were a source of considerable annoyance and perceptions of “red tape” (Figure 6-1 and Section 6.5.2.4).

Defra’s current Smarter Environmental Regulation Review (SERR) has explicitly sought to examine and improve the mechanisms through which businesses find out about and report on their environmental obligations (Defra, 2013a). The research presented in Chapter 3 and other case studies developed for the same purpose highlights the complexity of the overall environmental regulatory compliance responsibilities of businesses and the effort required by businesses to keep up to date and comply. Defra is now consolidating information reporting requirements and undertaking a major programme of reorganising and rewriting written guidance as it is moved onto the new single government website www.gov.uk.

These results support other research indicating that both direct regulation and alternatives can impose significant administrative costs on participants (Dinica et al., 2007; Krarup & Ramesohl, 2002; Sovacool, 2011). While these costs need to be weighed against the wider social benefits of regulation, for participants in this study poor implementation of administrative systems was a

significant cause of concern. Recent government initiatives have sought to improve the ease with which regulatees can find out about and report on regulation (Defra, 2013a). Greater adoption of service design techniques such as “customer journey mapping” (Heapy & Parker, 2006; Macdonald et al., 2011) could prove beneficial. In this context, customer (or service, or user) journey mapping involves analysing the experience of people interacting with government to understand their sequence, the information exchanged, the emotional impact of the exchange, and likely courses of subsequent events (e.g. a site visit, leading to a requirement for corrective action, leading to another site visit), so that systems can be designed for maximum effectiveness and efficiency. While such analysis approaches are well established in the commercial sector, their application for public services, or for environmental regulation, appears to be in its infancy and is under-researched. Improving the user experience should however be a high priority for government, and has scope to significantly reduce perceptions of “red tape” without need for change to the underlying regulatory framework, which is likely to be much more difficult and time consuming to achieve.

7.3.4 Risk-based regulation

Defra policy makers discussed various characteristics of environmental risks that influence the choice of regulatory intervention and the targeting of regulatory resources, including risk likelihood and impact, spatial variation, who is affected, the number and variety of actors and mitigation actions, persistence and irreversibility, speed of action required and understanding of risks (Section 5.7.2). Characterisation of risks played an important part in policy makers’ thinking about regulatory design, alongside economic, political and other considerations (Section 5.10 and Table 5-5).

Business and trade association respondents focused on the use of risk characterisation to prioritise regulatory effort, including the relative prioritisation of environmental issues for regulation, the prioritisation of regulation of different substances within the same regulatory framework, and the prioritisation of

attention from regulatory officers across different businesses. While in some cases they felt that risks were being appropriately regulated, in others they questioned whether policy priorities and regulatory interventions were truly risk-based (Figure 6-1 and Section 6.5.2.5).

Scholars have called for regulation to be risk-informed, to ensure that limited regulatory resources are targeted to best effect, and methods for risk analysis at a strategic and operational level have been developed and deployed by practitioners (e.g. Gouldson et al. 2009; Prpich et al. 2011). Regulators have been urged to regulate on the basis of risk (Hampton, 2005) and risk-based regulation is embedded in policies of regulatory agencies. However, commentators have observed that regulating on the basis of risk presents epistemic, institutional and normative challenges in its implementation (Rothstein et al., 2006). Löfstedt (2013) has highlighted recent EU regulations and directives that are not risk or evidence based and has called for greater scrutiny of new regulations in this regard, to be taken forward through an informal European Parliamentary Working Group on Risk. Löfstedt suggests this group should work on improving understanding and application of the terms “risk” and “hazard” in European policy making, developing a clearer definition of the precautionary principle, exploring the scientific basis of “pet” risks of member states, and improving understanding and management of risk-risk tradeoffs.

The responses of businesses and trade associations for this research provide evidence that while risk based regulation has been widely called for, and is understood and desired by respondents, its implementation is indeed challenging and has not always been successful. For UK and European regulation to become truly risk-based, it appears that further regulatory reform focused on this objective will be required; a need that must not be lost alongside other foci such as reducing administrative burdens. As government spending in England, including on environmental regulation, continues to be significantly constrained, the capacity of government to target the resources that remain according to environmental risk becomes even more important. Policy makers

need to ensure that regulatory agencies are afforded sufficient operational flexibility to target their resources according to risk, and politicians will need to lead public debate on relative priorities, tackling difficult trade-offs.

7.4 Government and business preferences for types of regulation

The evidence presented in Chapter 5 suggests that Defra policy makers are aware of a wide range of policy and regulatory instruments including direct “command and control” regulation, economic instruments, information based approaches, co- and self-regulation and support and capacity building. They have been seeking ways to harness the wider social influences on business behaviour beyond the state to encourage good environmental behaviour. They considered direct regulation to be necessary in many areas to reduce environmental risks with confidence and to tackle poor performance. Alternatives to direct regulation were generally also considered to be of value in the appropriate industry context, and co-regulation was thought to offer important advantages to accommodate uncertainty and develop evidence and solutions for emerging policy problems (Section 5.2). Policy makers included consideration of a range of constraints and stakeholder preferences in their instrument selection decisions, including the preferences of politicians, industry and the general public (Table 5-5). The current UK government preference for alternatives to direct regulation (Department for Business Innovation and Skills, 2013a) was discussed by around a third of policy makers (Table 5-5).

Case study businesses and trade associations expressed a range of views on which types of regulatory intervention were likely to be effective, and which were preferred from a business perspective (Table 6-5). Some respondents expressed enthusiasm for voluntary approaches to regulation, and highlighted examples of significant voluntary environmental action in particular sectors. However, other respondents were strongly sceptical of voluntary regulation, doubting that businesses would pursue better environmental performance without being compelled to do so. The ability of direct regulation to provide a

“level playing field” nationally or internationally, so that all businesses had to achieve the same environmental standards and could not avoid costs by not complying, was highlighted by several respondents as a significant advantage. In some cases (e.g. in the waste sector) direct regulation was argued to require firmer enforcement of regulations to tackle deliberate non-compliant or illegal behaviour (Section 6.5.2). While the number of respondents was too small to draw generalisable conclusions about the preferences for or suitability of different kinds of regulation for different sectors, the results suggest that the structure of the sector, the capability and attitude towards compliance of its members, the degree of national and international competition and the degree to which regulations are tailored to the sector all play a part in shaping industry attitudes towards regulation (Table 6-4 and Section 6.5.3).

These mixed preferences, where businesses appear to see both advantages and disadvantages in different forms of regulation, are reflected in the academic literature regarding the impact of environmental regulation on firm competitiveness. In their recent systematic review, Iraldo et al. (2011) identify three major theoretical views. Firstly, the “traditionalist” view of neoclassical environmental economics expects that environmental regulation imposes additional costs on compliant businesses leading to loss of market share and industries relocating to territories with less stringent environmental standards (the “pollution haven hypothesis”). Secondly, the “revisionist” view argues that improved environmental performance is a source of competitive advantage, arising from improvements in productivity and new market opportunities (the “Porter hypothesis”). Thirdly the “resource-based” view sees a firm’s competitive advantage as an outcome of valuable organisational capabilities such as continual innovation rather than simply the result of its external environment; capabilities which may be associated with a proactive environmental strategy. Overall, Iraldo et al. find that none of these views succeeds over the others in the available empirical evidence, suggesting that instead a mix of instruments will prove optimal for a given industry or sector. They suggest that traditional (direct) regulation should often be used to guarantee a “level playing field” for

the later application of market-based instruments, to clearly define the “rules of the game”. Economic instruments are then a cornerstone for the implementation of “soft” instruments such as voluntary agreements, which in turn can help to strengthen the competitive effect of mandatory measures. The research presented here shows that case study businesses and policy makers tend to agree with this view.

Examining SME attitudes towards environmental regulation, Petts (2000) found that among a sample of SMEs in England and Wales, non-management participants sought strong enforcement and penalties from direct regulation, while managers demanded consistent regulation to provide a level playing field. Respondents in Petts’ study thought SMEs were typically not pursuing self-regulation, and a balance of direct regulation and self-regulation received only cautious support. More recent UK research suggests that SMEs are motivated primarily by regulatory compliance, are unlikely to self-regulate, and that voluntary approaches are not generally likely to be effective, though may be effective when SMEs have the right combination of capability and pro-environmental orientation (Lynch-Wood & Williamson, 2013). These findings are echoed by Wilson et al. (2012) who found that a sample of UK SMEs had low levels of understanding of environmental legislation and their resultant obligations, and recommend that inspections and audits remain a key part of regulators’ enforcement strategies for SMEs, to improve the probability of legislation improving business environmental behaviour. While the research presented here has not focused on SMEs, where SMEs have been discussed respondents have tended to agree with these views of their motivations and the consequent suitability of regulatory interventions.

It has been argued that in reality we should not expect any single type of regulatory intervention to emerge in general as better or worse performing than another. As Gunningham (2009) puts it, following a review of four decades of environmental law and regulation in Anglo-Saxon jurisdictions:

“Stepping back from the detail of these developments and the particular successes and failures of individual instruments, the broader question remains: what sorts of architectures are likely to work best in terms of effectiveness, efficiency and political acceptability? Unfortunately, the general answer to such questions is it all depends.”

Instead, the challenge for policy makers and regulators is to design a coherent set of interventions tailored to the particular circumstances of the target industry sector or businesses. The views of Defra policy makers and businesses and trade associations captured in this research provide new evidence to support this view for the UK. Policy makers and regulators seeking to improve the efficiency and effectiveness of regulation should consider alternatives to direct regulation as part of a policy mix. However, they should anticipate that businesses may not respond positively to an approach that fails to recognise the part played by direct regulation in providing minimum standards and a level playing field on which other instruments can be built. This research has not directly examined the perspectives of other stakeholders, such as members of the public or NGOs, who may emphasise other factors driving their preferences between forms of regulation, such as the democratic legitimacy or transparency. These views will also influence the development of future environmental governance.

7.5 The role of evidence for regulation and regulatory reform

Defra policy makers discussed the significant role that the state of knowledge about environmental issues plays in instrument selection and regulation (Section 5.11). While some believed that good evidence exists to support their decision making, for others evidence was lacking, for example because assessing impact is intrinsically difficult or because policies have not been in place long enough to assess their effects. Evidence may be contested, which some argued could undermine regulatee’s willingness to comply. Under these conditions of uncertainty, some policy makers described adopting an incremental approach to developing policy as evidence emerges and other

actors (e.g. industry or NGOs) develop their positions on particular issues. Others described the need for a precautionary approach to deal with known hazards with uncertain associated risks. For some, an important advantage of co-regulation is the opportunity provided to develop evidence collaboratively with regulatees.

Several case study trade associations described their activities to develop and use evidence in the interests of their members (Figure 6-1 and Section 6.5.2.6). Examples were provided of evidence of environmental impact being gathered to respond to or in anticipation of scrutiny from customers and the media, and to influence other organisations in the supply/waste management chains of members. Several respondents argued that better evidence in support of regulations would improve the willingness of businesses to comply, and while noting that some regulatory regimes were demonstrably evidence based, others were considered to lack evaluation to demonstrate their impact on environmental outcomes and on costs to businesses affected.

Government departments including Defra are committed to decision making based on evidence (Solesbury, 2001), and invest in evidence generation in priority policy areas (Defra, 2011b). Decision making must accommodate the often significant uncertainties surrounding the impact of environmental regulation on society and the environment. A variety of risk analysis and decision making techniques have been developed that can help policy makers in this task, following an iterative cycle of problem formulation, risk assessment, options appraisal and taking action to address risk (Gormley et al., 2011). The above results provide evidence that at a given point in time Defra policy makers choose regulatory instruments in part on the basis of government's current state of knowledge about the environmental problems being tackled, adopting an iterative approach to risk assessment and appraisal of regulatory options. Judging when a risk assessment justifies a firm legislative regulatory response, and when to allow further time for evidence to be gathered, is a central challenge for policy makers. Some regulatory frameworks, such as REACH, have a built-in process for evidence gathering and decision making to

accommodate current uncertainty; co-regulation can also accommodate evidence gathering.

These results also illustrate how actors other than government, including businesses and trade associations, may invest in evidence generation and dissemination to support their interests, described elsewhere as “brokering” (Davies et al., 2010). Gulbrandsen (2008) contrasts two approaches adopted by scholars to study the interface between science and policy. Under the “rational-instrumental” approach, science provides verifiable facts on which policy makers make decisions. Scholars adopting the “political-institutional” perspective challenge an assumption of the rational-instrumental approach: that the influence of science is independent of the processes through which it is communicated by knowledge producers into the policy-making process. Instead they focus on analyzing the role of political actors, interest groups, and institutions in turning knowledge into policy. The results here suggest that in practice policy makers and other actors are engaged in a process of evidence generation and sharing that requires a political-institutional perspective to be fully understood.

Theories of motivation for compliance with regulation have been broadly categorised (Winter & May, 2001) as “calculated” (fear of detection of violations and resultant punishment), “normative” (feeling a civic duty to comply) and “social” (feeling a social pressure to comply, driven by a desire for approval and respect of significant people with whom regulatees interact). The normative motivation is thought to be related in part to a sense of civic duty to obey laws and general ideological values, and in part to the fairness and reasonableness of the rule given the harm caused by violations. Both policy makers and business and trade association respondents highlighted the importance of evidence that regulation was effective in reducing environmental harm to the willingness of regulatees to comply, providing further evidence in support of this normative element of compliance motivation.

Together with the initial observation from which this thesis originates, that evidence to inform environmental regulatory reform is often lacking, these results underline the continuing need for open and impartial evidence gathering, analysis and synthesis to inform the design of effective environmental regulation. The National Institute for Health and Clinical Excellence (NICE) has for many years provided independent recommendations on health policy in the UK, but similar institutions are lacking in other policy domains. A recent initiative to establish new independent “What Works” institutes for other areas of social policy, including crime reduction, active and independent ageing, early intervention, educational attainment and local economic growth (H. M. Government, 2013), could valuably be extended to inform environmental regulation.

7.6 Business participation in regulatory reform

As discussed in Chapter 4, Defra has sought direct involvement of industry representatives to understand the structure and impact of environmental regulatory frameworks on different sectors. In Section 5.11, Defra policy makers argued that an important advantage of co-regulation (particularly targeted at improving product sustainability) has been the opportunity it provides to develop an agreed evidence base with businesses, as well as building “buy-in” with industry stakeholders. More broadly, Defra policy makers had found that understanding the economic and environmental systems that they are aiming to influence can be a significant challenge (Section 5.12). In Chapter 6, business and trade association respondents generally argued for the early involvement of industry in the design of regulation, to provide a “real world” view of its likely impact that they sometimes considered lacking among policy makers (Section 6.5.4). They expected greater business involvement to provide innovative ideas for meeting environmental objectives and to reduce the number of problems that would later emerge in implementation. However, some respondents from this group highlighted risks of business involvement, including a loss of government independence, and of undue influence of larger firms that would disadvantage smaller businesses.

New UK government guidelines on consultation for policy making and implementation emphasise the need for “greater focus on robust evidence, transparency and engaging with key groups earlier in the process”, and requires policy makers to consider use of more informal forms of consultation such as web-based forums and working groups rather than relying on written consultations (Cabinet Office, 2013b). Regulatory impact assessment provides a process that is intended to ensure that the impacts of regulation on multiple parties, including industry groups, have been taken into account in policy formation. In the UK, the quality of RIAs for sustainable development policy has been found historically lacking (Russel & Turnpenny, 2009), though RIA quality in general is thought to be improving (Fritsch et al., 2013). The results presented in this research underline the great complexity of the regulatory frameworks within which businesses now operate, and suggest that better methods for analysing this complexity so that it can be redesigned are required (Section 5.12). Industry involvement that focuses on providing a detailed perspective on regulation in practice seems essential to achieve the necessary level of understanding. This perspective should complement, but cannot substitute, the knowledge and understanding of policy making and “the regulatory art” provided by practitioners from government and non-state governance organisations. More broadly, industry involvement should occur alongside involvement of other stakeholders (e.g. NGOs) in an open policy-making process.

It should be noted that running and participating in regulatory reform programmes requires a significant commitment or resources from government, businesses and other stakeholders affected. The impact of an individual regulatory instrument can vary significantly between industry sectors, and each sector will be subject to a particular combination of instruments in a unique mix. Analysing these industry-specific variations to identify the need for reform is a major challenge, so government must be adept at identifying where regulatory reform is needed most. While a law-by-law review programme, as implemented through the Red Tape Challenge, may provide a mechanism for identifying

problem areas, an industry sector by industry sector approach may prove more effective at addressing the issues of coherence among instruments that are highlighted within this research. A sector-based approach does present new challenges in itself, however, for example how to prioritise and sequence analyses for different sectors and mitigate the risk that a beneficial change for one sector does not have unintended negative impacts in another. In practice, a combination of industry-by-industry and law-by-law analysis seems likely to prove necessary.

7.7 Government capability in regulatory design

Defra policy makers discussed the challenges of policy making under conditions of uncertainty, and some highlighted a lack of tools to help analyse the human and environmental systems affected by policy and regulation, with the attendant risk of unintended consequences of intervention. Policy makers need to think broadly and creatively, and to be able to communicate and cooperate effectively with other actors involved in achieving environmental objectives, particularly when pursuing co-regulatory approaches (Section 5.12).

Business and trade association respondents typically blamed a perceived lack of coherence in regulatory frameworks on the failure of policy makers to work together across policy domains, or failing to incorporate new requirements into existing regimes (Section 6.5.2.1). From their perspective, policy makers need to understand when prescription and flexibility are appropriate for different types of regulated business (Section 6.5.2.2). They need to be able to design frameworks that enable positive regulatory relationships to develop (Section 6.5.2.3), are administratively efficient (Section 6.5.2.4), risk-informed (Section 6.5.2.4), evidence based (Section 6.5.2.6) and provide a stable policy environment in the face of changing environmental and socio-economic conditions (Section 6.5.2.7). Business and trade association respondents generally felt that greater business involvement in the policy making process would help policy makers to gain a better appreciation of the impact of policy

and regulation on businesses, which they expected to improve the design of the resultant regulations (Section 6.5.4).

A wide range of tools is available for policy makers for the purposes of integrated policy assessment for sustainable development, including assessment frameworks, participatory tools, scenario analysis tools, multi-criteria analysis tools, cost-benefit and cost-effectiveness analysis tools, accounting tools, physical analysis tools and indicator sets, and model tools (de Ridder et al., 2007). However, researchers have found a gap between the tools available and the simpler approaches adopted by policy makers in practice (de Ridder et al., 2007). This could be attributable to a lack of experience of those undertaking the assessment, limited commitment to completing the assessment, limited time, data and other resource constraints, the complexity of the policy, planning and decision-making environment and/or major differences in the tools developed by researchers and consultants and the simpler approaches adopted by practitioners (Lee, 2006). It is not possible to conclude from the research presented in this thesis whether Defra policy makers have examined the full range of tools available and found them lacking, or whether there are other causes for the reported lack of tools to help with policy analysis. A closer examination of this gap would be a valuable line of future research. Specifically, tools to help policy makers to analyse mixes of instruments experienced by different sectors, and the effect of instruments acting across multiple sectors, are required.

The Civil Service Reform Plan (H. M. Government, 2012) sets out the current government's plans to improve the performance of the UK Civil Service in the context of demands for change from the public and civil servants, a large budget deficit, and a growing and aging population, and the consequent need for major changes to the delivery of public services. It summarises the Government's policy agenda as "based on transparency, behaviour impacts, and payment by results, instead of top down targets, regulation and increasing public spending" (H. M. Government, 2012). Reform measures include "open policy making", through which policy analysis may be undertaken by bodies

other than the Civil Service (e.g. academics and think tanks), more sparing use of legislation, funding and regulation and greater use of behavioural insight, transparency and digital engagement to achieve policy objectives, greater focus on understanding “what works”, strengthening policy implementation and improving strategic thinking and horizon scanning. The recently revised Civil Service competency framework for policy makers states that “Policy Professionals bring together evidence, politics and delivery to support Ministers in achieving outcomes for government” (UK Civil Service, 2013). It emphasises the need for policy makers to develop and use a sound evidence base, understand and manage the political context, and plan from the outset how the policy will be delivered.

Requirements for the use of evidence, risk analysis, implementation of workable (potentially co-designed) systems, use of digital technologies and evaluation and iterative improvement align closely with the skills called for by participants in the research presented here. While arguing for greater involvement of those involved in the delivery of implemented policies in their design, the Civil Service Reform Plan says little about improving the implementation of state regulation. As long as state regulation continues to feature in the policy mix, policy makers will continue to need to understand how regulation works in practice, to ensure effective regulatory relationships (Section 6.5.2.3 and 7.3.2). Inter-agency knowledge sharing networks that spread understanding between policy designers and regulatory practitioners are likely to be key. Secondments that exchange staff between regulatory and policy making organisations and into industry are also likely to be of value, to exchange practical understanding of the operations and challenges of working in different parts of the policy design and regulatory implementation chain.

7.8 Implications for regulatory reform

This section draws together findings from the preceding discussion, summarising their implications for regulatory reform initiatives pursued by governments.

Use and further development of typology: The typology of instruments presented in Table 7-1 provides a firm basis to inform policy makers and regulators considering options for new regulation or the reform of existing regulation. Informal feedback from policy makers and regulators on the guidance document developed from this research programme (Appendix E) indicates that it is a useful framework for structure thinking and evidence. However, over time new forms of instrument will no doubt develop. Therefore an ongoing process of development and evidence-gathering will be necessary to ensure the typology is kept up to date.

Adopting alternatives to direct regulation: The evidence gathered through this research indicates that alternative instruments other than direct regulation have a place in achieving environmental policy objectives. However, their suitability depends on a range of factors that vary between industry contexts, including among other things the characteristics of the targeted environmental risks, the size, motivations and capabilities of regulated businesses, their willingness and capacity to organise themselves for joint environmental action, and the characteristics of the markets in which they operate; and these factors will change over time. This research suggests that before the process of instrument selection is undertaken a realistic assessment of government and industry capability to implement each type of instrument must be undertaken, as a lack of capability can significantly undermine the effectiveness of any chosen approach. Rather than considering instruments in isolation, those seeking to improve the design of regulatory frameworks need to understand and improve the full mix of instruments that a business faces, which is likely to include a base of direct regulation to provide a “level playing field” and minimum standards, upon which other instruments are built. Successful implementation of regulatory frameworks by government and/or industry depend on the capability of actors involved, so close attention must be paid to capability as a deciding factor in the choice of instruments pursued.

Generation and use of evidence: This research has found that while improving, the evidence base for regulatory effectiveness is fragmented, may

be contested and is often lacking. More ex-post evaluations of regulatory effectiveness are required to test the effectiveness and efficiency of interventions in practice, to inform future regulatory design and assess the accuracy of ex-ante regulatory impact assessments. Better evidence for effectiveness and efficiency may also increase willingness of businesses to comply with regulation, in turn increasing its effectiveness in achieving intended objectives. Co-regulation can provide a useful mechanism for generating new evidence in collaboration between industry, government and other stakeholders. Evidence may be generated and brokered by different stakeholders in regulatory reform to support their own interests, so a rigorous transparent process of evidence generation, gathering, assessment and synthesis is required to ensure the best possible view of the weight of evidence is established to inform the political process of policy making.

Addressing multiple dimensions of reform: This research has identified a range of factors affecting the effectiveness and efficiency of regulatory frameworks in practice, including their coherence, flexibility and the efficiency of their implemented administrative processes, the extent to which they truly reflect the principles of risk-based regulation, and the resources and capabilities of government or non-government regulatory officers and governance organisations. While these factors are linked to the underlying legal framework, they are frequently not defined in law but instead reflect how the law has been implemented through institutions. While approaching regulatory reform programmes on the basis of a statute-by-statute review may provide a convenient method for planning, simple metrics of “success”, such as the number of lines of regulation that have been removed, are unlikely to provide a good measure of whether regulation has been improved. Instead, a fuller (though proportionate) appraisal covering the multiple dimensions suggested by integrated assessment scholars is likely to be required.

Analysing instrument mixes for industry sectors: Given that the suitability of different forms of regulation depends significantly on characteristics that vary between industry sectors, it seems likely that regulatory reform proposals need

to be analysed on an industry-sector by industry-sector basis to maximise regulatory efficiency and effectiveness. However, this approach in turn presents challenges as many regulations affect multiple industry sectors, so change designed for one sector may have adverse effects on others. While regulatory impact assessment methods require that impacts on multiple sectors are required, how to undertake this complex analytical task requires further research beyond the scope of this thesis. Recent work by Weber et al. (2013) examining the policy mix for controlling noise in the Netherlands provides a useful starting point for further work in other policy domains and industries. Policy makers are likely to require supportive organisational arrangements, for example that encourage inter-departmental working and that explicitly incorporate the resolution of trade-offs between different policy domains championed by different political leaders, to be able to develop more integrated regulation in future.

Involving the business community: Case study businesses and trade associations frequently called for their earlier and greater involvement in the design of regulation. These calls are echoed in recent UK government guidance on consultation, which also calls for more collaborative consultation approaches beyond the traditional review of consultation documents. While recognising that policy makers and regulators must ensure that such involvement is transparent, and balanced with involvement of other stakeholders affected by regulatory reform, this research suggests that such involvement would be particularly useful to aid policy makers and regulators in understanding the interface between business and regulatory institutions. This perspective will help to identify areas of incoherence and to improve the administrative efficiency of implemented regulation, and provide greater insight into the important role played by front-line regulatory officers.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This chapter begins by summarising how the research presented in this thesis meets the objectives described in Chapter 1 (Section 8.2). It summarises the novelty and contribution of this work (Section 8.3), and provides a critical review (Section 8.4), and suggestions for further research (Section 8.5). Finally it summarises recommendations to government and industry that have arisen (Section 8.6).

8.2 How this research fulfils its objectives

This section reviews how the research described in this thesis has met each research objective set out in Section 1.3.

Objective 1: Identify the total range of instruments available to policy makers and regulators and the factors thought to affect their effectiveness and efficiency in practice.

Objective 1 is fulfilled by Chapter 2. A novel typology of instruments was developed from the prior art (Table 2-1), and evidence of what types of instrument have worked when and why was examined, drawing on international experience and recent examples from the UK. Important factors affecting their effectiveness in practice identified from this review are presented in Section 2.8, and include characteristics of instrument design (coherence and flexibility), characteristics of the regulated (motivation and capacity) and characteristics of regulators (motivation, risk-based decision making capability, technical knowledge and negotiation skills). Finding evidence to be frequently lacking, this review characterised the types of evidence required to enable regulatory reform and characterised gaps. Ethnographic research was proposed as an important approach to examine the particular evidence gap concerning nuances of regulatory practice.

Objective 2: Examine the regulatory frameworks in place for illustrative case study business sectors in the UK.

Objective 2 is fulfilled by Chapter 4. Five case study sectors were examined, summarising for each sector important industry characteristics, the regulatory framework, and providing example views from industry on the structure of legislation, how businesses locate and use guidance, information reporting obligations and compliance assurance requirements. These high-level case studies provide practical examples of instrument mixes in place, grounding the theoretical discussion in Chapter 2 and providing context for the views expressed by policy makers and industry representatives in Chapters 5 and 6. They illustrate that for these industries businesses typically are required to fulfil a large number of environmental regulatory obligations, originating from multiple laws and implemented through multiple government agencies. Understanding and complying with these obligations reportedly required significant resource commitment from businesses, which may prove challenging for smaller businesses where resources are limited. Problems identified by respondents included those arising from incoherence in obligations and processes between regulatory regimes, lack of clarity in requirements and definitions, and difficulties in finding information about obligations through multiple government channels. Various proposals for improving regulatory frameworks were made, including to the design of statute, to the responsibilities ascribed to implementing agencies, and to the design of regulatory processes and information provision.

Objective 3: Identify the factors that policy makers believe affect the selection, effectiveness, and efficiency of policy instruments.

Objective 3 is fulfilled by Chapter 5. Thirty-three Defra policy makers were interviewed to explore the range of instruments available to achieve policy objectives, validating and extending the typology of instruments developed to meet Objective 1 (Table 5-3 and Table 5-6). Policy makers were found to be seeking to harness the influence of non-governmental resources to encourage good environmental behaviour (Figure 5-2). The relevance of each influence

varies as risk and industry characteristics vary between policy areas (Section 5.7 and Table 5-4). The typology of policy and regulatory instruments was refined (Table 5-3 and Table 5-6). Direct regulation was considered necessary in many areas, to reduce environmental risks with confidence and to tackle poor environmental performance, while co-regulatory approaches may provide important advantages to help accommodate uncertainty for emerging policy problems, providing a mechanism to develop trusted evidence and to refine objectives as problems are better understood. The case study found that the choice of instruments made by policy makers arose from consideration of (i) the characteristics of policy and environmental risk management objectives, (ii) target actor attitudes, capabilities and interactions, (iii) policy instrument options known, (iv) instrument design objectives and (v) social, legal and political selection factors. The choices policy makers then made were influenced by their state of knowledge for each of these dimensions, mediated by their capabilities in policy making (Figure 5-4).

Objective 4: Identify the factors that businesses believe affect selection, effectiveness and efficiency of instruments.

Objective 4 is fulfilled by Chapter 6. Thirty-four respondents from 30 UK businesses and industry bodies from 5 industry sectors were interviewed to gather their perspectives on the range and suitability of policy and regulatory instruments. The typology of instruments developed for Objective 1 was further validated and refined (Table 6-3 and Table 7-1). While some respondents argued for the wider adoption of voluntary approaches, others preferred direct regulation to tackle poor performance and provide a level playing field (Table 6-5). Respondents sought regulatory frameworks that are coherent (Section 6.5.2.1), balance clarity, prescription and flexibility (Section 6.5.2.2), are enabled by positive regulatory relationships (Section 6.5.2.3), administratively efficient (Section 6.5.2.4), targeted according to risk magnitude and character (Section 6.5.2.5), evidence-based (Section 6.5.2.6), and that deliver long-term market stability for regulated businesses (Section 6.5.2.7). The findings suggest that theoretical advantages of different forms of regulation may be undermined

by poor implementation. Respondents argued that greater industry involvement in regulatory design could improve its efficiency and effectiveness (Section 6.5.4). Anticipated differences in performance between instruments could be undermined by poor implementation, so participants argue for greater industry involvement in regulatory reform to identify problems and solutions. Results support the need for policy makers and regulators to tailor an effective mix of instruments for a given sector, and for regulatory reform that tackles the details of implementation and major integrative challenges for government.

Objective 5: Evaluate existing evidence and theory in light of the data gathered from these case studies, and develop recommendations for future regulatory reform programmes.

Objective 5 is fulfilled by Chapter 7. The case study respondents have validated and extended the typology of instruments developed under Objective 1, which provides a firm basis for policy making by practitioners, although it should be expected to evolve as new governance models are developed (Section 7.2). The research provides new evidence in support of well-established theories of motivation for sustainable business motivation (Section 7.3.1) while drawing attention to the characteristics necessary for trade associations to lead voluntary action for their members, which cannot be assumed to always be in place (Section 7.3.1). New evidence is provided for the impact of regulatory officers on regulatory effectiveness, underlining the importance of their relationships with the regulated, trust, and the ability to cooperate with good performers while tackling poor performance with firm enforcement (Section 7.3.2). Regarding regulatory design, respondents have emphasised the need for greater coherence in some aspects of the UK regulatory framework (Section 7.3.3.1), echoing other research (UKELA, 2012). New evidence for the need for careful tailoring of the prescription and flexibility of regulation according to the sector targeted has been presented (Section 7.3.3.2), while drawing attention to the need for the better design of regulatory administrative systems and further research into how to achieve this (Section 7.3.3.3). While respondents called for regulation to be risk based, in line with well-established regulatory theory and

principles, it appears that further work is required to achieve this in practice, so achieving risk-based regulation should remain a focus of regulatory reform (Section 7.3.4). New and perhaps counter-intuitive evidence for mixed preferences for different forms of regulation among businesses has been gathered through this research, supporting theories calling for a tailored mix of interventions that includes direct regulation to provide minimum standards and a level playing field, upon which other forms of environmental governance can be built (Section 7.4). The research has provided evidence for the availability of evidence influencing instrument selection decisions by policy makers, while evidence is brokered among regulatory stakeholders, and can affect compliance motivations among the regulated (Section 7.5). While in theory various tools exist to support policy design, policy makers have reportedly found them lacking, and greater involvement of businesses in regulatory design has been called for by business respondents (Section 7.6 and 7.7). Section 8.3 below highlights particular points of novelty and contribution among these findings, while Section 8.6 summarises recommendations arising for government and industry.

8.3 Summary of novelty and contribution

The key areas of novelty and contribution of this research are as follows:

- The research has been undertaken using a novel methodology that includes close working with a government department through an industrial placement, providing an “insider’s view” of the realities of government policy making and regulation.
- The research developed and refined a typology of regulatory instruments based on the prior art (Department for Business Innovation and Skills, 2013a; Gouldson et al., 2008; Perman et al., 2003) through validation with 67 practitioners from government and industry (Table 5-3, Table 6-3, Table 7-1). This has been developed into guidance for practitioners now in use at Defra (Appendix E).

- The research provides new data and insight into instrument selection at Defra, which is a critical case for UK environmental policy making (Chapter 5), and new data and insight into industry preferences for instrument selection in the UK context (Chapter 6).
- The research provides a considerable body of evidence for the impact of a range of factors on regulatory effectiveness in the UK context, including the quality of relationships between regulatory officers and the regulated (Section 7.3.2), the coherence of the regulatory framework (Section 7.3.3.1), the suitability of the level of flexibility or prescription in rules for regulated businesses (Section 7.3.3.2), and the administrative design of regulation at the interface between businesses and regulators (Section 7.3.3.3).
- The research provides evidence concerning risk characterisation by policy makers, regulators and businesses for regulation, demonstrating the challenges of risk-based regulation in practice (Section 7.3.4).
- The research provides evidence that, to maximise effectiveness and efficiency, regulatory frameworks should be tailored to the target businesses, utilising a mix of instruments rather than any one intervention being more or less effective in general (Section 7.4).
- The research provides evidence for the tactical development and communication of evidence of business environmental impact among stakeholders, and the effect of evidence for the effectiveness of regulation on motivations for compliance (Section 7.5).
- The research highlights the need for policy makers and regulators to work collaboratively with the business community in the process of regulatory reform, to gain insight into the impact of regulation on business operations (Section 7.6), and provides new evidence that improved processes and skills in business engagement and regulatory analysis may be required by government to enable greater use of non-governmental forms of environmental governance (Section 7.7).

8.4 Critical review

While critically reviewing this thesis a number of themes arose, which are discussed below.

Firstly, the new data in this thesis have focused on two groups of stakeholders in regulatory reform: policy makers (Chapter 6) and industry (Chapters 4 and 6). Other groups whose perspectives are likely to be of particular relevance to this research include governmental and non-governmental regulatory bodies, and representatives of civil society, such as environmental non-governmental organisations and consumer groups. While in principle policy makers should understand and take into account these perspectives when designing policy, and have reflected these perspectives in their accounts of instrument selection in this thesis, it is likely that new insight would be gained from gathering data from these groups directly. This was not possible within the time available for this research.

Secondly, while the researcher sought where appropriate to challenge opinions expressed by interviews by respondents to test their validity, and other sources of evidence have been used to triangulate findings where possible, the new research presented here represents the views expressed by respondents. Researchers have found that parties affected by regulation may pursue strategic behaviour to influence its formulation (Bailey et al., 2002), and such strategic behaviour may be reflected in responses provided by business and trade association interviewees. Similarly, responses provided by Defra respondents may provide an incomplete view of reality. These limitations are reflected in the claims made for the validity of this research; however, with greater access to relevant data more triangulation may have been possible, for example to compare claimed performance of instruments with other evaluations.

8.5 Suggestions for further research

Further research in the following areas is suggested:

- Further research to develop and use methods for analysing mixes of policy and regulatory interventions is required, to develop tools to support policy makers, regulators and other stakeholders in regulatory reform efforts. This would include examination of the utility of service design techniques (Heapy & Parker, 2006) to support the redesign of the interface between the regulated and regulators. It would also include examination of the reasons for any gap between the theoretical literature on policy appraisal and the work of practitioners, and recommend how any gaps identified could be bridged.
- The case study of instrument selection in practice provided at Chapter 6 provides a valuable insight into the work of Defra. Other important UK organisations for this research for which further case study research would be relevant include the Department of Energy and Climate Change (DECC), the Department for Communities and Local Government (DCLG), and the Environment Agency. Of these, the case of instrument selection at the Environment Agency would perhaps be of greatest complementary value, providing a contrasting insight into instrument selection at the industry sector or individual business level. Similarly, the perspectives of environmental NGOs and consumer groups would also likely add valuable new dimensions to the work presented here.
- Further research examining the effectiveness of front-line environmental regulatory officers is required, for both those within government agencies and those employed in assurance roles in non-governmental regulatory institutions, building on the limited body of work of authors such as Pautz and Sparrow (e.g. Pautz & Wamsley, 2012; Sevä & Jagers, 2013; May & Winter, 1999; Sparrow, 2008).
- In general, further research is required that examines the chain of cause and effect between regulatory interventions and environmental outcomes, to improve the evidence base for comparing the effectiveness

and efficiency of different instrument types. A case study/multiple-case study approach (Yin, 2009) providing ex-post evaluations of nationally significant instruments would be particularly valuable to inform regulatory reform, as would systematic reviews to synthesise as far as possible evidence from multiple cases.

8.6 Recommendations to government and industry

As described in more detail in Section 7.8, the following recommendations are made to government and industry:

- **Use and further development of typology:** The typology of instruments presented in Table 7-1 provides a firm basis to inform policy makers and regulators considering options for new regulation or the reform of existing regulation. It should be developed further as new instruments are developed, and used as a structure for categorising evidence for instrument effectiveness and efficiency.
- **Adopting alternatives to direct regulation:** The evidence gathered through this research indicates that alternative instruments other than direct regulation have a place in achieving environmental policy objectives, but their suitability depends on context. Individual instruments need to be understood as part of a mix, which is likely to include a base of direct regulation to provide a “level playing field” and minimum standards, upon which other instruments are built. Close attention must be paid to capability of government and regulatory actors as a deciding factor in the choice of instruments pursued.
- **Generation and use of evidence:** This research has found that while improving, the evidence base for regulatory effectiveness is fragmented, may be contested and is often lacking; more ex-post evaluations of regulatory effectiveness and efficiency are required. Better evidence may also increase willingness of businesses to comply with regulation, in turn increasing its effectiveness.

- **Addressing multiple dimensions of regulatory reform:** Regulatory reform programmes need to address a range of factors affecting the effectiveness and efficiency of regulatory frameworks in practice, including their coherence, flexibility and the efficiency of their implemented administrative processes, the extent to which they truly reflect the principles of risk-based regulation, and the resources and capabilities of government or non-government regulatory officers and governance organisations.
- **Analysing instrument mixes for industry sectors:** Regulatory reform proposals are likely to need to be analysed on an industry-sector by industry-sector basis to maximise regulatory efficiency and effectiveness, though this presents significant analytical challenges. Policy makers are likely to require supportive organisational arrangements to enable cross-departmental coordination and resolution of political tradeoffs to make more integrated regulatory design possible.
- **Involving the business community:** Greater, earlier, but transparent involvement of businesses in regulatory design, as recommended by recent UK government guidance, could particularly help policy makers and regulators to identify areas of incoherence and to improve the administrative efficiency of implemented regulation, and provide greater insight into the important role played by front-line regulatory officers.

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APPENDICES

Appendix A : Interview briefing notes

A.1 Interview briefing note for Defra interviews

Environmental policy instrument selection – what works when and why?

Briefing for Defra policy maker interviews, September – October 2011

Introduction

Thank you for agreeing to contribute to this research.

Working within the Better Regulation Team and with [...] and their teams, I have been developing a guidance document about instrument selection, exploring which policy instruments work when, and why this is the case. This includes a typology of different policy instruments available to policy makers, which I would like to check with you to make sure the structure makes sense and is representative of the options that you think can be used, and to explore what determines when different instruments are appropriate. The typology is included at the end of this briefing note in Table 1*, and I would be grateful if you could review it prior to our meeting.

I am also compiling a list of example policy instruments that have been effective in the UK, to provide evidence to show how instruments work in practice. I would therefore like to discuss with you the best examples to include from your perspective, from which Defra colleagues can learn for future policy design and regulatory reform.

We are planning to issue a first version of the instrument selection guidance document in October. Following this I will research and develop a supporting database of example instruments, and update the guidance in 2012 and 2013.

This research forms part of my PhD research programme at [...], and is sponsored by Defra. This will include publishing a written thesis and papers for academic journals. I would like to record our conversation so that I can focus on the interview as we speak, and then return to the recording for future reference

and analysis.

I will keep the recording confidential to me and my supervisors at [...], and I will anonymise information you provide in any written material I publish. I will provide you with the opportunity to review the use of data you have provided before I publish, and you can withdraw your data at any time prior to publication. I will only use direct quotes from you with your express permission.

If you are not happy to be recorded, please let me know at the start of the discussion and I will take written notes instead. Your participation in the research is entirely voluntary, so if you would like to withdraw please just let me know.

Your input will be invaluable to help develop a robust and evidence-based view of what policy instruments work when and why, helping to inform future policymaking across Defra and beyond.

Questions for discussion

Q1) Before we meet I will review the main areas of policy that I understand fall within your responsibility, and will begin the discussion by checking this understanding with you.

Q2) The typology of instruments in Table 1 provides a broad categorisation of types of policy option that policy makers can choose from. Do you think this typology is comprehensive? Can you identify any significant gaps?

Q3) I wish to compile a set of examples of policy instruments from UK environmental policy that have worked in practice, to use as data to compare with theories of what works when and why. Which policy instruments are you aware of that have worked well? Why has this been the case, and how has their effectiveness been demonstrated?

Q4) Which policy instruments are you aware of that have worked less well? Why do you think this has been the case?

Q5) Do you think policy in your area could be improved? Is there scope to make more use of approaches other than direct regulation?

Q6) Thinking about the typology of instruments and the examples you have identified, which factors do you think determine whether or not a policy instrument will be effective for a given policy context?

* The briefing note included a copy of Table 2-1.

A.2 Interview briefing note for business and trade association interviews



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Dear Sir/Madam

**Choosing better approaches to environmental regulation –
invitation to participate in research**

I am writing to invite you to participate in an independent research project being undertaken by Cranfield University as part of a PhD research programme co-sponsored by the Defra Better Regulation Programme.

Defra and its delivery partners are committed to making a strong contribution to the Coalition Government's regulatory reform agenda. The focus is on achieving public policy objectives in ways that encourage sustainable growth and minimise the burden on those affected by regulation. One of the Coalition Government's central aims is to free business and civil society from unnecessarily burdensome and detailed regulation. Where possible this will be achieved by simplifying regulation and using alternative policy levers so as to enable businesses and civil society to innovate, diversify and grow whilst continuing to meet public policy objectives.

The purpose of this stage of the PhD research programme is to gather views from the business community on which types of policy and regulatory instrument have worked well when, and why this is the case. Taking part would involve a ½ - ¾ hr interview conducted by phone with our PhD researcher, Chris Taylor, using the interview guide included overleaf. The analysis of the interviews (which will be anonymised) will be published as an academic research paper.

I hope that you will be able to find time to contribute to the research. I would be grateful if you could let Chris know whether you will be able to take part by emailing him at c.taylor@cranfield.ac.uk, or calling on 07970 754161. If you have any questions please do not hesitate to get in touch with Chris to discuss further.

Yours sincerely

A handwritten signature in blue ink, which appears to read "E Lockhart-Mummery".

Edward Lockhart-Mummery
Evidence Lead, Better Regulation Programme, Defra

About this research

The interview will be recorded so that I can focus on the discussion and then return to the recording for future analysis. The recording will be kept confidential to the Cranfield research team, and information you provide will be anonymised in any published material. We anticipate that the findings from the research will be published in an academic journal. I will provide you with the opportunity to review the use of data you have provided before publication, and you can withdraw your data at any time prior to that point. Direct quotes (also anonymised) would only be included with your express permission. If you are not happy to be recorded, please let me know at the start of the discussion and I will take written notes instead. Your participation in the research is entirely voluntary, and you can of course withdraw at any point in the process.

Chris Taylor
Centre for Environmental Risks and Futures
Cranfield University

Questions for discussion

Q1) Before the interview I will review the main areas of environmental policy and regulation that affect businesses in your sector, and will begin the discussion by briefly checking this understanding with you.

Q2) The typology¹ in Table 1 provides a broad categorisation of types of policy and regulatory instrument that policy makers can choose from. Do you think this typology is comprehensive? Can you identify any significant gaps?

Q3) Which policy and regulatory instruments are you aware of that have worked well? Why has this been the case, and how has their effectiveness been demonstrated?

Q4) Which policy and regulatory instruments are you aware of that have worked less well? Why do you think this has been the case?

Q5) Do you think environmental policy or regulation for your industry could be improved? Is there scope to make more use of approaches other than direct regulation?

Q6) Thinking about the typology of instruments and the examples you have identified, which factors do you think determine whether or not a policy or regulatory instrument will be effective?

¹ Based on Taylor, C., Pollard, S., Rocks, S. and Angus, A. (2012), "Selecting Policy Instruments for Better Environmental Regulation: a Critique and Future Research Agenda", *Environmental Policy and Governance*, vol. 22, no. 4, pp. 268-292. <http://dx.doi.org/10.1002/env.1584>

Table 1: Policy and regulatory instruments that government can adopt or support

Type	Variant	Description	Example applications
Direct "command and control" regulation	Ambient pollution requirements	The regulator specifies required maximum levels of ambient pollution, allowing flexibility to polluters to decide how to achieve that level. In the EU, ambient targets have been set within EU directives, which member states tackle through their national policy mix	Water quality targets, air pollution targets
	Input restrictions and output quotas	Restrictions are applied in the use or output of products. If a material or practice is considered to be sufficiently harmful its use may be restricted or banned entirely, with penalties enforced for violations of the ban. Where banned materials remain in use, their disposal will need to be carefully controlled.	Restrictions in pesticide or fertiliser use, restrictions in production of potentially harmful chemicals
	Non-transferable emissions licences	Typically a regulator issues a non-transferable licence, in the UK often referred to as a permit, to a business that gives authorisation to operate according to specified environmental performance requirements, for example maximum permitted levels of emissions. The regulator monitors the operation to ensure compliance, and may enforce penalties for non-compliance.	Controls on emissions to air and water, controls on waste production and disposal
	Technology controls	The regulator specifies requirements for how a business operates, specifying the use of particular processes or technologies. Variations of standards include application of "best practicable environmental option" (BPEO), "best practicable means" (BPM), "best available techniques not entailing excessive cost" (BATNEEC) and "best available technique" (BAT).	Mandatory use of catalytic converters in road vehicles, use of specific pollution abatement technologies
	Zoning/ location controls	Human impacts on the environment in a particular area can be controlled through spatial controls. Spatial controls can be used to locate polluters away from people and sensitive ecosystems, or to prevent clustering of harmful activities, or (less commonly) to move people away from sources of harm.	Low emissions zones in urban areas, building development controls, national parks and conservation areas, controlled fishing zones, marine conservation areas
Economic instruments	Taxes and subsidies	Environmental taxes and subsidies operate by changing the market price of a good or service, reducing or increasing the quantity demanded and supplied in the market	Taxes on emissions to air, land, and on resource use. Subsidies to support renewable energy
	Tradable rights	Tradable rights systems work by specifying a quantity of allowances, e.g. to abstract water or to emit carbon, which can then be traded amongst users. The system is designed to create an opportunity cost of using an allowance, and therefore also creates benefits from not using an allowance. Trading allows market actors to find the allocation of allowances that maximises the cost-effectiveness of using the allowance	Individual tradable quotas for fisheries, water abstraction rights, emissions trading e.g. for CO ₂ , SO _x , discharge to water
	Payments	Conditional payments may be made to incentivise a particular activity. 'Payments for Environmental Services' (PES) involve beneficiaries (state or private) paying ecosystem managers for the benefits delivered by those ecosystems.	Agri-environment payments, conservation payments, deposit return payments

Type	Variant	Description	Example applications
Information based instruments	Targeted information provision	Information is made available by public or private bodies to enable businesses or individuals to make better-informed decisions that impact upon the environment.	Training programmes, advisory bodies (e.g. UK Carbon Trust and Energy Savings Trust)
	Naming and shaming/faming	Information is made available describing the environmental performance of businesses, through for example a publicised inventory of toxic emissions, with the intention of incentivising better environmental behaviour through avoided damage to or enhancement of corporate reputation.	Emissions inventories, public accolades and prizes, adverse publicity associated with prosecutions
	Registration, labelling and certification	Typically information describing the environmental performance of the businesses delivering a product or service is made available to consumers using a product label, enabling consumers to choose products with better environmental performance.	Food labelling, electrical product labelling
Co-regulation and self-regulation	Voluntary regulation	A group of businesses, often organised through a trade association, chooses to apply environmental performance standards as a condition of membership of an industry group.	Responsible Care Initiative in chemicals industry
	Covenants and negotiated agreements	In this approach government makes an agreement with regulated businesses to achieve particular standards, which forms a contract and may incur sanctions if the contract is not met.	Packaging reduction agreements, recycling agreements, pollution reduction agreements
	Private corporate regulation	Businesses may choose to apply environmental standards both within their organisation and along their supply chain, so that the purchasing business is effectively acting as a regulator of suppliers' performance.	Food retailer sustainability programmes, government procurement requirements
	Private professional regulation	A professional body acts to apply standards through conditions of membership.	Membership of professional bodies
	Self-regulation	Businesses may choose unilaterally to apply environmental performance standards, for example by adopting an externally monitored standard such as ISO14001 or EU EMAS, or as a feature of corporate social responsibility commitments.	Environmental management systems, unilateral commitments to good performance
	Civic regulation	Civic organisations, for example conservation charities or local community groups, may apply pressure to businesses to improve environmental performance through scrutiny of their behaviour and publicising good or bad performance.	Activities of NGOs and community groups
Support mechanisms and capacity building	Research and knowledge generation	Governments or other actors may undertake research to increase knowledge that informs better environmental decision making.	Funding of university research
	Demonstration projects and knowledge diffusion	Governments may choose to invest in demonstration projects to demonstrate feasibility, raise awareness and reduce risks of new technologies or processes. This investment could be managed through a specially designed investment institution, such as the UK's planned Green Investment Bank.	Carbon capture and storage, sustainable agriculture practice, eco-homes and buildings
	Network building and joint problem solving	Initiatives designed to encourage people to exchange ideas and learning to improve environmental performance.	Discussion groups, conferences, networking events

Appendix B : Regulatory instruments for multiple-case study industries

The following tables provide summaries of key regulatory instruments for each of the case study sectors examined in Chapter 6, prepared in advance of research interviews to provide contextual knowledge.

B.1 Construction and construction products regulatory instruments

Instrument type	Instrument name
Direct regulation	<p>Environmental permitting regulations 2010 (EA or LA) - implement EU IPPC Directive 2008, which in turn will be absorbed into the Industrial Emissions Directive 2010 (along with Waste Incineration Directive (including sewage), large combustion plants, VOCs and titanium dioxide industry).</p> <p>Planning permission, which may include species surveys, EIA etc.</p> <p>Water Act 2003 - Water abstraction licence/exemptions e.g. for dewatering - with Water Industry Act 1991 - requirement for water resources management plan from water companies, and drought plans.</p> <p>Waste duty of care requirements.</p> <p>Environmental Permitting Regulations - Discharge to water (note requirement to contact sewerage undertaker to discharge to sewer).</p> <p>Building Regulations 2000 esp. Parts D (Toxic Substances); G (Sanitation, Hot Water Safety and Water Efficiency); H (Drainage and waste disposal); L (Conservation of fuel and power).</p> <p>Construction Products Regulations.</p> <p>Construction Design and Management Regulations.</p> <p>Environmental Impact Assessment - under Town and Country Planning Regulations - including need for wildlife surveys.</p> <p>Sustainable Drainage System (SuDS)/ National Standard for Sustainable Drainage/ Flood and Water Mgmt Act 2010.</p> <p>Contaminated Land regulations (Part 2A of Env Protection Act 1990).</p>

Instrument type	Instrument name
	Flood defence consent from EA (main rivers)/local river authority. Hazardous waste regulations. Nuisance monitoring. Site Waste Management Plans. Tree preservation orders. Wildlife protection – licensing.
Economic instruments	CRC Energy Efficiency Scheme. Landfill Tax. Renewables Obligation/ Renewables Obligation Certificates (ROCs). Government procurement standards. Other incentives for sustainable buildings - Warm Front , Carbon Emissions Reduction Target (CERT) , Community Energy Saving Programme (CESP), Feed-in Tariff, Renewable Heat Incentive , The Green Deal.
Information based instruments	Energy Performance Certificates. PEFC - sustainable forestry standard. FSC - sustainable forestry standard.
Co- and self-regulation	Contaminated Land: Applications in Real Environments (CL:AIRE) - Definition of Waste Code Of Practice (DoWCoP). Code For Sustainable Homes. Considerate Constructors Scheme. Halving Waste to Landfill Commitment. ISO14001. BREEAM. CEN350 - EU standard on construction product sustainability. BES6001 and BS8902 - building product sustainability standards.

Instrument type	Instrument name
Support and capacity building	Waste and Resources Action Programme (WRAP). Zero Carbon Hub - towards Zero Carbon Homes by 2016; zero carbon requirement is under consultation to be built into the building regulations part L http://www.building.co.uk/sustainability/sustainability-news/government-commits-to-zero-carbon-homes-by-2016/5052153.article . Contaminated Land: Applications in Real Environments (CL:AIRE).

B.2 Food and agriculture regulatory instruments

Instrument type	Instrument name		
	Agriculture	Food and drink manufacturing	Food and drink retail
Direct regulation	Control of Pesticides/Plant Protection Products Regs – pesticide use. Nitrate Pollution Prevention Regulations – Nitrate Vulnerable Zones. Environmental Permitting Regulations/ Sludge Use in Agriculture/ Hazardous Waste/ Environmental Protection (Duty of Care) – waste/agricultural waste. Environmental permitting for intensive farms – including emissions and waste. Water Resources Act/Regulations – water abstraction. Water Resources (Control of Pollution)(Silage,	Environmental Permitting Regulations/ IPPC – permitting of higher risk sites e.g. large dairy manufacturing – including waste disposal e.g. spreading waste on land. Water Resources Act/Trade Effluent Regulations – discharge consents. Water Industry Act/Water Resources Regulations – water abstraction. Waste Regulations (duty of care), Hazardous Waste regulations. Packaging Regulations/Producer Responsibility Regulations – including compliance schemes. Ozone Depleting Substances/ Fluorinated	Waste regulations. Packaging Regulations/Producer Responsibility Regulations – including compliance schemes. Environmental Permitting. Planning system – planning permission.

Instrument type	Instrument name		
	Agriculture	Food and drink manufacturing	Food and drink retail
	<p>Slurry and Agri Fuel Oil) Regulations 2010 (SSAFO).</p> <p>Habitats and species conservation and species licensing and protection e.g. Wildlife and Countryside Act, Conservation of Habitats and species, Badgers Act, Hedgerows regs, Town and Country Planning Act.</p> <p>Common Agricultural Policy Single Payment Scheme cross compliance requirements – Statutory Management Requirements (SMRs), Good Agricultural and Environmental Condition (GAEC) requirements, requirements for permanent pasture – these capture the requirements of the law listed elsewhere.</p> <p>Food and animal disease controls/ Animal movements controls.</p> <p>Animal health and welfare requirements.</p>	<p>Greenhouse Gas Regulations – refrigeration.</p> <p>Planning system – planning permission.</p>	
Economic instruments	<p>Environmental Stewardship scheme – Entry Level and Higher Levels.</p> <p>Water abstraction rights trading.</p>	<p>Carbon reduction commitment Energy Efficiency Scheme/Climate Change Levy Regulations – food and drink scheme.</p> <p>Water abstraction rights trading.</p>	<p>Carbon Reduction Commitment Energy Efficiency Scheme.</p>

Instrument type	Instrument name		
	Agriculture	Food and drink manufacturing	Food and drink retail
Information based instruments	Assured Food Standards (Red Tractor). Linking Environment and Farming (LEAF). Soil Association Organic Standard. Freedom Food (RSPCA monitored). Supermarket own-brand assurance schemes.		
Co-regulation and self-regulation	Campaign for Farmed Environment Voluntary Initiative (on pesticide use). ISO14001 (marginally relevant).	Courtauld Commitment (packaging waste in food producers and retailers). Federation House Commitment (water use reduction in food and drink). Climate Change Agreement – food and drink, pigs and poultry schemes. Carbon Disclosure Project. ISO14001.	Courtauld Commitment. Carrier bag voluntary phase out. Carbon Disclosure Project. ISO14001. Own unilateral commitments – e.g. Marks and Spencer Plan A.
Support mechanisms and capacity building	WRAP – agriculture. Farming Advice Service.	WRAP – agriculture/ retail.	WRAP – retail.

B.3 Personal care products regulatory instruments

Instrument type	Instrument name
Direct regulation	<p>Environmental permitting regulations 2010 (EA or local authority) - implement EU IPPC Directive 2008, which in turn will be absorbed into the Industrial Emissions Directive 2010 (along with Waste Incineration Directive (including sewage), large combustion plants, VOCs and titanium dioxide industry).</p> <p>Planning permission, which may include species surveys, EIA etc.</p> <p>Water Act 2003 - Water abstraction licence/exemptions e.g. for dewatering - with Water Industry Act 1991 - requirement for water resources management plan from water companies, and drought plans.</p> <p>Waste duty of care requirements (tracking where waste goes).</p> <p>EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006 (as amended) and the REACH Enforcement Regulations 2008.</p> <p>Waste (England and Wales) Regulations 2011 (as amended).</p> <p>Packaging (Essential Requirements) Regulations 2003 (as amended).</p> <p>Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (as amended).</p> <p>Water Resources (Abstraction and Impounding) Regulations 2006 (as amended).</p> <p>Control of Major Accident Hazards (COMAH) Regulations 1999 (as amended).</p> <p>Biocidal Products Regulations 2001 (as amended).</p> <p>Cosmetics Directive (76/768/EEC) (implemented in the UK through the Cosmetic Products (Safety) Regulations 2008 (as amended)), [primary purpose of which is to protect human safety] - being replaced by Regulation (EC) No. 1223/2009 in July 2013.</p> <p>Aerosol Dispensers Directive 75/324/EEC - amended 94/1/EC and 2008/47/EC EU Aerosol Directive.</p>
Economic instruments	<p>CRC Energy Efficiency Scheme.</p> <p>EU ETS + Climate Change Agreements (voluntary agreements).</p> <p>EC Directive on Packaging and Packaging Waste/ Packaging Waste Recovery Notes (UK).</p>

Instrument type	Instrument name
Information based instruments	On-pack recycling labelling scheme. Soil Association Certification. European Eco-label - including for Soaps and Shampoos. EU Organic Leaf label.
Co- and self-regulation	International Fragrance Association (IFRA)/ Research Institute for Fragrance Materials (RIFM). Responsible Care Initiative - Chemicals Industries Association.
Support and capacity building	WRAP – packaging.

B.4 Waste management regulatory instruments

Instrument type	Instrument name
Direct regulation	<p>Duty of care – waste transfer notes.</p> <p>Hazardous waste – tracking cradle to grave.</p> <p>Waste electrical and electronic equipment – extended producer responsibility.</p> <p>Packaging waste producer responsibility – compliance schemes.</p> <p>Batteries and accumulators responsibilities.</p> <p>Restriction of hazardous substances – to make them easier to recycle.</p> <p>Environmental Permitting – permitting of waste sites.</p> <p>Planning system – planning permission.</p> <p>Designated conservation areas & species licensing.</p> <p>Contaminated land regulations.</p>
Economic instruments	<p>Landfill Tax.</p> <p>Packaging Recovery Notes – part of packaging waste producer responsibility.</p> <p>Renewables Obligation/Certificates (ROCs).</p> <p>Landfill allowance trading scheme (ending 2013).</p> <p>Carbon Reduction Commitment Energy Efficiency Scheme.</p> <p>Rewards & incentives pilots for recycling e.g. Nectar points at Royal Borough of Windsor and Maidenhead.</p> <p>PFI for waste infrastructure development, Green Investment Bank.</p>
Information based	<p>Love Food Hate Waste & Recycle More campaigns.</p> <p>On-Pack recycling labelling scheme.</p>

Instrument type	Instrument name
instruments	EA naming and shaming.
Co-regulation and self-regulation	Courtauld Commitment (retail packaging waste). Halving Waste to landfill Commitment (construction waste). ISO14001 and other environmental management system standards.
Support mechanisms and capacity building	WRAP – waste management.

B.5 Water collection, treatment, supply and management regulatory instruments

Instrument type	Instrument name
Direct regulation	<p>Environmental Permitting Regulations - Discharge to water (note requirement to contact sewerage undertaker to discharge to sewer).</p> <p>Environmental permitting regulations 2010 (EA or LA) - implement EU IPPC Directive 2008, which in turn will be absorbed into the Industrial Emissions Directive 2010 (along with Waste Incineration Directive (including sewage), large combustion plants, VOCs and titanium dioxide industry).</p> <p>Planning permission, which may include species surveys, EIA etc.</p> <p>Water Act 2003 - Water abstraction licence/exemptions e.g. for dewatering - with Water Industry Act 1991 - requirement for water resources management plan from water companies, and drought plans.</p> <p>EU Drinking Water Directive 1998/ Water Supply (Water Quality) Regs 2000.</p> <p>EU Water Framework Directive 2000 -> Water Industry Act 1991/Water Resources Act 1991. Water Framework Directive absorbs Freshwater Fish Directive, Shellfish Water Directive and Dangerous Substances Directive by December 2013.</p> <p>EU Urban Wastewater Treatment Directive 1991 -> Urban Wastewater Treatment Regulations 1994 as amended</p> <p>Wildlife and Countryside Act 1981 (including protected species + SSSIs).</p> <p>Sewerage Sludge Directive 1986 -> Sludge (Use in Agriculture) Regs 1989.</p> <p>Flood and water management act 2010 , including National Flood and Coastal Erosion Risk Management Strategy run by EA.</p>
Economic instruments	CRC Energy Efficiency Scheme.
Co- and self-regulation	Federation House Commitment – food and drink sector water efficiency.
Support and capacity building	Waste and Resources Action Programme (WRAP) – business water efficiency.

Appendix C : Qualitative analysis overview

This appendix provides a top-level summary of the coding used to analyse interview transcripts to produce the analysis presented in Chapters 5 and 6, and an example transcript from a research interview. A confidential appendix is available for thesis examiners containing data in the form of interview transcripts and framework matrices. However this information has not been made publically available to protect the anonymity of respondents.

C.1 : Defra case study thematic analysis

Theme/ framework matrix name	Thesis reference	cross- Codes included within theme
FW1.01: Comments on typology	Section 5.6	Comments on typology table
FW1.02: Use of economics terminology	Section 5.7.1	concepts - externalities - selected from text search concepts - information failure - selected from text search concepts - market failure - selected from text search concepts - polluter pays - selected from text search concepts - property rights - selected from text search concepts - public goods - selected from text search

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW1.03: Character of environmental harms	Section 5.7.2	concepts - character of harms - impact and likelihood of risk concepts - character of harms - number and variety of actors and mitigation actions concepts - character of harms - persistence and irreversibility concepts - character of harms - spatial characteristics concepts - character of harms - speed of action required concepts - character of harms - understanding of risk concepts - character of harms - who is affected by risk
FW1.04: Industry motivation and attitude towards compliance	Section 5.8 Table 5-4	Industry - corporate social responsibility Industry - degree of acceptance and buy-in Industry - deliberate non-compliance Industry - financial and economic drivers Industry - other motivations Industry - realities of decision making
FW1.05: Industry capability	Section 5.8 Table 5-4	Industry - ability to understand regulations Industry - good management practice Industry - managing risks Industry to Regulators - providing information Regulators and Policy Makers on Industry - educating
FW1.06: Individual motivations capability and attitudes to compliance	Section 5.8 Table 5-4	concepts - nudge and behavioural interventions Public - degree of acceptance and buy-in Public - motivation Regulators and Policy Makers on Public - explaining risks and educating Regulators and Public - engaging and enforcing

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW1.07: Regulator capability	Section 5.8 Table 5-4	Policy Makers on Regulators - delegation of responsibilities Regulators - capacity and capability in implementing policy Regulators on Industry - powers to control behaviour Regulators on Industry or Public - credibility in providing advice and leading change
FW1.08: Strength of regulatory threats	Section 5.8 Table 5-4	Regulators on Industry - ease of enforcement Regulators on Industry - threat of harder regulatory framework Regulators on Industry - threat of regulatory enforcement action or punishment
FW1.09: Strength of investor or insurer influence	Section 5.8 Table 5-4	Investors on Industry - pursuing opportunities and managing risks Insurers on Industry and Public - providing insurance for environmental risks
FW1.10: Strength of NGO scrutiny	Section 5.8 Table 5-4	Media on Industry and Government - amplify pressure to improve environmental performance NGOs on Industry - pressure to improve environmental performance NGOs on Politicians and Policy Makers - influencing policy
FW1.11: Strength of public buying power and other influences	Section 5.8 Table 5-4	Industry on Public - encouraging compliance Public on Industry - changing buying patterns Public on Industry - monitoring performance Public on Industry - taking legal action Public on Industry - trust in environmental claims
FW1.12: Supply chain influence	Section 5.8 Table 5-4	Government on Industry - purchasing conditions Industry on Industry - supply chain influence Policy Maker on Industry - influencing operation of supply chains Regulators on Industry - controlling marketability and performance standards Regulators on Industry - naming and shaming

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW1.13: Strength of political influence	Section 5.8 Table 5-4	Politicians on Industry - expressing desire for industry change
FW1.14: Industry capacity to self-regulate	Section 5.8 Table 5-4	Industry with Industry - self-regulating
FW1.15: Coherence of mix of instruments	Section 5.9.1	Mix of instruments - instruments complement each other Mix of instruments - instruments enable each other Mix of instruments - instruments interfere with each other Mix of instruments - instruments preclude others Policy Makers with Policy Makers - coordinating policy design Regulators with Regulators on Industry - coordinating effort
FW1.16: Flexibility of instruments	Section 5.9.2	Court on Regulation - clarify meaning through case law Policy Makers on Regulation - flexibility to change design over time Regulations on Industry - flexibility to environmental variation Regulations on Industry - flexibility to industry characteristics Regulators on Industry - less regulation if risk reduced by other factors
FW1.17: Costs	Section 5.10 Table 5-5	concepts - costs concepts - burdens concepts - benefits concepts - risk - from text search
FW1.18: Fairness	Section 5.10 Table 5-5	concepts - fairness - level playing field concepts - fairness - other contexts
FW1.19: Impact on innovation	Section 5.10 Table 5-5	concepts - innovation - enabled by regulation concepts - innovation - other contexts

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW1.20: Political preferences	Section 5.10 Table 5-5	Policy Makers - preferences for types of regulation Policy Makers on Politicians - credibility in providing guidance Politicians on Policy Makers - expressing preferences in regulatory design Politicians on Policy Makers - preference for non-regulatory approach
FW1.21: EU or WTO compliance	Section 5.10 Table 5-5	EU on Policy Makers - allows flexibility in form of regulation EU on Policy Makers - enforcing implementation of rules EU on Regulation - determines form of regulation EU on Regulation - influences effectiveness Industry and NGOs on EU - influences policy debate Policy Makers on EU - influencing policy WTO on Regulation - influences allowable approaches
FW1.22: Ethical preferences	Section 5.10 Table 5-5	concepts - ethics
FW1.23: Industry and public preferences	Section 5.10 Table 5-5	Industry with Politicians, Policy Makers and Regulators - expressing preferences Public with Politicians, Policy Makers and Regulators - expressing preferences
FW1.24: Availability of evidence	Section 5.11	Policy Makers - anticipating and evaluating impact of interventions Policy Makers with stakeholders - disputing evidence Strategies for lack of evidence - coregulation Strategies for lack of evidence - gradual policy development Strategies for lack of evidence - precautionary approach

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW1.25: Capability of policy makers	Section 5.12	Policy Makers - capability - new skills required Policy Makers - capability - regulatory reform process Policy Makers - capability - thinking broadly Policy Makers - capability - understanding the regulated system Policy Makers - capability - unintended consequences Policy Makers - capability - value of experience

C.2 Business and industry body thematic analysis

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW2.01: Comments on typology	Section 6.5.1	Typology views – looks comprehensive Typology views – no comment Typology views – other comments on typology Typology views – suggested additions
FW2.02: Coherent regulatory frameworks	Section 6.5.2.1	Gov regulators - Able to reconcile local conflicting objectives Gov regulators - Reconcile multiple environmental objectives Policy makers - Reconcile multiple objectives Instruments - Cater for big and small businesses Instruments - Cater for leaders and laggards Instruments - Coherent across whole environment Instruments - Coherent with each other Instruments - Enable each other in a mix Instruments - Target appropriate products or processes Instruments - Work in a mix along supply chain

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW2.03: Clarity, prescription and flexibility	Section 6.5.2.2	Instruments - Appropriately detailed Instruments - Avoid unnecessary complexity Instruments - Clarity of definitions Instruments - Clear on whether mandatory or voluntary in requirements Instruments - Flexible and nimble Instruments - Focus on outcomes Instruments - Measurable Instruments - Tailored to local env conditions Instruments - Transparent Instruments - Understandable and clear on what to do Instruments - Well publicised
FW2.04: Positive regulatory relationships	Section 6.5.2.3	Gov regulators - Consistent in decisions Gov regulators - Coordinated within and between regulatory bodies Gov regulators - Easy to contact Gov regulators - Gain buy-in from regulatees Gov regulators - Have necessary skills Gov regulators - Interpret legislation correctly Gov regulators - Keep up with industry innovation Gov regulators - Provide information about regulatory compliance Gov regulators - Transparent in decision making Gov regulators - Understand industry characteristics Instruments - Act as honest broker

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW2.05: Administrative efficiency	Section 6.5.2.4	Instrument improvements - detailed procedural Instruments - Enabled by information technology Instruments - Not bureaucratic or costly
FW2.06: Risk based regulation	Section 6.5.2.5	Gov regulators - Make risk informed decisions Gov regulators - Target resources according to risk Instruments - Targeted and proportionate to environmental risk or impact
FW2.07: Evidence based policy	Section 6.5.2.6	Instruments - Based on scientific evidence Instruments - Credible with regulated Policy makers - Capable of making risk-based decisions Policy makers - Understand science
FW2.08: Long term stability	Section 6.5.2.7	Long term stability
FW2.09: Involving the business community	Section 6.5.4	Policy makers – Negotiate regulatory design with industry Policy makers – Conduct balanced consultations Policy makers - Engage industry effectively in policy and regulatory design Policy makers - Understand how policy is implemented

Theme/ framework matrix name	Thesis cross-reference	Codes included within theme
FW2.10: Role of trade associations	Section 6.5.5	<p>Other industry bodies - Capability to participate in technical discussions</p> <p>Other industry bodies - Influence beliefs of public and media</p> <p>Other industry bodies - Influence policy development</p> <p>Other industry bodies - Provide regulatory advice to members</p> <p>Trade associations - Capability to participate in technical discussions</p> <p>Trade associations - Coordinate international activity</p> <p>Trade associations - Coordinate sector activity</p> <p>Trade associations - Design regulation and supporting guidance</p> <p>Trade associations - Enable performance benchmarking</p> <p>Trade associations - Enforce compliance with standards for members</p> <p>Trade associations - Influence beliefs of public and media</p> <p>Trade associations - Influence policy development</p> <p>Trade associations - Provide regulatory advice to members</p> <p>Trade associations - Provide stronger voice for sector</p> <p>Trade associations - Represent views of various industry subsectors</p>

C.3 Example interview transcript

The following text is a verbatim transcript of a research interview with a director of a large waste management business, provided here to illustrate the structure and content of a typical interview.

START AUDIO

Interviewer: So as that explains, doing a PhD sponsored by DEFRA. The question is really, when is it appropriate to use different types of regulation for different markets? So, as illustrated in the back here, you have this range of different ways of doing things, from your direct permitting, licensing type based approaches, through some of the economic approaches based around taxes and subsidies and so on.

Then things like labelling and methods that are intended to raise different people within the supply chain's understanding of environmental impact, I suppose. Then various either government negotiating...

Respondent: Appealing to people's better...

Interviewer: Appealing to people's better, exactly.

Respondent: ...When all else fails...

Interviewer: Self regulation is also within the list. Then finally approaches that are based around trying to increase the capacity of the regulated I suppose. Really the question is

we're trying to understand when are those different approaches likely to be appropriate?

So the way that I'm approaching this at the moment is, I'm looking at a number of different case study industries. I've arranged it so that I'm looking at food and agriculture; personal care products, so soaps and things like that; construction, and then a sort of cross-cutting water and waste. So obviously I've got some questions it would be great to work through them. I hope you don't mind if I tap a way a little bit as we talk.

Respondent: No help yourself.

Interviewer: But it would be very helpful if you could start off by just giving me a very brief summary of... I mean I've looked at what [W003 organisation] is. I've got your report in my bag. It would be really helpful to understand how you've arrived at the position that you're in.

Respondent: What me personally?

Interviewer: Yes.

Respondent: Oh, okay. Goodness gracious. I've been in [W003 organisation] for 11 years this summer and for the past eight of those eleven as the Managing Director. [content redacted to protect anonymity]

Oh gosh. I've been in the waste industry forever. Initially in vehicle operations, moving across then into the commercial world of selling and then back into general management in the early '90s. So I'm one of these dinosaurs that can remember when there was virtually no regulation. We were all worried about the introduction of regulation in 1974. I can remember back that far.

So we've seen a fair bit of regulation one way and another. Interested in how environmental regulation has progressed significantly in certain areas and less so in other areas. We're in an interesting period for regulation against a backcloth of some requirement to deregulate, the Red Tape challenges that are being brought up.

But what we're seeing in our sector is the emergence of different interpretations of environment regulation, or application of environmental regulation in Wales, in England and in Scotland.

Again it's a very interesting period of time with the emergence of banning. With the emergence of much more centralised direction around collection methodology. To the absence of clarity around ongoing fiscal measures i.e. Landfill Taxes effectively hitting a ceiling in the not too distant future.

Interviewer: I saw that you also previously were [senior role in trade association]

Respondent: Last year, yes I was [senior role in trade association]. [content redacted to protect anonymity]. So again interesting to observe some of the ways in which DEFRA go about managing the love/hate relationship with the waste sector. How it looks after the Environment Agency in terms of its role as a regulator for the sector.

Again it's been interesting to observe the challenges that the department has had to face up to, in the sense of democratic and local accountability, versus European direction and directive. Balancing that against industry interest and the development of the industry, in it moving away from tried/tested collect and dispose methodologies, essentially centred around landfill. Again in the last five to eight years that's really picked up a pace.

Interviewer: You've touched on a load of very interesting things there before we've even started, which is fantastic. This is possibly slightly irrelevant but if I was just to try to run, off the top of my head, the main regulatory instruments that I think that you're subject to.

So I think you've got the Environmental Permitting regime, plus also the planning system as being sort of main chunks of direct regulation. I guess there are also pieces related to that around hazardous waste and water pollution potentially.

I think you then get into on the fiscal things you've got Landfill Tax, as you've already mentioned, plus also Renewable Obligations. Some would argue that packaging

recycling note type stuff fits into that world as being a sort of trading system.

On the information side, perhaps less than in other industries, but I suppose there's a lot of stuff directed towards the public to try and get them to change behaviour. Also things like on packaging, recycling labels to say, "Yes." Or "No." you can't recycle particular materials, into the co-regulation, self-regulation. I'm aware of the various things that WRAP get up to around stuff like Courtauld Commitment, zero waste to landfill and those sorts of things.

Also the more self-regulatory stuff around environmental management systems, ISO 14001, and that kind of thing. Already mentioned WRAP as kind of a way of trying to build capacity. Are there other big chunks that I've missed out of that list?

Respondent: For me the only other big chunk and it may be embedded in what you were saying a little earlier. But for me, particularly in the last years with [W003 organisation], the rules, the regulations around public procurement, I think, have been a significant barrier to progress. Rather than the ambition that they had, which would be a significant beneficiary to the development of new and alternative infrastructure.

Interviewer: I'd like to come back to that. First of all though, that list that I obviously haven't given you a very great deal of time to look at it. But does that seem like a reasonably comprehensive...?

Respondent: It is comprehensive. I think there's no obvious error of omission there, in terms of the list that you've put forward. This is a more subjective rather than objective one. That is I don't think that any administration really genuinely understands the impact that it has on the ability of these, very well meaning, instruments to be successful or fail by not being consistent.

You're talking to an industry that actually, pretty much without exception, welcomes regulation in all of its forms. But is constantly disappointed by the regulation inadvertently either conspiring to delay, planning is a good example or procurement is another good example. Or not actually delivering what is required on the ground because the regulation gets, shall we say, compromised by example by localism agenda which is much spoken about. But nobody really understands what it means.

I think from an industry player perspective localism means serving the local community. I think from a local community's perspective it's a means of saying "No." So you end up with polarised views on the same subject which is interesting

Interviewer: Yes. More interesting comments, determined to stick to the time. So can you think of examples of regulation that have worked well and that you'd point to as being good, ultimately effective in achieving the intended environmental objective?

Respondent: I think that it is clear that Landfill Taxation has had an effect in the sense that, over time, it has made a low cost disposal option higher cost, which has enabled competing and more environmentally and socially attractive solutions to come to pass. So that's one that's worked. I would argue that current and previous administrations could have used that instrument more aggressively. It's been in for a long time. It is only just now providing that kind of economic hurdle that enables alternative technologies to come through to market.

However still we see a similar economic instrument which has been less successful, from the view of the waste management industry, and that's the ROC and Renewables Regime. That even today is largely unclear as to its long term future. But in terms of economic consequences on some of the capital investments that are being considered, is an absolute key long term instrument.

So again you come back to the broad statement I made a little earlier around governments not recognising, that without this consistency, they can actually undermine what is a very valuable instrument, in terms of shifting materials away from an old solution into something that's newer and more preferable going forward.

Interviewer: So when you say consistency, what sorts of facets of consistency...?

Respondent: If we take ROC regime there is no certainty beyond the end of this decade, as it were, as to its ongoing monetary value.

The threat, and this is an implied threat, that it as a subsidy and support regime can be reviewed pretty much at any time, which leads to uncertainty, which leads to more challenging circumstances when you go to seek funding for these pieces of infrastructure. So who'd have thought, in this country, that funders would have a conversation about political risk associated with these kind of economic support regimes.

What I'm finding and what I'm observing is that you end up perhaps with competing and conflicting economic support. So at the front end of a process you have a PFI credit system. Yet at the back end of a process you have this energy support system. One is taking credit away from the other. What do I mean by that? Local authorities are being given economic value for the ROC or the renewable support income that's got nothing to do with, if you like, the waste related support that PFI credits are supposed to provide.

I think that this lack of a helicopter view over fiscal support, from central government, for environmental initiatives, actually result in us all, whether we're tax payers, rate payers, electricity bill payers, we're all overpaying.

Interviewer: Yes. When you say a helicopter view so is that...?

Respondent: So I think the Treasury should be taking a view across all of these aspects. That the support mechanism should not be driven by DECC, in the case of an energy support mechanism by way of example.

Interviewer: Okay. So it's the co-ordination between central government departments?

Respondent: I think it's co-ordination between central government departments. Then I think it's when one of them is looking at the subsequent procurement of assets for environmental improvement. Whether they're recycling facilities, energy plants, anaerobic digestion plants, is that the procurement should then look across the entire fiscal support structure and not team and lade. I am actually one of a number of people who'd actually prefer to see that procurement done centrally, rather than locally.

Interviewer: When you say locally, through local authorities?

Respondent: Correct. They're generally not equipped to make these kinds of procurements decisions. Local in this procurement context is probably not the most efficient way of doing it, either in time or cost terms.

Interviewer: Yes, because you're having to have multiple conversations with lots of different...?

Respondent: Well you have multiple conversations with different authorities. So if we take a recent procurement process, we're procuring with an authority. But that authority is

having then to also have its own negotiations with people in DEFRA and indeed people with the Treasury. Then in parallel we are both having conversations with the people who fund these kinds of assets. Then there are conversations with the public at large over the infrastructure. So there are a huge amount of conversations going on.

For what is a relatively, at least in concept, simple procurement i.e. "Today I'm disposing of my waste to landfill. That's not acceptable going forward. I'd like to dispose of it through separate or alternative uses, that maximise recycling and subsequently maximise the diversion from landfill." which as a concept could take anywhere between five and eight years to deliver. That's just the procurement. Then you have to build it.

Interviewer: Yes. So would that procurement process include getting planning permission?

Respondent: Yes.

Interviewer: Okay.

Respondent: Then the planning is really extremely difficult subject because I'm sure there are many companies, in many sectors that say, "We're different and we're special. We should have, therefore, different planning arrangements in

place.” But I do happen to think that we are different. We are special.

It was interesting in your introduction that you quite rightly put your sectors that you’re looking at in segments and silos and you’ve put us in with the water. Well why not put us in with the energy sector. My point being is that we are a fundamental utility. In terms of if we fail, as an industry, to deliver what we’re obligated to do, either through contract or otherwise, we actually have an effect on the quality of life here, The Winter of Discontent, and all that good stuff.

Therefore assets and infrastructure related to the reuse, recover, recycle of materials that have been discarded, waste management parlance, why shouldn’t those assets be treated in the same vein as electricity provision, water provision. But it’s not done like that. I think the industry suffers unnecessarily so and its clients therefore suffer unnecessarily so, from over politicisation of the collection of dustbins from people’s front or back gardens. It sounded like a bit of a rant. It wasn’t supposed to.

Interviewer: No. Do you have a sense of why we’ve ended up in the situation where there is that difference?

Respondent: Again, it’s my supposition of course and that is that many things are centralised these days, education, health. So many local authorities the one thing that remains, is their touchstone with the voting public, is the collection and

treatment of refuse. It's almost the last thing that they will guard jealously and not give up.

Somebody was telling me that in Scotland they have I think it is 36 local authorities. I don't know whether that's 30 too many or too few. But they have 100 different collection methodologies in Scotland. That is a clear reflection of seeking to introduce things that are of import to the local community, and/or the people who represent them.

I'm not saying that is replicated throughout the rest of the United Kingdom. But I can assure you that there are a myriad of different ways of collecting waste which in themselves, in isolation, look pretty good. But it is, at the end of the day, collecting waste. There should be a huge amount of common collection methodologies that would be efficient. Would be low cost. Would not be detrimental to the public at large, but would, as a consequence, provide efficiencies in the subsequent recycling, recovery and/or treatment of the materials collected, as an example.

So for me I think the question of we've over localised our business, as it were, to the point where you have national or country regulation and legislation. But you're trying to apply it on a localised basis. It doesn't work particularly well.

Well I'll give you an example in where I live how difficult it is for a local planning committee, staffed by well meaning, publicly elected people, who are hearing planning applications for the construction of private dwellings. Then they're looking at a planning application for a half a million tonne energy from waste plant which attracts tremendous local angst. How are they equipped, emotionally or indeed

from an understanding point of view to objectively opine on that?

So what happens is, more often than not, they can't make a decision that will satisfy the local community. So they reject. Then there's an appeal which takes time and money. That appeal if it is successful then probably gets further appealed. In the meantime what's happening to the material that it was supposed to recycle and recover and divert?

The planning again is something that I think the waste management sector, for key pieces of infrastructure, should be taken out of the hands of the local community.

Interviewer: Yes. I think there are several PhDs just in that subject in itself.

Respondent: I'm sure there are.

Interviewer: So in terms of examples of things that have worked. You started off by saying Landfill Tax had been effective. Renewables Obligation Credits would be effective if it wasn't unclear about what the future was. You talked about planning and centralisation, not centralisation. Are there other examples that particularly stand out as being effective that spring to mind?

Respondent: I really struggle.

Interviewer: So are there then other examples of things that are less good that you would particularly draw out?

Respondent: Again I think, as with all of these things, there's never a right perfect and there's never a wrong and totally imperfect solution. I think that the mistake that we all make, when you consider either command and control regulation or economic instruments, is the time they take to take effect. There are no quick wins in our particular sector.

That is something that I think has caught the public. It's caught the political classes. It's caught the investors and operators, caught us all out when we assumed that with PFI credits, as an example, we can now procure in the certainty that it's affordable.

But planning is a challenge or permitting is a challenge. Or the procurement process starts to skew into actually encouraging certain technology or techniques over others, which in themselves are very laudable. But actually when you look to invest in infrastructure and assets, most people want to invest in infrastructure and assets that they know work. Rather than things that are unproven, again adding to the timescale. So I think that this is a more global statement as it were.

We are talking about instruments. We're talking about initiatives that actually, in terms of impact, are almost generational. It's interesting your comment I was picking up on one thing about labelling. As we've seen with recent

events and horses and beef, labelling is not in itself going to do anything much.

This is a personal opinion, I often wonder and I'm guilty of it as much as anybody else, is we talk about the public, but actually all we're doing is we're representing the industry view. Not the public's view, the industry's view. Or the politicians are actually only representing the political perspective. They're not truly representing the public, because the reality of the public today, in my opinion, and specifically around waste. The majority of the people want two things. They want their waste collected regularly. Whether that's weekly or fortnightly is a debate for those that read the Daily Mail.

They really want somebody else, "The Council" to take care of it once it's collected. They don't really want to get involved in the debate around "Do I have a blue bin, a black bin, a green bin, a six bin, a four bin, a fortnightly collection system. Just get on and do it."

They don't really want to get involved in the debate around technologies. Is anaerobic digestion better than Open Windrow Composting? Is that better than IVC? "Or really should we burn it all? They don't really want to be involved in that debate.

Where they do want to get involved is where it goes in terms of a physical location, because unlike many of our continental cousins, the UK mentality around house ownership, house value is a really sensitive issue. An Englishman's home is his equity release as it were. Therefore any development that impacts on or is perceived to impact on house value will get a "No."

But I can assure you that once these assets are built and are operating, provided that the operators operate them properly and professionally, they just become a feature of the local landscape. There are hundreds of installations that are in very close proximity to people's houses, where they work, where they are educated. Nobody even knows they're there.

Interviewer: Yes. This is kind of two questions in one, but are there particular bugbears or particular areas that you think are ripe for improvement, within the current regulatory framework? Within that is there scope to use different approaches to direct regulation or what do you think?

Respondent: Again in terms of if you want pace, so if you want to get pace in terms of change then there are two things to be done for me. That is prohibiting certain activities, so banning things from landfill with clearly defined timescales for implementation. A well thought through fiscal regime around taxation that encourages materials out of pure disposal into recycling, into energy recovery, etc.

I don't think that the waste industry per se should be involved in or need to be engaged in the packaging end. Because there are other industries that should be engaged, should be similarly incentivised to reduce the amount of packaging, to increase the amount of, if you like, reuse or recyclability of that packaging post consumer. Our industry will manage those consequences.

Interviewer: When you say develop a fiscal regime that encourages different use. So where would that apply?

Respondent: We should be actively encouraging more material out of landfill through taxation and banning.

Interviewer: So more or higher Landfill Tax.

Respondent: Yes. We should be, in my view, encouraging the construction of energy generating infrastructure to take some of those materials. I think there should be, whether it's tax incentives or incentives around funding to encourage the UK growth of UK based recycling, because at the moment the majority of the materials that are collected and aggregated for recycling are exported. We should have a fiscal policy that encourages self-help, as it were, in that context.

Interviewer: So do you think...all of those things sound quite government driven. Do you think there's scope for the industry to do more self-regulation perhaps more on the pollution emission side of things?

Respondent: I think when you are in danger of polluting the environment I don't think that you should rely on self-regulation. There is a significant amount of money in our industry. It is

attractive to less scrupulous operators to... So I'm not in favour of increased self-regulation.

Interviewer: Yes. Brilliant. So final question, I've gone over. I'm four minutes over.

Respondent: You're alright. I haven't dropped my gong yet.

Interviewer: Okay. I suppose this is more just reflecting back on the things that you've said. So what do you think the main factors are that determine whether a particular instrument is effective or not?

Respondent: I think looking back the UK would have, were it not for the imposition of the Landfill Directive, carried on quite comfortably collecting and land filling the majority of the waste that's discarded by householders and industry.

So to that end I think, that having been put in a position where that's no longer acceptable, the UK can actually take a lead in this interest. It's a bit shooting oneself in the foot as it were, in the sense that our industry has always relied on volume. "So more waste please, more rubbish please and I'll make more money." But I think that the UK should be really, really focused on packaging, reducing it. It should be focused on packaging, making sure it's reusable. Then I think it should be then focusing on actively promoting the growth of UK based manufacturing whose input stock, feed stock is "waste."

Then after that is energy recovery. Example, we're thinking in the next three to five years we'll see some, probably not all, but some of our coal fired power stations close. How much would it cost to put the appropriate environmental abatement equipment into those assets? Then feed those assets with energy bearing waste. I would suggest not a great deal.

It might help in terms of our exposure to increasing fuel poverty and our exposure to increased cost of fuel, because we're having to import more, etc, etc. It's not the answer but it will contribute to it. But I'm really a great fan of stopping, in a proper way, the ongoing export of materials that are capable of being recycled into other products. We should be doing that here and then exporting those goods because we're pretty good at doing that.

Interviewer: So that in terms of factors affecting effectiveness. That sounds like a lot of that is about a whole, I keep putting words in your mouth which I'm not supposed to do. It's a whole system thing of saying it's about building the infrastructure to let...

Respondent: If you step back and you look at, this is maybe looking at it slightly differently, but we look at waste then we think about the impact on the environment, rightly so. We think about waste collection methodologies. We think about how we can get rid of it. We try and influence behaviour through collection methodologies, through labelling, through PR campaigns etc.

There is something like; these are my number so big health warning, 45/50m tonnes of materials thrown away every year. That's ignoring mining wastes and slurries and sludges. Of that material, I don't know; let's say half of it is capable of being reused. So we've got now 25m tonnes of virgin material or raw material. So look at it from a raw material basis and start saying, "What industry do I need to encourage to be in place to use that as a raw material? "What industry do I need to put in place so I get rid of it cheaply?"

So should this be looked at stepping all the way back from a government perspective? This is something that is around about the potential to start contributing to the rebuilding of the industrial manufacturing base. That's a raw product that you haven't got to go and get out of the ground, or buy from some other foreign country. It's here. I am getting on my soap box now.

Interviewer: No, it's good stuff.

Respondent: What can't be reused or recycled you can recover energy from. I'll throw that in the mix.

Interviewer: Does that basically mean this would then be a growth world for the waste management industry?

Respondent: It would be potentially again the industry needs to start thinking differently. It's potentially growth in the context of

value but at the expense of volume. At the moment our value proposition is based around “Just send me more.” What I’m suggesting is “You can send me less but I can get more value out of it.”

Interviewer: Yes. So everyone’s happy.

Respondent: Should be. If you look at and I don’t know if you’ve been able to speak to other waste management companies, but we’re all tussling with this shift from volume to value. At the moment we’re in the middle and we’re in the dip, because three/four years ago the value was going to be in the value that I could get for my recycled paper, for my recycled plastic. But that commoditised world market has pretty much collapsed in the last two years. So our value of that material, our value proposition is around about 40% less than what we thought it was going to be. Oops.

What we’ve not however then is we’re not able to replace that value because it’s a world commodity issue. But energy then is the next if you like subsidy or substitute value. But we’ve still yet, as an industry, to grasp that many of us either don’t own or operate an energy plant. But we’re busily building them. So by 2018 there’ll be a significant amount of waste to energy plants in the UK.

Interviewer: Yes. One of my supervisors is an economist. He’ll love that bit. That has been extremely helpful. Thank you very much.

Respondent: The light going out is just if we stand still long enough it does that automatically. It wasn't a signal.

Interviewer: It's all going on in the brain is what's happening. Fantastic.

Respondent: Sure.

Interviewer: So I'm doing hopefully 30 odd interviews with lots of different people which I'll then, as it says in there, ultimately turn into some sort of paper. But what I'll do, within that process, is if there are particular pieces where I think I've understood something from you, and I want to check it then I'll come back to you. Often it makes these things good if they can have real quotes in them. But if I wanted to quote you directly I'd come back and check that with you. It wouldn't be attributable.

Respondent: What I've said to you today I shall say to anybody both privately and publicly. In fact I'm on a platform next week where I'm one of the speakers to talk about energy from waste, and should we be exporting or not?

Interviewer: That's also very helpful to know. Makes the writing process a bit less angst driven than it is.

Respondent: There's nothing there that I would be concerned about having my name put against it. Or indeed I can assure you what I've said is pretty much what the company strategy is also moving towards. Okay.

Interviewer: Brilliant.

Respondent: Good.

Interviewer: Thanks very much.

Respondent: Absolute pleasure.

END AUDIO

Appendix D : Confidential data appendix

A confidential appendix is available for thesis examiners containing data in the form of interview transcripts and framework matrices. However this information has not been made publically available to protect the anonymity of respondents.

Appendix E : Instrument selection guidance for Defra

The following slide set was developed by the author to provide a suitable output for Defra policy makers and other environmental regulators summarising some of the findings from this research.

The document is available for download here:

http://randd.defra.gov.uk/Document.aspx?Document=11687_InstrumentSelectionGuidance041113-external.pdf



What's inside?

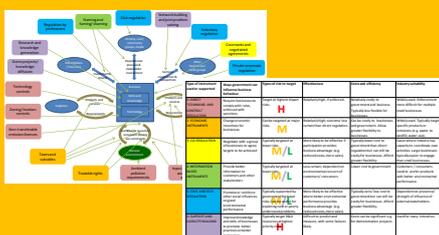
This pack helps policy makers and regulators think of ways to influence business behaviour to achieve environmental objectives

20 different ways to influence business behaviour are described and compared

Step-by-step discussion questions help you think through which options could work for the businesses you are targeting

Cross-cutting themes help you think through **effective implementation**

Useful **models** help you analyse businesses and compare options



You could use it to **stimulate your own thinking**, to spark ideas with **colleagues** in a workshop, or with **external stakeholders**

It is structured to read from end to end, but you can also **dip in** to the most useful bits

Links to more detailed information are provided throughout

2

About this guide

- The purpose of this guide is to help policy makers and regulators develop ideas for achieving policy objectives that make use of the full range of policy and regulatory instruments at your disposal (e.g. emission licenses, tradable permit schemes, product labelling, voluntary agreements).
- It could be used to design new measures, or to identify better ways than at present to achieve objectives that harness the influence of non-government actors. It is intended to spark thinking and debate. You could use this guide to help stimulate your own thinking, or to support a discussion with your team or other stakeholders.
- The content focuses on describing the range of instruments that could be used and exploring when they are suitable. It focuses on instruments to tackle environmental risks, though many of the approaches described can also be used for other policy objectives.
- It is assumed that the reader already has a good understanding of the policy objectives to be met, the forms of market failure (e.g. polluters not compensating for damage caused) or other policy considerations that lead to the need for intervention, the stakeholders involved and the environmental, social and economic systems that connect them together. It is also assumed that the option of doing nothing has been considered but is unacceptable.
- In line with the Defra Policy Cycle, instrument ideas sparked from this guide will need to be developed into full proposals and their impact assessed. This development process is beyond the scope of this guide.

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Contents of this guide

Section 1 provides a summary of the main types of instrument available, and when they might be appropriate

Section 2 provides a set of key questions to consider when selecting instruments

Section 3 discusses some important themes that can apply across all types of instrument

1: Instrument options

The main types of instrument

20 ways to influence business behaviour

How instruments influence business behaviour

2: Instrument selection questions

How strongly do instruments need to influence business behaviour?

Could government negotiate targets with a group of businesses?

Could signals about customer preferences be strengthened?

Could community/civic group/other stakeholder influences be strengthened?

Could shareholder influence be strengthened?

Could private business initiatives be encouraged or strengthened?

Are better business skills or knowledge required?

Could economic incentives/prices be altered to change behaviour?

Is scientific knowledge of problems and solutions lacking?

3: Cross-cutting themes

Enhancing instrument effectiveness

Providing flexibility and certainty

Providing a good user experience

Piloting, testing and assessing

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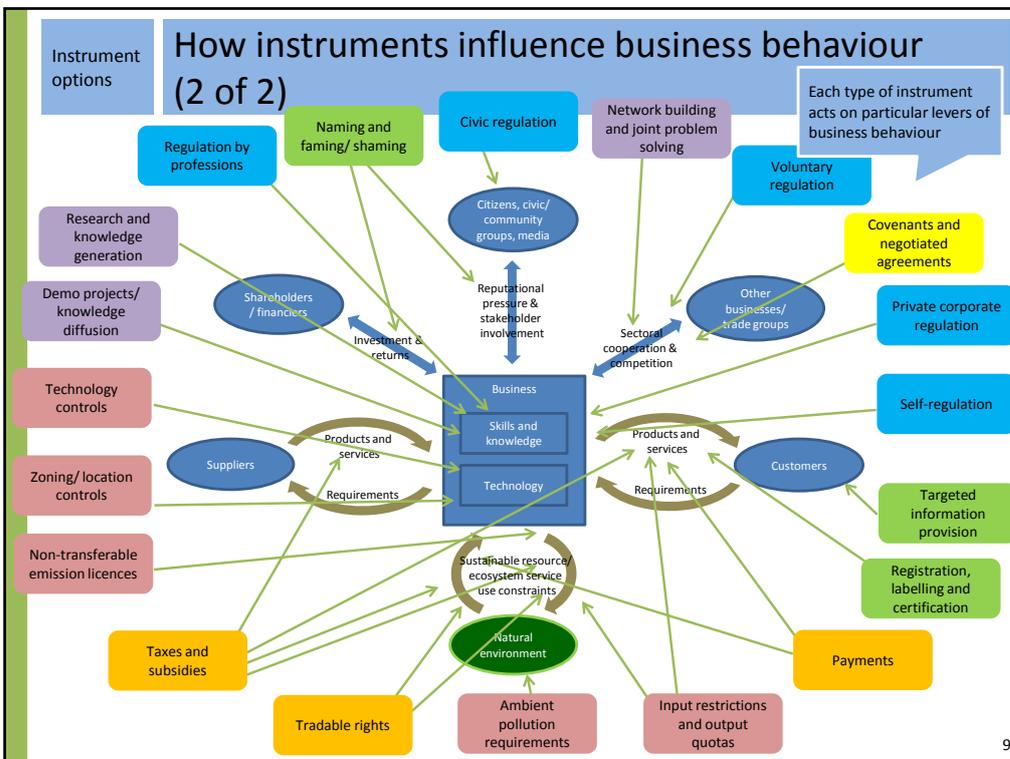
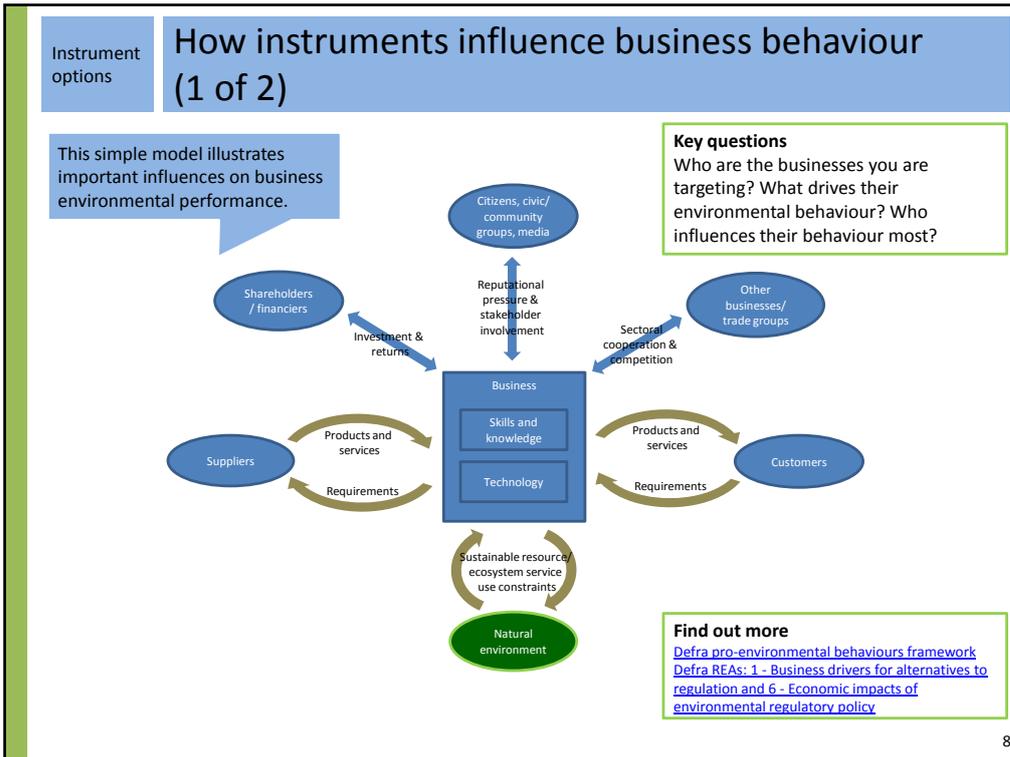
1: Instrument options

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Instrument options		The main types of instrument			
Type of instrument used or supported	Ways government can influence business behaviour	Types of risk to target	Effectiveness	Costs and efficiency	Industry suitability
1: DIRECT "COMMAND AND CONTROL" REGULATION	Require businesses to comply with rules, enforced with sanctions.	Target at highest impact risks. H	Relatively high, if enforced.	Relatively costly to government and business. Typically less flexible for businesses.	Widely used. Enforcement more difficult for multiple small businesses.
2: ECONOMIC INSTRUMENTS	Change economic incentives for businesses.	Can be targeted at major risks. M	Relatively high; outcome less certain than direct regulation.	Can be costly to businesses and government. Allow greater flexibility to businesses.	Widely used. Typically target specific products or emissions (e.g. waste to landfill, water use).
3: CO-REGULATION	Negotiate with a group of businesses to agree targets to be achieved.	Typically targeted at lower risks. M/L	More likely to be effective if participation provides business advantage (e.g. reduced costs, more sales).	Typically lower cost to government than direct regulation but can still be costly for businesses. Afford greater flexibility.	Easier where industry has capacity to coordinate own activities. Large businesses typically easier to engage than small businesses.
4: INFORMATION BASED INSTRUMENTS	Provide better information to customers and other stakeholders.	Typically targeted at lower risks. M/L	Less certain; dependent on environmental concern of customers/ consumers.	Lower cost to government.	Customers / consumers need to prefer products with better environmental performance.
5: CIVIC AND SELF-REGULATION	Promote or reinforce other social influences on good environmental performance.	Typically supported by government for lower risks. Can be useful for exploring new or poorly understood problems. M/L	More likely to be effective where better environmental performance provides business advantage (e.g. reduced costs, more sales).	Typically zero/ low cost to government but can still be costly for businesses. Afford greater flexibility.	Dependent on presence/ strength of influence of external stakeholders.
6: SUPPORT AND CAPACITY BUILDING	Improve knowledge and skills of businesses to promote better practices or better technology.	Typically target R&D resources at highest priority risks. H	Difficult to predict and measure, with some failures likely.	Costs can be significant e.g. for demonstration projects.	Used for many industries.

Find out more: [SNIFFER ER30: 2 - Choose and Design Interventions](#)

Instrument options		20 ways to influence business behaviour	
1: DIRECT "COMMAND AND CONTROL" REGULATION		4: INFORMATION BASED INSTRUMENTS	
Technology controls	Requirements for businesses to use specific technologies in their operations or products e.g. catalytic converters	Targeted information provision	Information provided to enable businesses or individuals to make better-informed decisions that affect the environment
Zoning/ location controls	Performance requirements linked to a specific geography, e.g. to locate polluters away from sensitive ecosystems	Registration, labelling and certification	Product labelling, and associated standards, enabling consumers to choose products with better environmental performance
Non-transferable emission licences	Licence to operate according to environmental performance requirements, with compliance monitored and penalties enforced. Inspection requirements could be reduced for good performers through 'earned recognition'	Naming and faming/ shaming	Publicising environmental performance information, incentivizing better behaviour to avoid damage to or to enhance reputation
Ambient pollution requirements	Specify required maximum levels of ambient pollution, allowing flexibility to polluters to decide how to achieve	5: CIVIC AND SELF-REGULATION	
Input restrictions and output quotas	Restrictions are applied in the use or output of products/ resources	Voluntary regulation	A group of actors agree standards to which individual businesses can sign up. Becomes a form of co-regulation if government involved.
2: ECONOMIC INSTRUMENTS		Civic regulation	Community or pressure groups agree performance standards with particular firms
Payments	Conditional payments made to incentivize a particular activity e.g. provision of ecosystem services	Regulation by professions	A professional body applies standards through conditions of membership
Taxes and subsidies	Change the market price of a good or service, changing the quantity demanded and supplied in the market	Private corporate regulation	One firm defines standards with which suppliers are required to comply in order to maintain business
Tradable rights	Specify a capped quantity of allowances, e.g. to abstract water or to emit carbon, which can then be traded among users	Self-regulation	Businesses independently adopt environmental standards, unilaterally or with external verification
3: CO-REGULATION		6: SUPPORT AND CAPACITY BUILDING	
Covenants and negotiated agreements	Government makes a contractual agreement with regulated businesses to achieve particular standards	Research and knowledge generation	Governments or other actors undertake research to increase knowledge that informs better environmental decision making
		Demonstration projects/ knowledge diffusion	Governments invest in projects to demonstrate feasibility, raise awareness and reduce risks of new technologies or processes
		Network building and joint problem solving	Initiatives designed to encourage people to exchange ideas and learning to improve environmental performance



2: Instrument selection questions

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Instrument selection questions

How strongly do instruments need to influence business behaviour?

Regulation should be targeted according to risk. Direct regulation provides strong controls and a level playing field, but can be costly

In general, direct regulation is expected to provide the strongest controls on environmental risk, but is also costly to the regulated and government. It can provide a level playing field between competing firms, and tackle illegal behaviour. Direct regulation should be targeted at the highest risk activities, to provide the strongest controls where they are needed most. Other forms of regulation (see later slides) generally provide weaker controls and therefore are suitable for tackling smaller risks or to enhance the effectiveness of direct regulation.

Forms of direct regulation	When they are used
Technology controls	Better performing technology exists but businesses are unwilling to adopt, typically due to additional costs. Can force a transition to wider adoption e.g. Energy saving lightbulbs; catalytic converters
Zoning/ location controls	Specific geography needs additional protection e.g. for unusual or fragile ecosystems; to prevent pollution hotspots. Typically linked to other instruments for that area e.g. vehicle technology controls in low emission zones.
Non-transferable emission licences	Specific business operations sites present risks to the environment e.g. through emissions to air or water. Operations are monitored and sanctions may be imposed for failure to meet requirements.
Ambient pollution requirements	Pollution typically arising from multiple sources must be kept within limits. An overall requirement is set requiring other instruments to be deployed to ensure it is met.
Input restrictions and output quotas	Natural resources are not being used sustainably (e.g. over-fishing; over abstraction of water), or use of specific materials present risks to the environment (e.g. Polychlorinated biphenols).

Key questions

What environmental risks need to be managed?
 What are their expected impact and probability?
 To what extent can risk occurrence be tolerated?

Find out more

[Defra Guidelines for environmental risk assessment and management: Green leaves III](#)
[SNIFFER ER30: 4 – Promote Compliance and 6 - Regulatory Strategy](#)
[Defra REAs: 4 – Earned Recognition](#)

11

Could government negotiate targets with a group of businesses?

Negotiation can be used to design interventions tailored to characteristics of particular sectors

Negotiating with a group of businesses to achieve environmental objectives may provide a relatively quick way to bring about change, that is tailored to the specific characteristics of a sector. The target industry needs to have a representative body (e.g. a trade association, or a specially formed group) that can negotiate on its behalf and monitor compliance, which may be easier to achieve in sectors with a few large businesses than those with many small businesses.

Voluntary regulation may prove effective where participation provides business and environmental benefits, for example cost reductions through resource efficiency. WRAP have established agreements e.g. for waste reduction.

Covenants and negotiated agreements offer stronger assurance that objectives will be met, as targets are contractually binding. For example, Climate Change Agreements are agreed between DECC and industry bodies to allow a reduction in Climate Change Levy in return for reaching emissions reduction targets. The Law Commission is considering how 'conservation covenants', which involve landowners making an agreement a conservation organisation or a public body to protect the conservation value of a site, could be enabled through law.

Businesses may prove more willing to participate in these forms of regulation when there is a credible threat of harder regulation (e.g. through a new tax or direct regulation) being introduced if the instrument proves ineffective.

Key questions

Do businesses have representative bodies that can coordinate joint action? How much of the sector can they represent? Can government present a credible threat of harder regulation to incentivise participation?

Find out more

[Defra REAs: 2 – Voluntary Agreements and other business designed approaches](#)
[Waste and Resources Action Plan voluntary agreements](#)
[Climate Change Agreements](#)
[Law Commission consultation on Conservation Covenants](#)

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Could signals about customer preferences be strengthened?

Businesses may be driven to improve environmental performance by their customers

Customers may be concerned about the environmental impact of the products and services that they buy, so they buy better performing products in preference to poorer performing products. Their suppliers therefore have an incentive to differentiate their products and services on this basis. For example, in the UK many consumers are concerned about the environmental impact of food, and food products that claim better environmental performance have been developed in response to this demand.

Registration, Labelling and Certification schemes (e.g. Forest Stewardship Council, Roundtable on Sustainable Palm Oil, EU Ecolabel) improve the ability of customers to buy in response to environmental performance, providing incentives for businesses to improve the environmental performance of their products. These approaches can be encouraged and supported by government. In some markets (e.g. construction) the government is a major buyer, so it may be possible to bring about change along supply chains by changing environmental standards required by government procurement.

However, customer concern for environmental performance is much less evident for some products than others. For example, in the UK few cosmetics brands make explicit claims about environmental performance. So the strength and therefore relevance of customer-driven instruments depends strongly on levels of customer concern for a given product.

Key questions

Do customers choose between the products of target businesses on the basis of environmental performance?
 Is government a major buyer in the target sector?

Find out more

[Defra REAs: 2 – Voluntary Agreements and other business designed approaches](#)
[Forest Stewardship Council](#), [Marine Stewardship Council](#)
[EU Ecolabel](#)
[Assured Food Standards Red Tractor](#)

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Could community/civic group or other stakeholder influences be strengthened?

Local community or civic groups can have a significant influence on the behaviour of some businesses, as can other stakeholders including individual citizens and the media

Community and civic groups, ranging from international NGOs to small local community groups, can play a role in influencing business environmental behaviour. For example, WWF initiated international action with major businesses to establish the Roundtable on Sustainable Palm Oil. At a more local level, the Wildlife Trusts have worked with businesses to restore biodiversity for land affected by industrial activity. These kinds of activities can be broadly described as '[civic regulation](#)'.

Government can act to strengthen the influence of such groups. For example, Defra is currently piloting Local Nature Partnerships, which give formal recognition to groups of public, private, NGO and local community organisations to influence local decision-making relating to the natural environment and its value to social and economic outcomes.

Government may be able to gather, share or publicise information directly or to be used by other stakeholders. There may be scope to make publically available useful information currently held within government, as outlined in Defra's Open Data Strategy, or to encourage or require disclosure of environmental performance by businesses. Individual citizens may be able to help to monitor business performance, for example by reporting apparent bad behaviour to regulators (e.g. reporting flytipping) or helping to monitor environmental conditions (e.g. spotting the presence of non-native species).

Key questions

Do local community groups or civic groups have a significant influence on business behaviour? What should government do to strengthen their influence? Which other stakeholders could assist, and how?

Find out more

[Defra information on Local Nature Partnerships Roundtable on Sustainable Palm Oil](#)
[Surrey Wildlife Trust manages Nutfield Marsh](#)
[Reporting flytipping with a smartphone at Birmingham City Council](#)
[Reducing the Impact of Non-native Species in Europe \(RINSE\) app](#)

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Could shareholder influence be strengthened?

For some sectors, shareholders may prove an important influence on business environmental behaviour

Shareholders in publically listed businesses can influence business behaviour through their investment decisions. Investors may prefer businesses with better environmental performance because, for example, they believe they are less likely to be affected by surprises that affect share value e.g. environmental accidents, or winning new work.

Many businesses do not have external shareholders. Nevertheless, their customers or suppliers may do, in which case their behaviour may be influenced indirectly along their supply chain.

Regulators can publicise information about good or bad business environmental performance through **Naming and shaming/faming** with the intention of influencing shareholders. Some non-government bodies develop indices to help inform shareholders e.g. Carbon Disclosure Project. Government may be able to gather, share or publicise information directly or to be used by other stakeholders. There may be scope to make publically available useful information currently held within government, as outlined in Defra's Open Data Strategy. Legislation could also be used to increase transparency of business environmental performance, e.g. as required for UK listed companies' greenhouse gas emissions reporting under the Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013.

Key questions

Do target businesses, or their customers or suppliers, have external shareholders? Are shareholders likely to change their investment behaviour on the basis of environmental performance of their investments? What information could government gather or share that would enhance this effect?

Find out more

[Defra Open Data Strategy](#)
[Carbon Disclosure Project](#)
[Defra environmental impact measuring and reporting guidance](#)

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Could private business initiatives be encouraged or strengthened?

Government can encourage good environmental management approaches developed by the private sector

Businesses may decide independently of government to pursue better environmental performance, for example to achieve improvements in resource efficiency, or to attract customers who are concerned about environmental performance.

Under **self-regulation** businesses may choose to develop their own environmental management strategies and procedures, often implemented through an environmental management system (EMS). They may choose to adopt an externally verified standard such as ISO14001, to assist in setting it up and to provide reassurance about its quality to customers or other stakeholders. In addition, a business may choose to impose good environmental performance requirements on its suppliers, described as **private corporate regulation**. This could include requirements to comply with bespoke standards developed by the business, or to adopt externally-verified standards such as ISO14001.

Policy makers and regulators can encourage these approaches where they already exist, for example simply by publicising good performers (**Naming and faming/shaming**). Where they are confident that these initiatives are providing sufficient controls, government may choose to reduce its own direct regulatory effort e.g. by reducing the number of inspections, an approach sometimes known as 'earned recognition'.

Key questions

Are businesses exhibiting self-regulation or private corporate regulation?
What evidence exists that these approaches are delivering sufficient controls on environmental risk?

Find out more

[Defra REAs: 2 – Voluntary Agreements and other business designed approaches](#)
[Defra REAs: 4 – Earned Recognition](#)
[Defra research on benefits of environmental mgmt systems for SMEs](#)
[Earned recognition and Red Tractor Assurance](#)

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Are better business skills or knowledge required?

Some instruments are specifically designed to improve business skills and knowledge

The effectiveness of businesses in protecting the environment is affected by the skills and knowledge of the people who work in them. Government measures to increase skills and knowledge can help to improve the effectiveness of other forms of regulation:

During inspections: Inspectors can provide advice to businesses on good practice while checking compliance e.g. with **non-transferable emissions licences** or as part of **registration, certification and labelling** schemes.

Targeted information provision: Marketing campaigns can increase general awareness of environmental issues. e.g. Love Food Hate Waste

Regulation by professions: People can learn skills through professional accreditation e.g. Chartered Environmentalist. Government can support this, e.g. by requiring professional accreditation as a condition of permits.

Network building and joint problem solving: Government can support professional networks that provide training or work jointly on problems e.g. WRAP

Demonstration projects and knowledge diffusion: Where uncertainty about new technologies is inhibiting business adoption, government can support projects that demonstrate them working in practice.

Key questions

How well do businesses understand the environmental impact of their operations and how they could improve?
Who can help transmit this knowledge to them; who would they trust to do so?

Find out more

[Love Food Hate Waste](#)
[Chartered Environmentalist](#)
[Waste and Resources Action Programme](#)
[DECC activities to support development of carbon capture & storage](#)

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Could economic incentives/ prices be altered to change business behaviour?

Creating a market for or changing the prices of business inputs or outputs can drive significant behaviour change

While direct regulation can provide strong controls for environmental risks, it may offer limited flexibility for businesses to choose the most efficient way to achieve a given environmental objective for their specific circumstances. Economic instruments work by changing prices for business inputs or outputs (including pollution) to alter their demand or supply. Businesses can decide the most efficient way to respond to these signals, so some may choose to absorb price changes without changing behaviour, while others may change rapidly in response. Economic instruments therefore generally provide less certainty about how a given business will behave compared to direct regulation.

Types of economic instrument	When they are used
Taxes and subsidies	Specific inputs (e.g. solar panels for energy production) or outputs (e.g. waste to be put to landfill) which are traded and closely linked to environmental impact can be taxed or subsidised to alter demand/supply.
Tradable rights	Rights to use quantities of specific of inputs (e.g. water) or produce quantities of specific outputs (e.g. carbon dioxide) are issued and then traded among businesses. Total quantity used/produced is capped by size of rights issue.
Payments	Businesses are paid in proportion to their provision of goods or services that are environmentally beneficial e.g. For maintaining woodland that provides flood protection, recreational value and habitat for biodiversity.

Key questions

Can environmental impacts be linked to specific traded business inputs or outputs? Will businesses change use in response to changed prices?
If a market does not exist, could one be created?

Find out more

[OECD work on market based instruments for environmental policy](#)
[Defra payments for ecosystem services research pilots](#)

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Is scientific knowledge of problems and solutions lacking?

Some instruments are specifically designed to generate new scientific knowledge about environmental impacts and the solutions to reduce them, while others can have built-in features to improve knowledge

In some areas of environmental policy, scientific knowledge to inform the design of environmental regulation is lacking. **Research and knowledge generation**, for example through government funding of university research programmes, is an instrument that can be used to address such areas of uncertainty. Government may choose to adopt a precautionary approach where potentially large risks have been identified, for example by not allowing an activity to be pursued until sufficient research has been undertaken to demonstrate that it is safe.

Some instruments can have built-in features that help to improve knowledge. For less severe environmental risks, **Voluntary Regulation** may provide a useful platform for government and businesses to work together to improve shared understanding. For example the Courtauld Commitment, a voluntary agreement focused on reducing packaging waste, has included research to examine how the environmental impact of packaging can be measured and reduced. This has allowed government and participating businesses to agree better objectives for successive phases of the programme, as shared knowledge has increased.

Direct regulation can also be designed to gradually improve understanding of environmental impacts, for example by requiring businesses to undertake environmental risk assessments to allow products to be marketed (e.g. REACH).

Key questions

Which aspects of environmental problems or their solutions are well understood?
Where is knowledge weaker?
Who is best placed to improve understanding?

Find out more

[Defra Guidelines for environmental risk assessment and management: Green leaves III](#)
[Defra's evidence investment strategy](#)

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3: Cross-cutting themes

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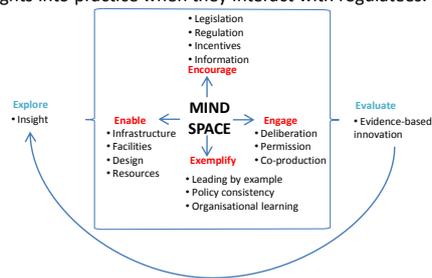
Cross-cutting themes

Enhancing instrument effectiveness

Research, including from behavioural economics, provides insights into the drivers of human behaviour, which can be incorporated into the implemented design of all instruments to ensure they are effective in practice

The MINDSPACE mnemonic provides prompts for how people may respond to the design of regulation. For example, ensuring information is provided by a source trusted by the intended audience, or publicising commitments made, may improve effectiveness. Government can design interventions that engage, enable, encourage and exemplify (the '4Es') good environmental performance. Regulatory officers are most effective when they have the skills and experience to put these and other insights into practice when they interact with regulatees.

Messenger	we are heavily influenced by who communicates information
Incentives	our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses
Norms	we are strongly influenced by what others do
Defaults	we "go with the flow" of pre-set options
Salience	our attention is drawn to what is novel and seems relevant to us
Priming	our acts are often influenced by sub-conscious cues
Affect	our emotional associations can powerfully shape our actions
Commitments	we seek to be consistent with our public promises, and reciprocate acts
Ego	we act in ways that make us feel better about ourselves



Key questions

Does the design of implemented instruments enable, exemplify, encourage and engage?
Should the skills and experience of regulatory officers/inspectors be enhanced?

Find out more

[Guidance from Institute for Government – MINDSPACE](#)
[SNIFFER ER30: Better Regulation evidence](#)

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Providing flexibility and certainty

Instrument design needs to balance long-term certainty with flexibility to change

Environmental regulations can have a significant effect on business investment decisions. For example, the Landfill Tax has created incentives for waste management companies to invest in alternative waste processing technologies as alternatives to putting waste to landfill. Unpredicted changes to regulation can undermine business willingness to invest in technologies that could improve environmental performance, and businesses prefer less regulatory uncertainty.

However, environmental, social and economic conditions change over time, and regulation may need to change to reflect this. A balance needs to be struck between providing certainty in regulations, and accommodating change through flexibility.

Certainty and flexibility can be accommodated in many forms of regulation. The Building Regulations (**direct regulation**) incorporate a 3-yearly review of standards, allowing product innovation and some stability in requirements. The Landfill Tax (an **economic instrument**) has a variable rate which can be adjusted from year to year, and has followed a consistent upwards trajectory over recent years. **Voluntary regulation** can offer opportunities for rapid adaptation to changing circumstances, negotiated with participating businesses.

Key questions

What flexibilities need to be accommodated by the mix of regulations for target businesses?
How much certainty can be provided?

Find out more

[Defra REAs: 3 - Results orientation, timeframes and stability in regulatory policy](#)

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Providing a good user experience

Instruments should be designed to minimize administrative costs for businesses

Administrative processes associated with any regulatory instrument should be designed to make them as easy to use as possible for participating businesses. Many businesses are now accustomed to using email and internet to communicate and share information, and well designed web-based processes can significantly reduce costs for businesses compared to paper-based approaches. Businesses can struggle to find out about and keep up to date with their environmental obligations, so it is key to ensure that information is provided in forms that are easy to find and easy to understand.

The single government website, www.gov.uk, is becoming the one-stop-shop for citizens and businesses seeking to interact with government on the internet, so guidance and other web-based materials need to be designed to fit this approach. Registration and reporting processes should also be designed to minimise the administrative burdens on participating businesses, making use of modern web-based technologies wherever appropriate.

Key questions

How would target businesses prefer to interact with government? How smoothly does this work at present?
How could it be improved?

Find out more

[Defra Smarter Environmental Regulation Review phase 1 report](#)
[Government Digital Service Design Principles](#)
[Defra REAs: 5 – Environmental policy integration](#)
[SNIFFER ER30: 3 - Deliver Interventions](#)

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Piloting, testing and assessing

Wherever possible, changes to the regulatory framework should be piloted . Effective measurement of outcomes is essential for ongoing improvement

Pilots provide opportunities to try out changes on a small scale, to test their effectiveness and identify unanticipated consequences. Learning from pilots can then be incorporated into larger scale implementation.

Irrespective of the form of regulation adopted, it is essential that the impact of any given regulation is measured so that its effectiveness and efficiency can be assessed and learnt from. This will require a set of performance indicators to be monitored across the chain cause and effect from regulatory instrument, through changes to business and citizen behaviour, to the resulting impact on environmental quality.

Key questions

How could you test your ideas for improvement through piloting?
How will the effectiveness of implemented instruments be measured?

Find out more

[HM Treasury guidance on evaluation – the Magenta Book](#)
[BIS Better Regulation Framework Manual](#)
[SNIFFER ER30: 5 – Evaluate](#)

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This guide has been developed in a collaboration between Defra and the Cranfield University Centre for Environmental Risk and Futures.

CT is part-funded by an Engineering and Physical Sciences Research Council (EPSRC) Doctoral Account held at Cranfield University. This research is co-funded by Defra, EPSRC, Natural Environment Research Council (NERC) Economic and Social Research Council (ESRC) (EP/G022682/1).



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Appendix F : Cranfield University Ethics Policy

Cranfield recognises that it has an obligation to all its stakeholders to observe and maintain the highest ethical standards. These standards must be upheld in the day-to-day activities of all members of the University*. They embrace the Seven Principles of Public Life (the Nolan Principles) of selflessness, integrity, objectivity, accountability, openness, honesty and leadership. In addition, helping students to acquire a sense of professional and personal ethics in their work is an important part of the educational process the University offers.

The Cranfield University Ethics Policy articulates the general principles that will guide all members of the University in meeting these standards. They are developed into more specific practices relevant to particular areas of activity (e.g. teaching, research etc) and particular members of the University (e.g. students, staff etc) in the Schools and Administrative Departments.

The Seven Communities

The University serves six (often overlapping) communities and in its daily operation interacts with a seventh, its suppliers. It is the University's responsibilities to these seven communities that form the underlying basis for this code of ethics.

Students

The University seeks to offer a rewarding experience to all its students to support their future careers, on courses clearly described in the University's Prospectuses. Courses are based on the transmission of up-to-date knowledge on fundamentals and their application, informed by the University's work.

Employers

The University seeks to meet the needs of all employers, both as sponsors of students and as employers of graduates. It aims to create graduates who can move smoothly into employment, contribute swiftly to the improved performance of their organisation, and rapidly rise to senior positions.

Research Clients

The University seeks to bring its full capabilities to its research programmes for all clients, in both the public and private sector. It seeks both to generate new knowledge and to apply existing knowledge, wherever in the world that may have been created, to create new insight and opportunities for the clients.

* Members of the University include all officers, staff, students, alumni, members of Court and Council, as defined in Statute II.

Teaching Clients

The University seeks to bring all its knowledge and experience to the design, delivery and assessment of all its teaching programmes. In particular it seeks to produce high quality graduates while giving value for money to all clients of taught programmes, both in the public and private sector in the UK and overseas.

Academic Community

The University seeks to fulfil its responsibility to the wider academic community, both undertaking all its academic work to the highest professional standards, and contributing wherever possible to the development of that community worldwide.

Wider Community

The University seeks to contribute fully to the development of its Local Regions, the UK and Europe, and to be perceived as one of the leading International institutions in each of its chosen fields.

Suppliers

The University seeks to co-operate with all its suppliers. It expects value for money, good service and fair treatment from all its suppliers and recognises its suppliers need for fair terms of trade.

Professional Conduct

All members of the University shall seek to conduct their work in a thoroughly professional manner to the benefit of all the communities that the University seeks to serve. More specifically, they will not claim knowledge, competence or qualifications they do not possess and they will take every precaution to ensure that their views are not subject to misrepresentation, and to immediately take steps to correct any misrepresentations. In their work members will not seek to harm anyone, but where irreconcilable conflicts arise, members will seek to resolve these with integrity. Integrity implies not merely honesty but fair dealing and truthfulness.

Teaching

In its teaching the university will endeavour to:

- Seek to bring all its knowledge to the design, delivery and assessment of all its teaching programmes;
- Describe clearly and appropriately the level and content of all courses;
- Recruit and admit only such students who are believed, by those admitting them, to be appropriately qualified, willing to study diligently, and able to satisfactorily complete, the course;

- Not discriminate on the basis of the student's source of funding, or on the basis of their race, colour, nationality, ethnicity, religious views, sexuality, disability or marital status;
- Assess fairly and honestly all students and maintain honest feedback to students concerning their progress;
- On completion of the course describe honestly and fairly the student's performance on the course.

Research

In their research all staff and students will endeavour to:

- Maintain professional standards including honesty and integrity;
- Properly document all results;
- Evaluate critically all results;
- Attribute honestly the contribution of others;
- Wherever possible report all results openly, bearing in mind the University's commercial considerations and sponsors' needs for confidentiality.

In addition all staff will endeavour to:

- Educate and develop new research workers to an understanding of good research practice;
- Secure and store primary data for an appropriate period of time.

Support Services

In the delivery of all services in support of the work of the University all staff will endeavour to:

- Seek at all times to deliver a prompt quality service;
- Not treat any clients in a way they would not personally wish to be treated by others;
- Give value for money;
- Project at all times a caring image of a University that seeks to help and support.

Consultancy

In its consultancy the university will endeavour to:

- Only offer consultancy and advice within the area of the consultant's knowledge and field of expertise;
- Maintain professional standards including honesty and openness;
- At all times respect client confidentiality, unless expressly permitted by the client to divulge any details;
- Give value for money.

Students

The University would wish to recruit only those students who will:

- Abide by the regulations of the University;
- Observe the University's Codes of Practice and Policy Statements including that on Free Speech;
- Conduct themselves in a manner which neither brings discredit on the University nor harm to its members.

Ethical Quick Test

- Is the action legal?
- Shall I be proud of it?
- Will I feel bad about it?
- Does it comply with the University's values?
- How will it look to my friends and family?
- How will it look in the Media?
- If you know it's wrong don't do it.
- If you're not sure, ask.
- Keep asking until you get an answer that enables you to answer the questions above to your satisfaction.

Implementation of the Code

These fundamental principles should govern the conduct of each member of the University. Whilst the Principles defined above apply to all activities, there are in addition a number of areas where more detailed ethical principles and practices have been set out. These include inter alia the University's Financial and Personnel Manuals, the Student Handbook, and for research the relevant UK Research Council publication (e.g. EPSRC's "Good Practice in Scientific and Engineering Research, 2002-2006", MRC's "Good Research Practice 2000", Wellcome Trust's "Guidelines on Good Research Practice 2005", and the Joint Code of Practice for Research issued by the BBSRC, DEFRA, FSA and NERC, April 2003). Each School or Administrative Department must ensure that all members of the University are made aware of both the Code itself and any local amplifications of it.

In the event that any member has any query or concern regarding the Code, or their obligation under it, they should immediately consult either their Head of School or Department, or (for staff) their Personnel Officer, or (for students) their Head of Registry.

Approved Council, December 2000; updated September 2003