

Tax and the environment: using economic instruments

November 2002



HM TREASURY



HM TREASURY

Tax and the environment: using economic instruments

November 2002

© Crown copyright 2002.

Published with the permission of HM Treasury on behalf of the Controller of Her Majesty's Stationery Office.

The text in this document (excluding the Royal Coat of Arms and departmental logos) may be reproduced free of charge in any format or medium providing that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright and the title of the document specified.

Any enquiries relating to the copyright in this document should be sent to:

HMSO
Licensing Division
St Clements House
2-16 Colegate
Norwich
NR3 1BQ

Fax: 01603 723000

E-mail: hmsolicensing@cabinet-office.x.gsi.gov.uk

HM Treasury contacts

For enquiries about this publication or to obtain further copies, contact HM Treasury Public Enquiry Unit:

Public Enquiry Unit
HM Treasury
1 Horse Guards Road
London
SW1A 2HQ

Tel: 020 7270 4558

Fax: 020 7270 4574

E-mail: public.enquiries@hm-treasury.gov.uk

You can also find HM Treasury on the internet:

www.hm-treasury.gov.uk

CONTENTS

	Page
Foreword by the Chancellor of the Exchequer, Rt Hon Gordon Brown MP	
1. Overview	1
2. Introduction	5
3. Sustainable Development Objectives and Indicators	9
4. Why Not Leave It To The Market ?	13
5. Setting Environmental Objectives and Standards	17
6. Choosing Policy Instruments	23
7. Policy Development Process	35
8. Conclusions	45
Annex A: Sustainable Development Indicators	47
Annex B: Public Service Agreements	51
Annex C: Consultation with Stakeholders	53
List of Boxes	55
List of Tables	55
List of Charts	55
List of Abbreviations	56
References / Bibliography	57

FOREWORD BY THE CHANCELLOR OF THE EXCHEQUER

Tax and the Environment: Using Economic Instruments

As a Government we have an obligation to protect the environment for our children and for future generations. And so, over the past five years, we have put in place demanding, long-term strategies to tackle climate change, improve air quality, regenerate our towns and cities and protect the countryside and our natural resources.

We now have fifteen sustainable development indicators against which we are generally making good progress and we are one of the few countries on track to meet our targets for reducing greenhouse gas emissions under the Kyoto Protocol. But key environmental challenges remain and we are determined to do more.

In 1997 the Treasury published a Statement of Intent on environmental taxation which set out the role that the tax system can play in delivering environmental objectives. Well-designed environmental taxes and other economic instruments can play an important role in ensuring that prices reflect environmental cost – in line with the “polluter pays” principle – and discouraging behaviour that damages the environment. The climate change and aggregates levies, for example, have sent strong environmental signals.

Environmental taxes can also be an efficient mechanism for improving the productivity of natural resources, in line with the wider productivity improvements the Government is seeking to make across the economy.

Of course any Government intervention must be proportionate and well-targeted, and needs to take into account other factors such as distributional effects and business competitiveness, which is key.

This document reviews our experience with environmental taxes so far and reflects the extensive consultations we have had with stakeholders over the last few months. It also shows how economic analysis can help us understand the issues involved in designing and implementing policy measures. And it sets out how effective Government intervention can help achieve the long-lasting changes across the economy that we know are necessary to achieve environmentally sustainable development.



Gordon Brown
November 2002

OVERVIEW

1.1 The Government has a clear aim of improving the quality of the environment, both now and in the future, as part of its strategy of achieving sustainable development. Underpinning this aim, the Government has long-term strategies to tackle the key environmental issues including climate change, improving air quality, regenerating towns and cities, and protecting the countryside and natural resources. Good progress has been made in many of these areas. For example, certain types of air and water pollution have fallen and the UK is one of the few countries which are on track to meet their targets for reducing greenhouse gas emissions under the Kyoto Protocol. Nevertheless, significant challenges still remain in many areas which are crucial to improving the quality of life and delivering an environmentally-sustainable economy.

1.2 The Government believes that, in general, markets provide the best means of allocating an economy's resources. This is as true for environmental resources as for others. However, many markets are subject to imperfections or failures. This is particularly the case for markets involving the environment. Correcting the market failures will help to make the market work better and deliver more efficient outcomes. In order to determine the most effective form of intervention, it is therefore necessary to understand the nature of the relevant market failures. Market failures can exist where the costs of environmental damage are not reflected in prices of goods and services; where environmental improvements can only be achieved by society acting collectively rather than individually; or where decision-makers do not have clear information about how best to reduce their costs. If the Government intervenes to correct these market failures efficiently it will achieve better environmental outcomes as well as greater overall economic efficiency. Intervention needs to take account of the dynamic nature of markets and the long-term nature of many environmental problems, and of the potential for innovative solutions to be developed. There are many different ways in which the Government can intervene and it needs to ensure that any intervention is effective in achieving its objectives, and that the benefits are likely to justify the costs.

1.3 Taxes and other economic instruments have a central role to play in this process. They can provide incentives for behaviour that protects or improves the environment, and deter actions that are damaging to the environment. For both consumers and business alike, economic instruments such as tax can enable environmental goals to be achieved at the lowest cost and in the most efficient way. By internalising environmental costs into prices, they help to signal the structural economic changes needed to move to a more sustainable economy. They can encourage innovation and the development of new technology. The revenue raised by environmental taxes can also be used to reduce the level of other taxes, which can help to reduce distortions in the economy, while raising the efficiency with which resources are used. Where there is a strong case, some or all of the revenue may also be used to reinforce the effectiveness of a tax measure by strengthening incentives for positive action, or mitigating adverse impacts.

1.4 In recognition of these benefits, the Government published its Statement of Intent on environmental taxation in 1997. This set out the Government's intention of using environmental taxes as one of its policy mechanisms for addressing the environment, providing they meet the tests of good taxation. Since 1997 the Government has implemented a range of tax measures such as the climate change levy and the aggregates levy, made changes to existing taxes such as the landfill tax, and used fuel duty differentials to favour cleaner fuels and graduated vehicle excise duty (VED) to favour less polluting cars. The

Government believes that the principles set out in the Statement of Intent have worked well in taking forward these measures.

1.5 One of the key features of environmental policymaking is that it often requires assessments to be made of uncertain future environmental impacts. There will also usually be a range of constraints which mean that it will not be possible to introduce the most theoretically efficient instrument. These may include distributional issues, impacts on business competitiveness, and administrative or practical constraints. Consequently judgements need to be made about how to balance uncertain environmental costs against the costs of taking action, and about how to offset the various constraints on policy options. Economic analysis offers a framework to help determine how best to reconcile these factors, taking account of the long time horizons which may be involved. Economic tools can be used to appraise the costs and benefits of actions, and to identify the most efficient methods of government intervention. The Government aims to use these techniques as effectively as possible to ensure that intervention is effective and efficient, and proportionate to the problem being addressed.

1.6 Environmental tax measures also involve inherent uncertainty in the behavioural response which they will achieve. Consequently there may be a perception that they are being implemented for other reasons, such as to raise revenue or to achieve other effects through their distributional impacts. Dialogue with stakeholders during the design and development of policy instruments is important in ensuring that the issues involved are well understood and that as much information as possible is available. The Government aims to ensure that the potential need for intervention is signalled early and that the options are explored thoroughly with stakeholders. Once decisions have been taken, the Government clearly sets out the timescale for introduction of policy measures so that those affected have time to respond. Following implementation of a measure, mechanisms are put in place to evaluate its effectiveness and to report on progress.

1.7 The Government's approach to correcting environmental market failures reflects its wider agenda of improving productivity across the UK economy by tackling wider market failures, recognising the dynamic and long term nature of responses within markets. Removing environmental market failures will help to ensure that the productivity of natural resources is maximised along with the productivity of the other inputs used by production processes. Particularly important in this context are the Government's policies to support innovation, in recognition of its positive benefits, along with ensuring that the market reflects environmental costs in prices.

1.8 The Government has discussed its approach to environmental taxation and the key issues with a range of stakeholders over summer 2002. This paper draws upon these discussions and describes how the approach will continue to be developed in the light of experience. It also describes how taxation can be used as one of a range of measures, and the ways in which it can be linked with other approaches such as regulation, information, tradable permit schemes and voluntary agreements.

1.9 This paper does not set new environmental objectives for Government. Instead, it shows how the Government can meet existing and evolving objectives in the most efficient and effective way. The Government believes that these principles, and the lessons from the UK's experience with environmental economic instruments, should continue to be used at home, in the EU and internationally to help frame policy responses to the next key environmental challenges.

I.10 The 2002 Pre-Budget Report has outlined a number of areas where further work is being undertaken on the use of economic instruments to tackle environmental issues. These include waste, agriculture, and domestic energy efficiency, including the possible role of product charges. The Government also anticipates that economic instruments will continue to have a key role to play in tackling climate change and the environmental impacts of transport. The Government will continue to explore the use of economic instruments to achieve its environmental and sustainable development objectives, and it will continue to engage with stakeholders on the use and design of these instruments.

2.1 The Government's objectives for using environmental taxes are set out in its Statement of Intent on environmental taxation, published in July 1997 (see Box 2.1)¹.

Box 2.1: Statement of Intent on environmental taxation

The Government's central economic objectives are the promotion of high and sustainable levels of growth and high levels of employment. By that we mean that growth must be both stable and environmentally sustainable. Quality of growth matters; not just quantity.

Delivering sustainable growth is a task that falls across government. It will be a core feature of economic policy under this administration. The Treasury is committed to that goal.

How and what governments tax sends clear signals about the economic activities they believe should be encouraged or discouraged, and the values they wish to entrench in society. Just as work should be encouraged through the tax system, environmental pollution should be discouraged.

To that end, the Government will explore the scope for using the tax system to deliver environmental objectives – as one instrument, in combination with others like regulation and voluntary action. Over time, the Government will aim to reform the tax system to increase incentives to reduce environmental damage. That will shift the burden of tax from “goods” to “bads”; encourage innovation in meeting higher environmental standards; and deliver a more dynamic economy and a cleaner environment, to the benefit of everyone.

But environmental taxation must meet the general tests of good taxation. It must be well designed, to meet objectives without undesirable side-effects; it must keep deadweight compliance costs to a minimum; distributional impact must be acceptable; and care must be had to implications for international competitiveness.

Where environmental taxes meet these tests, the Government will use them.

2.2 The Government believes that environmental taxes and other economic instruments will continue to be key policy tools for achieving environmental improvements. The Statement of Intent has been effective in providing a framework for these policies. It is prudent to consider now how this approach has worked and how it should continue to be applied. The Government also believes a similar approach and framework should be applied in assessing the case for other economic instruments.

2.3 The process which the Government takes in determining whether and how to intervene to improve the environment involves a number of steps.

2.4 First, the Government will identify **the environmental policy objective**. The Government has strategies for each of the key environmental issues, such as tackling climate change, improving air quality, regenerating towns and cities, protecting the countryside and tackling the problems of waste. Each of these strategies sets out the issues involved and the objectives which need to be met. The Government's sustainable development indicators, set out in Chapter 3, show progress on some of the most important environmental issues.

¹ 'Tax Measures to Help the Environment', HM Treasury news release, 2 July 1997.

2.5 Second, the Government will assess **the rationale for becoming involved** in helping to achieve the objectives. The relevant market failures need to be identified in order to determine whether there is a case for government intervention to tackle them, and so improve market efficiency and increase resource productivity. On occasions the Government may decide it needs to intervene to change behaviour in order to achieve specific targets or commitments.

2.6 Third, the Government will evaluate **the benefits and costs of intervention**. The potential environmental benefits need to be considered in relation to the costs of achieving them. In addition, the Government will consider other impacts of possible measures, including the potential distributional effects and impacts on the competitiveness of sectors exposed to international competition. The potential administrative compliance costs also need to be considered, along with the risk that intervention will be unsuccessful or may deliver unintended consequences.

2.7 Fourth, the Government will determine **the most efficient instruments for achieving the objectives**. The most efficient approach will be the one that provides the greatest overall economic benefits. The instruments might include taxes or other economic instruments, regulation, the provision of information, or voluntary agreements. Taxes may be used as part of a package with other measures such as tradable permit schemes, spending programmes, tax incentives, or voluntary agreements. Other measures may also be used in place of a tax if they can achieve the same objective at lower economic cost. The Government has not taken a single approach to all environmental problems, but has adapted its approach depending on the circumstances. It will consider alternatives to environmental taxes, as it has done for pesticides, where agreement was reached on a voluntary package of measures in place of a tax. Tradable permit schemes, such as for greenhouse gas emissions and for waste, will also have a role to play.

2.8 The Government will also consider the extent to which the potential instruments have synergies or trade-offs with other economic and social objectives and the extent to which these are acceptable.

2.9 Finally, the Government will take forward **the process of policy development and implementation**. Given the long-term nature of many environmental problems and the significant impacts which some policy measures can have, the Government believes that policies to tackle the environment should be developed over a period of time in consultation with stakeholders. Having identified an environmental problem, the Government engages in a lengthy process of evidence-gathering, consultation and analysis before deciding on the most effective policy response. Once decisions have been made on the type of policy mechanism to use, there is further consultation on the design of measures and the shape of the overall package, including recycling of revenue from environmental taxes. Measures are kept under review once they have been implemented and further changes will be made where they are justified. Changes may be required as a result of a range of factors, including market developments, introduction of new technologies, or the availability of new information on environmental impacts. The environmental effectiveness of measures will be assessed over time and the Government will report on progress in Budgets and Pre-Budget Reports.

2.10 Environmental taxes broadly fall into two groups. Taxes on broad aspects of economic activity such as energy, waste and transport raise significant levels of revenue which can be used to offset other taxes. The Government has used revenue from taxes such as the climate change levy and aggregates levy to reduce employers' national insurance contributions and has also introduced enhanced capital allowances to reduce costs of investments in environmentally-friendly technologies. Some of the revenue has also been used to support related spending programmes.

2.11 There may also be a role for much smaller taxes which target specific environmental impacts. These would be unlikely to raise very much revenue and therefore would not have any significant impact on the overall tax base. For such taxes there may be a stronger case for using most or all of the revenue to encourage a response to the tax.

2.12 Innovation and technological developments have been crucial in enabling past improvements in environmental performance to be achieved and this will continue to be the case in the future. A key issue for the design of instruments to improve the environment is to ensure that they provide incentives for further innovation.

2.13 The rest of this paper explores the Government's approach in more detail. Chapter 3 covers sustainable development objectives. Chapter 4 discusses why the market alone does not always deliver the most efficient environmental outcome, and Chapter 5 considers the case for Government intervention. Chapter 6 discusses the choice of instruments and Chapter 7 sets out a framework for the process of developing them. Conclusions are set out in Chapter 8.

SUSTAINABLE DEVELOPMENT OBJECTIVES AND INDICATORS

3.1 As set out in the UK Sustainable Development Strategy¹, the Government's aim is to achieve a better quality of life for everyone, now and for future generations. However, quality of life depends on a range of factors, and is not captured by any one variable. In recognition of this, the Government has adopted fifteen headline sustainable development indicators, covering economic, social and environmental dimensions. The fifteen headline indicators, which the Government has indicated should move in the right direction over time, are set out below. Where a trend in any of the indicators is unacceptable, the Government will adjust policies accordingly, and will look to others to join it in taking action.

Box 3.1: Headline sustainable development indicators

Maintaining high and stable levels of economic growth and employment:

- total output of the economy (GDP);
- investment in public, business and private assets; and
- proportion of people of working age who are in work.

Social progress which recognises the needs of everyone:

- poverty and social exclusion (fuel poverty etc);
- qualifications at age nineteen;
- expected years of healthy life;
- homes judged unfit to live in; and
- level of crime.

Effective protection of the environment:

- emissions of greenhouse gases;
- days when air pollution is moderate or high;
- road traffic;
- rivers of good or fair quality;
- populations of wild birds; and
- new homes built on previously-developed land.

Prudent use of natural resources:

- waste arisings and management.

3.2 Progress against the environment-related indicators is set out in the charts in Annex A².

3.3 These indicators provide an accessible indication of the progress that society as a whole is making towards delivering sustainable development. As the Sustainable Development Strategy makes clear, delivery of a better quality of life is the responsibility of all sectors, not just government.

3.4 The headline sustainable development indicators are not intended to capture every aspect of social welfare. They only measure certain key variables and some of the environmental indicators do not measure impacts directly. For example, the level of road traffic is not in itself a measure of the greenhouse gas emissions, emissions affecting air quality, congestion, or noise implications of road use.

¹ 'A better quality of life: a Strategy for Sustainable Development in the United Kingdom', DETR, 1999.

² 'Achieving a better quality of life – Review of Progress towards Sustainable Development in 2001', DEFRA, 2002.

3.5 Nevertheless, these indicators do provide an important snapshot of society's progress towards sustainable development. Measuring the overall volume of road traffic is a useful proxy for the more complex environmental issues that arise from this form of transport, for example. The Government has a wider suite of 147 sustainable development indicators which enables this complexity to be brought out.

3.6 The indicators demonstrate the progress that is being made in delivering the environmental dimension of sustainable development. For example, river and air quality continue to improve significantly. The UK's greenhouse gas emissions are also on a downward trend and are on track to meet the UK's target under the Kyoto Protocol. On current trends the UK is one of the few EU member states likely to meet its Kyoto target. The UK is also making progress towards the Government's own, more demanding, goal of cutting carbon dioxide emissions by 20 per cent below 1990 levels by 2010. However, it may be harder to reduce emissions beyond the Kyoto commitment period of 2008 to 2012. Future emissions targets are likely to become tighter, and the UK needs to be ready to take further action to continue to reduce emissions in the longer term.

3.7 Another key area where action will be required to meet environmental targets is waste. Waste sent to landfill gives rise to emissions of methane (one of the six greenhouse gases covered by the Kyoto Protocol) as well as causing local environmental impacts. The UK has targets which are set by the EU Landfill Directive to reduce the volume of biodegradable municipal waste sent to landfill. The volume should be reduced to 75 per cent of the 1995 level by 2010, 50 per cent of that level by 2013, and 35 per cent of that level by 2020. The Government has also set its own targets for increasing recycling rates. However, volumes of waste sent to landfill have continued to rise over recent years.

3.8 The environmental impact of road traffic and other forms of transport also remains very significant. Some of the environmental impacts of transport have been tackled successfully, such as lead in petrol. The impact of transport on local air quality is also being addressed. However, although the fuel efficiency of new vehicles is improving, transport continues to be a major user of energy and source of carbon dioxide emissions.

3.9 There are also other sustainable development indicators which presently show slow progress, such as populations of farmland birds. This reflects changes which are occurring in the countryside and which may also be related to landscape and habitat. Agriculture and other land management activities have an important role to play and further action is required to redress the adverse trends of the last few decades.

3.10 Better progress has been made in reducing specific emissions to air and water. However, many of these are by-products of economic activity which are relatively easy to control through better technology and management. By contrast, in order to reduce carbon dioxide emissions from energy use, the volume of waste, and the demand for transport some structural change in the economy will be required. Demand for energy, materials and transport will all tend to increase as society becomes better off, with a resulting increase in environmental impact unless these trends can be offset. For energy, greater use of renewable energy or other clean energy supplies will help to reduce emissions, but these currently supply a small part of the UK's total energy demand. The Government has put in place measures to support growth of technologies such as renewable energy, but it will also remain important to encourage innovation to reduce demand from all sectors of the economy.

The Government's Role

3.11 The Government has a central role to play in making progress on each of the measures set out by the sustainable indicators. This is reflected in departmental Public Service Agreements (PSAs). These PSAs set out the priorities that Government departments have set and give targets against which progress can be monitored. They closely reflect the overall headline indicators. Key PSAs relating to the environment are listed in more detail in Annex B.

3.12 Given the important role which economic instruments can play in achieving environmental improvement, one of HM Treasury's ten PSAs is to: 'protect and improve the environment by using instruments that will deliver efficient and sustainable outcomes through evidence-based policies'³. Each department's PSAs were agreed as part of the 2002 Spending Review. Box 3.2 describes how the Spending Review took account of sustainable development issues.

Box 3.2: Sustainable development and the 2002 Spending Review

In recognition of the importance of considering the interactions between social, economic and environmental policy measures the Government took steps in the 2002 Spending Review to ensure that sustainable development issues were considered and reflected in departmental submissions to the Review.

For the first time, HM Treasury provided specific guidance in the 2002 Spending Review to departments on how to consider sustainable development¹. Departments were asked to produce a Sustainable Development Report, setting out the sustainable development dimension to their work. This guidance reflects the importance the Government attaches to a strong evidence base for its decisions on public spending.

By encouraging consideration of the wider implications of departmental work, and the application of the analytical principles set out in this document, the Government is better able to identify the interactions between the social, economic and environmental factors that together contribute to our quality of life.

The 2002 Spending Review sustainable development guidance used the Government's fifteen headline indicators as its starting point. This provided a consistent framework for comparisons across departments and encouraged consideration of wider impacts.

¹'Sustainable Development at the Heart of Government Policy Development', HM Treasury press notice 123/01, 14 November 2001

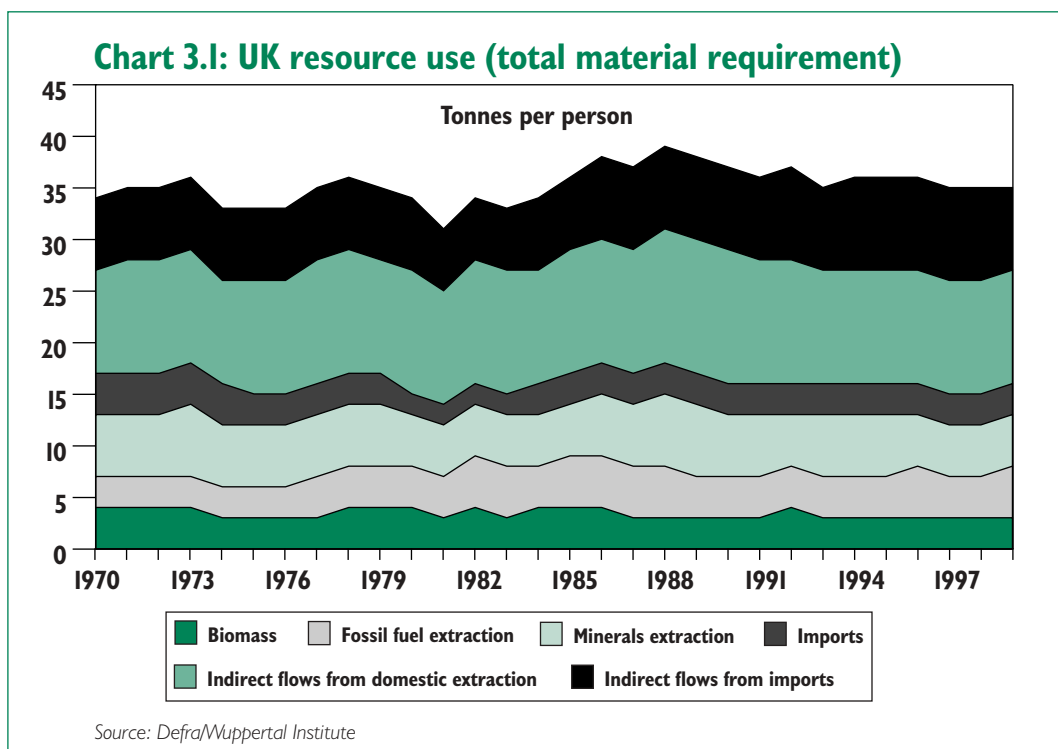
Resource productivity indicators

3.13 Intervention by the Government to improve environmental performance will also help to improve the efficiency with which resources are used in the economy, by ensuring that environmental costs are taken into account more effectively in the decision-making process.

3.14 Resource productivity indicators offer one means of measuring environmental progress in relation to social and economic factors. These can show the efficiency of the economy in generating added value from the use of natural resources⁴. An example of an indicator of resource use is shown in Chart 3.1.

³ 'Spending Review 2002 Public Service Agreements', HM Treasury, 2002.

⁴ 'Resource Productivity: Making More With Less', Cabinet Office, 2001.



3.15 This chart shows that total resource use per capita in the UK has remained fairly stable over the past three decades, despite a substantial increase in the output of the UK economy. This indicates that efficiency of resource use has improved over this period of time. However, it is not easy to determine how this improvement affects overall quality of life.

3.16 The Government has recently undertaken further analysis of the resource requirements of the economy⁵. This concluded that economic growth in the UK is becoming de-coupled from the total use of materials, and that the UK's resource productivity was relatively good compared with other members of the EU. However, economic growth has not yet been de-coupled from levels of waste production or use of water.

3.17 Another recent report for DEFRA assessed a number of different indicators of resource productivity that have been developed⁶. The report found that not one of the measures considered scored highly against all of the criteria used to assess them in terms of robustness, practicality and usefulness to policy-makers. Therefore while resource productivity indicators can be one useful measure, because of these difficulties, the Government continues to use the range of sustainable development targets and indicators listed above as concrete methods of judging society's progress towards its quality of life objectives. The Government is also continuing to evaluate how best to measure resource productivity more effectively.

⁵ Wuppertal Institute, 'Resource Use and Efficiency of the UK Economy', Report to DEFRA, 2002.

⁶ Moffatt I., Hanley N., Allen S., Fundingsland M., 'Sustainable Prosperity: Measuring Resource Efficiency', Report to DETR, 2001.

4

WHY NOT LEAVE IT TO THE MARKET?

4.1 The Government believes that, in general, markets provide the best means of allocating an economy's resources¹. Markets provide incentives to all participants in the economy to maximise the productivity of resources and they encourage the most productive businesses to flourish. However, many markets are subject to imperfections or failures. This is particularly the case for markets involving the environment. Correcting the market failures will help to make the market work better and deliver more efficient outcomes. In order to determine the most effective form of intervention, it is therefore necessary to understand the nature of the relevant market failures, while recognising the complexities involved.

Market failures

4.2 Market failure exists when the competitive outcome of markets is not efficient from the point of view of the economy as a whole. This is usually because the benefits that the market confers on individuals or firms carrying out a particular activity diverge from the benefits to society as a whole. Put another way, markets fail when the private returns which an individual or firm receives from carrying out a particular action diverge from the returns to society as a whole – resulting in a sub-optimal amount of it being done. Markets can also fail when the individual or firm does not have sufficient information to recognise the returns from undertaking an action.

4.3 Many of the market failures related to the environment are complex and involve information failures relating to understanding of future costs and benefits. The Government recognises the difficulties involved in identifying market failures clearly, but believes that intervention will be most effective if it is based on the best possible analytical framework. This framework also needs to take account of the dynamic nature of markets, and the ability of business to respond to market signals to innovate and develop new ways of supplying goods and services.

Externalities **4.4** Probably the most widespread market failures related specifically to the environment are externalities. Externalities lead to the incorrect level of a good being supplied in two ways:

- negative externalities: economic agents impose costs on others but do not pay these costs, therefore they do not take them into account when making production or consumption decisions; or
- positive externalities: actions give rise to benefits which are not reflected in the price, therefore leading to under-consumption.

Box 4.1: Example of environmental costs

In a simple example, two firms, a factory and a fishery, use the same river as an input good. By using the river to dispose of waste, the factory imposes costs on the fishery and reduces its productive capacity; but the market does not reflect this cost in prices because there are no property rights for the pollution. There would be an overall gain for the economy as a whole if the amount of pollution was set where the marginal benefit accruing to the factory from each additional unit of waste disposal was equal to the marginal cost to the fishery of each additional unit of river pollution. (Marginal benefits and costs are those which arise from a change in the level of an activity. They may be different from the overall average benefits and costs from the activity.) The efficient outcome cannot occur while the factory does not face the full costs of its activities – its own private costs and the wider social costs.

¹ 'Productivity in the UK: The Evidence and the Government's Approach', HM Treasury, 2000.

4.5 Other examples of negative externalities include the health costs of air pollution from road traffic and the visual and noise impacts of quarries. These are social costs that would not be faced by the polluters in the absence of government intervention. Examples of positive externalities can include developers cleaning up contaminated land, which encourages the regeneration of the surrounding area, and landowners improving the quality of the countryside, which increases the enjoyment of visitors.

4.6 If the market does not reflect costs properly, there will implicitly be subsidies within the economy to those causing pollution, and there will be insufficient reward to those who are, or who would, undertake actions which have positive external benefits. By intervening in the market, government can ensure that efficiency is achieved and that social costs and benefits are factored into prices and are thus reflected in the decisions that agents make. This will also help to ensure that resources are used more efficiently.

Public goods **4.7** Market failures may also occur where the environment has the qualities of a public good. Here, the market failure is that overall society would be better off if a good or service was provided, but this does not occur in a free market context without some form of intervention. This is a consequence of the features of public goods: they are non-rival and they are non-excludable. ‘Non-rival’ means that one person’s consumption of the good does not reduce anybody else’s ability to consume the same good. ‘Non-excludable’ means it is impossible to prevent individuals from benefiting from the good.

4.8 An example of an environmental public good is public open space, which nobody would provide on their own, even though everybody benefits from it being available. Street lighting is another example of a public good.

Other market failures **4.9** There are also market failures because of:

- **information failures:** economic agents do not make optimal decisions because they have imperfect information about the (social and private) costs and benefits of their actions, for example on energy efficiency or waste minimisation;
- **absence of perfect competition:** industries characterised by imperfect competition will produce inefficiently low levels of output in order to maximise profits and may engage in other inefficient actions such as bundling goods, price discrimination and creating and maintaining barriers to entry in order to retain market power. Government can intervene to prevent or ameliorate the effects of imperfect competition through enforcing laws against anti-competitive behaviour and by regulating natural monopolies/oligopolies. Anti-competitive behaviour may have impacts on the environment, while market characteristics may also influence how government intervenes to address environmental externalities, public goods or information failures; and
- **Government intervention:** sometimes actions by government to address a problem have unintended or unavoidable indirect environmental impacts. For example, production subsidies can have negative environmental consequences. In addition, although government regulation has a clear and vital role to play in ensuring that markets operate efficiently, excessive or unnecessary government regulation can obstruct efficient market functioning.

Resource productivity **4.10** The Government’s approach to tackling environmental market failures will help to ensure that natural resources are used as efficiently as possible. If the environmental costs of

resources including their externalities are reflected in prices, there should be no incentive to consume more of them than the economically-efficient amount. This will improve economic and environmental efficiency, and will also lead to an increase in resource productivity.

4.11 The Government's wider productivity agenda is aimed at tackling market failures. Where wider market failures such as imperfect competition or inadequate or poor regulation result in inefficient use of resources, government intervention to correct these may also help to improve resource productivity along with wider efficiency improvements within the economy more generally. Decision-makers will have incentives to ensure that they maximise the productivity of natural resources together with the productivity of other inputs to production.

4.12 Tackling environmental market failures is therefore part of a wider strategy of correcting more general market failures in order to deliver a more dynamic and competitive economy which properly reflects environmental costs along with other costs. Resource productivity should rise through the pursuit of profits via innovation and the adoption of new technology.

Innovation 4.13 A number of market failures may hold back innovation, including environmental externalities not being reflected in prices and information failures and uncertainties about future costs. New technologies can also deliver positive spillover effects from a wider application which are not reflected in the returns to innovators.

Distributional implications

Impacts on different groups 4.14 Market failures may have distributional effects in the way that they impose costs on different groups. The presence of environmental externalities can lead to:

- costs for those not causing the externalities. The impacts can be:
 - local, eg air quality;
 - regional, eg river pollution;
 - national or international, eg sulphur emissions;
 - global, eg climate change; or
 - intergenerational, eg climate change;
- costs for those groups directly involved in the activity that are not incorporated in the price. An example is congestion, where there is no distinction between consumers who place a high value on road use and those who have a low value for it;
- differential impacts on different income groups. For example, air pollution often affects those on low incomes in inner cities. Income inequalities are also an issue for transboundary issues such as climate change, where the most adverse effects might fall on less developed countries in south or south-east Asia which are least able to adapt; and
- differential impacts on different sectors of the economy. For example, congestion imposes costs on sectors of business; water pollution from activities such as agriculture imposes costs on the water industry and on consumers.

4.15 Some of these distributional issues also apply to the welfare losses from the under-provision of a public good. These costs can impact more on lower income households as they have less ability to substitute with private goods.

4.16 Environmental damage caused by one group or sector can lead to costs for others. Equally, tackling environmental damage can impose costs. They can also have social and distributional implications. It may be necessary to balance the short term with the very long term (imposing costs now to deliver benefits for later generations); the local with the global (reconciling the costs of reducing greenhouse gas emissions in Europe and the USA with estimates for example that 80 million people in southern and south-east Asia may be at risk of flooding by 2080 as a result of climate change²); and the impacts on different sectors of society and business (eg a recent study³ estimates that the agrochemical industry imposes clean up costs of £120 million a year on the water supply industry in the UK).

**Weighting
different
priorities**

4.17 Addressing distributional impacts may require value judgements to be made about the relative values of costs and benefits falling on different groups. This can encompass different groups in society and also future generations. In making these judgements, the Government aims to ensure that its decisions are fair within and across generations, and that they reflect society's obligations to the future. But so far as possible these decisions should be underpinned by economic analysis so that the debate is well-informed.

² 'UK Climate Change Programme', DETR, 2000.

³ Pretty J.N., Brett C., Gee D. et al, 'An assessment of the total external costs of UK agriculture', *Agricultural Systems*, vol. 65, pp. 113-136, 2000.

5

SETTING ENVIRONMENTAL OBJECTIVES AND STANDARDS

5.1 Where an environmental problem or goal has been identified, the case for government intervention needs to be carefully considered. Economic analysis offers a framework to help determine how to reconcile the competing objectives which society faces. It provides a consistent methodology for quantifying environmental, economic and social impacts. By carrying out such analysis government is better placed to make decisions that will improve quality of life overall.

Evidence-based policy making

5.2 The costs and benefits involved in addressing a particular market failure need to be analysed as rigorously as possible, to inform decision-making. Where an environmental problem is identified, the Government will need to determine whether it is worth intervening to address it. Any intervention will only be worthwhile if the benefits are likely to justify the costs.

5.3 Analysing costs and benefits will also help to determine the most efficient extent of any intervention. It will also be necessary to determine the level at which action should be taken – local, national or international.

5.4 Gathering robust evidence concerning environmental issues often involves considerable difficulties in evaluating future costs and risks. These can be difficult to quantify effectively and consequently in the past there has been a tendency to avoid quantifying them altogether. While these difficulties remain, the Government is doing its best to reduce the level of uncertainties involved. The Government recognises that many environmental assets are currently not valued clearly, but it believes that its interventions to protect them will be better founded and more effective if the evidence is as robust as possible.

Scientific evidence

5.5 Decisions should be made on the basis of good scientific evidence. However, there are often limitations or uncertainties in the science. For example, the impacts of climate change may have very significant consequences for the environment in the longer term which are impossible to predict with any degree of certainty. As a result, the costs of not acting are not always clear, nor are the potential risks involved. The Government is working to understand the impacts of climate change more fully through a major research programme managed by DEFRA.

Precautionary principle

5.6 Where there are significant uncertainties surrounding the scientific case, policy decisions should take account of the precautionary principle. The Rio declaration¹ defines the precautionary principle as: ‘where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation’. This encompasses the concept that precautionary action may be justified to mitigate a perceived risk or uncertainty, even if the probability of environmental damage is low, but where if it did happen the outcome would be very adverse.

5.7 The purpose of the precautionary principle is to create an impetus to take a decision, notwithstanding scientific uncertainty about the nature and extent of risk. However, precautionary action should accord with the principles of good regulation, including being proportionate and consistent. Taking action involves making assumptions about consequences and likelihoods of a hazard or threat in order to establish credible scenarios, and then using standard procedures of risk assessment and management to inform decisions

¹ Report of the UN Conference on Environment and Development, June 1992.

on how to address it. Decisions which take account of the precautionary principle should be reviewed as further information that reduces uncertainty becomes available.

5.8 A result of the uncertainty surrounding many environmental issues is that there is sometimes scepticism about the value of government action, or the reasons for action when it is taken. However, the Government will ultimately need to make judgements taking account of the available information. It is also important that the issues involved are explained and well-understood.

Environmental valuation

5.9 There are a variety of tools to value environmental goods, which do not usually have a market price. These generally involve inference of a 'price', either from consumers' behaviour, or from their stated valuation of a good or service.

5.10 'Hedonic pricing' is an example of a technique to infer an implicit price revealed indirectly by examining consumers' behaviour in a similar or related market for a private good. For example, the relationship between house prices and levels of environmental amenity, such as 'peace and quiet', may be analysed in order to assign a monetary value to the environmental benefit. Other examples are travel cost models (principally for recreational values) and random utility models (to estimate the value of different individual features of a site).

5.11 Stated valuations are normally obtained by means of specially constructed questionnaires and interviews designed to elicit estimates of the willingness to pay (WTP) for, or willingness to accept (WTA), compensation for a particular outcome.

5.12 An alternative is to refer directly to the cost of remediating damage caused by pollution. For example, some of the costs of pollution to water can be measured through the costs involved in removing the pollution. This approach is useful in demonstrating the resource implications of environmental problems, whereas the methods discussed above demonstrate how important an environmental impact is to society. Pollution control costs tend to be at the lower end of the range, given that society has chosen to pay at least that amount to reduce the pollution. If other valuation techniques are used, costs derived in this way can aid checking valuation data obtained through other methods.

5.13 Where full valuation of costs and benefits is thought not to be possible or worthwhile, they should still be recorded. Multi-criteria analysis can then be used to bring directly into the appraisal process data expressed in different units. These can be weighted according to their importance and the results used to rank options.

5.14 Although environmental valuation is subject to uncertainty because of the complexities involved, it continues to develop and the Government has contributed to the debate through the commissioning of studies on environmental impacts such as the effect of local air quality on people's health and the value attached to a particular level of health. The Government has also begun work to assess the social costs of carbon emissions².

Economic appraisal

5.15 Economic appraisal provides a mechanism for determining whether it is worth taking action – and the most efficient degree of action. The Treasury 'Green Book'³ gives a standard appraisal methodology. A revised draft of the Green Book is currently subject to consultation⁴.

² Clarkson R., and Deyes K., 'Estimating the Social Cost of Carbon Emissions', Government Economic Service Working Paper 140, 2002.

³ 'Appraisal and Evaluation in Central Government', HM Treasury, 1997.

⁴ 'Appraisal and Evaluation in Central Government Draft under Consultation', HM Treasury, 2002.

Box 5.1: Contingent valuation for the aggregates levy

The former DETR commissioned a study to inform a decision on whether to impose a tax on aggregates and, if so, at what level. This estimated how much people valued avoiding the adverse environmental effects of quarrying for construction aggregates (rock, sand or gravel) both in their locality and in landscapes of national importance.

In the second phase of the study, ten thousand respondents were picked at random from areas surrounding 21 sample quarries and other extraction sites. They were asked how much they would be willing to pay, in the form of increased taxes over a five year period, for the local quarry to be shut down, assuming that the site was restored in keeping with the surrounding landscape, and that the workers find new employment.

A further 1,000 respondents, chosen at random from 21 English postcodes not near aggregates production sites, were asked what they would be willing to pay to close a quarry in a National Park (the Peak District and Yorkshire Dales were used as examples). These results in respect of National Parks show the value attributed to the environmental damages of quarrying by people not themselves directly affected. The environmental effects which people were asked to value included:

- adverse effects on nature, such as loss of biodiversity;
- noise from quarry transport and blasting;
- traffic and dust levels; and
- visual intrusion.

From the results of the surveys, national estimates were calculated for the average amount that people are willing to pay for the environmental benefits obtained from early enclosure of a quarry. The national average, weighted by the type of output, was calculated to be £1.80 per tonne. The Government subsequently set the rate of aggregates levy at a more cautious £1.60 per tonne when it was introduced in April 2002.

5.16 The costs of taking action are also difficult to substantiate in some cases, especially where a significant change is required. An example is the large-scale deployment of renewable sources of energy, where there are arguments that costs will come down over time as technologies develop and economies of scale improve. But this makes it difficult to assess potential future costs when policy is being developed.

5.17 As a result, this may inhibit the adoption of policy measures which would encourage significant innovation. This is another aspect of the risk involved in long-term policymaking.

5.18 Assessing costs and benefits should include appropriate discounting of future costs and benefits. The social time preference rate is the rate by which costs and benefits should be discounted to reflect the value society places on consumption of goods and services now, compared with consumption in the future. The revised draft of the Green Book recommends a discount rate of 3.5 per cent rather than the rate of 6 per cent in the previous version. However, the costs associated with optimism bias, systematic risk and variability have been separated out from the new rate, and account also needs to be taken of each of these. Overall, the lower the discount rate the greater the value given to future costs and benefits. The revised draft Green Book also sets out some exceptions where the standard rate may not be appropriate, including:

- proposals where the impacts occur over the long term, where a lower discount rate may be appropriate; and
- proposals where the quantity to be discounted is not a real expenditure or income.

5.19 The efficient extent of intervention will not necessarily eliminate all negative environmental impacts; ideally, it will reduce them to a level where the marginal (private and social) costs of the environmental impacts are equal to the marginal benefits derived from undertaking the activities which cause them. The fact that a degree of environmental impact can be economically efficient is central to the idea of sustainable development and the recognition that social and economic progress are also important to our overall quality of life.

Box 5.2 Valuation of lorry track and environmental costs

The Government commissioned research into the track and environmental costs of lorries in 1998. The conclusions of the research were published in April 2000¹. In the 2000 Pre-Budget Report the Government launched a consultation exercise on plans for a comprehensive reform of vehicle excise duty (VED) for lorries, to reflect better the track and environmental costs of different lorries.

In Budget 2001 the Government introduced a new system of lorry VED, which came into effect in December 2001. The new lorry VED rates were related to the track and environmental costs which were established by the research, and improved the environmental signals that hauliers face to encourage them to use lorries which cause less road damage and pollution. Overall, the new rates were around 50 per cent lower than the previous rates, so they allowed the Government to improve both the environmental and competitiveness impacts of VED simultaneously.

¹ Dodgson et al, 'Lorry Track and Environmental Costs', Report to DEFRA, National Economic Research Associates, AEA Technology and Transport Research Laboratory, April 2000.

Use of environmental targets **5.20** Cost-benefit analysis should be used to appraise individual measures and also to inform high level target setting. Targets offer a means of setting long-term objectives but if they are not set at the economically-efficient level they can impose unnecessary costs. If the benefits of action are overestimated or the costs are underestimated the targets will be tighter than necessary, while they will be insufficiently stringent if the errors are the other way. It is therefore right that the Government takes a prudent and cautious approach to setting targets and is reluctant to do so unless the evidence is convincing and compelling.

International obligations **5.21** The Government is committed to taking account of costs and benefits in its domestic environmental protection policies and also believes that they should underpin negotiation of international commitments⁵. Where targets are agreed at the EU or international level, it should be clear that the benefits of achieving the targets outweigh the costs and that meeting them will deliver improvements in overall quality of life.

5.22 However, there are some policy areas where target setting is not easily based on an objective assessment of the costs and benefits. For example, it may be difficult to establish the costs of action or the benefits of avoided environmental damage. If there is significant uncertainty then judgements will need to be made on the relative importance of the factors involved. In some instances targets will be set through a process of negotiation, such as for the climate change targets agreed under the Kyoto Protocol. In these cases the process of target setting will help to reveal the weight which society puts on the costs and benefits, but unless all those involved have a good understanding of these there remains a danger that targets will be set at an inefficient level.

⁵ 'Realising Europe's Potential : Economic Reform in Europe', HM Treasury White Paper, February 2002.

5.23 It is not always clear that targets set by EU environmental legislation are commensurate with the environmental costs imposed by particular sources of pollution within the UK. For example, it could be argued that the Landfill Directive targets will require much greater reductions in the quantity of waste landfilled than might be implied by the initial estimates of the external costs of landfill in the UK. In addition, the quantity of waste sent to landfill in the UK has relatively little consequence for the environment outside the UK. Of course, such assessments are complicated by the uncertainties and the costs and benefits may change over time.

5.24 At EU level, as in the UK, progress against targets should be kept under review and, as far as possible, the targets adjusted (up or down) if the costs and benefits turn out to be different from those originally expected. However, where the UK has firm international commitments, the Government will plan to meet them using the instrument or package of measures that does so in the most efficient way.

At what level should action be taken?

5.25 The level at which action should be taken will depend on the nature of the environmental problem. This will help to ensure that the intervention is as efficient as possible as well as addressing competitiveness issues in relation to transboundary problems. Collective action can be an important way of avoiding free riding where the benefits of environmental protection measures cannot be appropriated. The UN, OECD and EU can facilitate cross border action of different types.

5.26 If a problem is global, such as climate change, then there can be significant benefits in a global response. Transboundary problems such as acid rain are best dealt with at European level. Problems which only affect the UK are best dealt with by national measures, while localised problems such as road traffic congestion may best be tackled through local instruments.

Global or transboundary problems

5.27 Where problems suggest an international level response, it need not be the case that the instrument to use is regulation. Until recently, this has tended to be the way in which much environmental legislation has been framed, particularly from the EU. However, it is now increasingly recognised that other responses may be more appropriate⁶.

5.28 Nevertheless, for global or transboundary problems, actions by individual countries will have little effect on their own, and may achieve nothing at all if the result is that polluters simply move to other countries which have not taken any action. For tax measures which address global problems such as climate change, this means that there may be benefits in having a common framework with minimum rates in order to prevent the environmental objectives being undermined. The same applies to trading schemes with auctioning of permits and to some forms of regulation. The draft EU directives on taxation of energy products and on emissions trading are both intended to address this issue. The Government is playing an active role in the negotiation of both of these directives. The UK has already put in place comprehensive policies to tax energy use through the climate change levy and duties on oil products, and if other EU countries were to introduce similar policies, this would help to reduce greenhouse gas emissions from the EU as a whole. However, the Government does not believe that directives on tax issues are justified on competition grounds, as this would undermine healthy tax competition between member states.

⁶ 'Economic Policy Committee Annual Report on Structural Reforms 2002', EPC Report, February 2002.

5.29 As the EU is a single market, there may also be good reasons for common standards for traded products in all member states. For example, allowing different product standards in each member state would have high transaction costs for companies wishing to supply in all member states and would be unlikely to deliver environmental benefits while unrestricted cross-border trading continued. However, for products such as chemicals and steel which are traded on global commodity markets, even a framework which applies at EU level will not necessarily alleviate problems with competition with producers from other countries.

Local or national problems

5.30 For local or national environmental problems, the optimum solution will be achieved by a different mix of instruments at the national level. However, there are environmental issues which do not have a transboundary effect nor impact on the single market but where the EU has nevertheless developed a body of legislation. The EU is able to add greatest value by tackling issues which have transboundary effects or which affect the single market, while member states are best placed to deal with other issues.

5.31 Many environmental impacts are differentiated according to geography. This is often taken into account in regulation, and there may also be a case for differentiating other measures including taxes on a local basis in order to reflect environmental costs effectively⁷. Uniform tax rates do not take account of how pollution problems differ according to geography and population location. For example, the concentration of particulates is highest in urban areas where populations and associated health risks are most dense. A differential tax rate based on location would therefore be a more efficient way of achieving efficient standards for air quality across the country. However, constructing a highly differentiated scheme raises issues of administrative cost and may have adverse social consequences. These costs need to be balanced against the potential efficiency advantages of a differentiated tax.

5.32 One example of local taxation which helps to tackle local environmental issues is congestion charging. The Government has enabled Local Authorities to introduce congestion charging and the first scheme has been introduced in Durham, with the scheme for London due to be introduced in February 2003. This will allow some of the local environmental costs of congestion to be reflected in the prices which road users pay for access to city centres.

⁷ Tietenberg, T.H., 'Spatially Differentiated Air Pollutant Emission Charges: An Economic and Legal Analysis', *Land Economics*, August 1978.

6

CHOOSING POLICY INSTRUMENTS

INTRODUCTION

6.1 Chapter 5 describes the criteria which need to be considered in deciding whether an environmental intervention is worthwhile, and in determining the most effective level of intervention. This Chapter sets out a framework for determining which policy instrument or instruments are most suited to a particular objective or market failure. A selection of examples of policy measures are outlined in Table 6.1, to indicate in a stylised way some of the approaches which have been used to tackle different types of market failures. In practice, where there are several market failures, or if a single instrument on its own is insufficient, a range of measures might be used.

Table 6.1: Examples of Government policies to address market failures

Market failure	Tax	Trading schemes	Tax credits/ public spending	Voluntary agreements	Publicity campaigns	Regulation
Negative externalities	<ul style="list-style-type: none"> • Aggregates levy • Climate change levy • Landfill tax • Fuel duty 	<ul style="list-style-type: none"> • Emissions trading scheme • Landfill permits • Acid gas trading (proposed) 	<ul style="list-style-type: none"> • Reduced rate of VAT on grant-funded installation of central heating and heating appliances 	<ul style="list-style-type: none"> • Pesticides • EU CO₂ from cars agreement 		<ul style="list-style-type: none"> • Integrated pollution prevention and control • Water quality legislation
Positive externalities or public good			<ul style="list-style-type: none"> • Tax relief for cleaning up contaminated land • Public space • Agri-environment schemes 			<ul style="list-style-type: none"> • Habitats and species protection legislation
Information failures	<ul style="list-style-type: none"> • Differential rates of fuel duty 				<ul style="list-style-type: none"> • 'Are you doing your bit?' • Car labelling scheme • EU eco-label scheme and energy labelling 	<ul style="list-style-type: none"> • Environmental impact assessment directive

Note: Measures such as fuel duty can help to address information failures as well as external environmental effects.

6.2 The most suitable policy measures for different market failures may be as follows:

- negative externalities – a tax or tradable permit scheme will allow negative externalities to be incorporated in prices. The appropriate level of intervention will depend on the nature of the pollution. There will also be decisions to be made on whether it is better to use a tax or tradable permit scheme. However, if certainty is required at the level of each pollution source, regulation may be necessary;
- positive externalities – depending on the type of externalities, may be appropriate to address through regulation or using subsidies, such as through public spending or tax credits;
- under-provision of public goods – may be tackled through regulation, voluntary agreements or other forms of collective provision. Public information schemes may also have features of public goods; and
- information failures – may be a role for Government providing information to aid decision-making.

6.3 Where there are several market failures, or there are limitations on the extent to which a single instrument can achieve an objective, a package of policy measures may be used. This has often been a feature of the Government's approach. Regulations are also often used to tackle externalities in place of taxes or trading schemes. This may be because of practical constraints in using other mechanisms, although it also reflects conventional past practice. Regulation will continue to have an important role to play, but the Government believes that economic instruments should also continue to have an increasing role.

Policy design issues

6.4 Having identified a preferred type of policy instrument, it is necessary to determine whether it is possible to design a measure which will meet all the other relevant criteria. For example, a tax must meet the criteria set out in the Statement of Intent. Similar criteria will apply to a tradable permit scheme. Criteria can also include:

- ability to intervene directly to tackle the cause of an environmental problem – ie ability to tackle pollution or emissions rather than using proxies such as inputs to a process or activity;
- ability to intervene at the most appropriate geographical level, whether local, national or international;
- effects of a policy on the international competitiveness of sectors which are subject to international competition;
- effects on competition within industry sectors;
- distributional effects of a policy on different groups within the population as a whole;
- compliance costs of implementing and administering a measure, including cost to government and to business and other groups; and
- compatibility with international legislative requirements such as EU state aid rules.

6.5 The ideal environmental instrument will tackle the pollution itself. This is often not possible to achieve directly but proxies can be used. For example, taxes on energy can be used in place of a tax on carbon dioxide emissions. Tax on transport fuels provides a means of taxing the range of environmental costs of transport, but more specific taxes, such as road charging or congestion charging, would be more effective in addressing some of the externalities themselves.

6.6 As a result of all of these factors, a series of judgements will need to be made on how best to design and implement a policy. The constraints may mean compromises have to be made in the design of a policy instrument, or that the most efficient instrument cannot be used at all and an alternative is required instead.

Economic instruments

6.7 Economic instruments have a number of benefits compared with other measures¹. They can allow internalisation of environmental costs, in line with the polluter pays principle (see Box 6.1), and give polluters flexibility in the way they respond. Economic instruments can include taxes, charges, tradable permit schemes, subsidies or tax credits, or deposit/refund schemes.

Box 6.1: Polluter pays principle

Much environmental pollution, resource depletion and social cost occurs because those responsible are not those who bear the consequence. If the polluter, or ultimately the consumer, is made to pay for those costs, that gives incentives to reduce harm, and means that costs do not fall on society at large. At the same time, it may not always be possible for everyone to bear all such costs, particularly for essential goods and services¹.

In principle, a subsidy can be used to achieve the same fall in pollution as a tax or trading scheme. However, subsidies can have a range of distorting effects, leading to a less efficient outcome. In particular, subsidies can allow polluters to increase profit, attracting inefficiently high levels of entry into a polluting industry.

¹ 'A better quality of life: a strategy for sustainable development in the United Kingdom', DETR, 1999.

¹ 'Making Markets Work for the Environment', Department of Environment, 1993.

6.8 Where environmental costs are fully internalised into the price of a product or activity a reallocation of resources in the economy occurs². This is because price signals are changed so that producers and consumers face the environmental costs of goods and services. Consumers are encouraged to substitute away from outputs with higher relative prices, with demand shifting in favour of lower priced alternatives that are less environmentally damaging. Likewise, business is encouraged to restructure away from producing polluting products and from using polluting production methods. Using taxes to address environmental externalities therefore leads to an efficient level of pollution abatement, which can occur at the lowest marginal cost and therefore the lowest cost in terms of foregone output³. Consequently tax is an economically efficient way of achieving behavioural change.

6.9 In contrast to economic instruments, regulation often takes the form of uniform emission standards across industry. This is because regulators lack the necessary information about firm-specific pollution abatement costs to design a pattern of regulation whereby the marginal abatement costs between firms are equalised. However, a well-designed economic instrument can equalise the marginal abatement costs between polluters. This provides incentives for efficient abatement measures across industry, with those industries that face lower abatement costs cutting back on pollution relatively more. The result is that abatement is achieved at minimum overall cost and marginal abatement costs are equalised between firms. This means that economic instruments can bring about the same reduction in pollution for less cost in foregone output than regulation, with positive consequences for those businesses affected, and for overall welfare.

6.10 Economic instruments can also create dynamic incentives to reduce pollution, as polluters are required to pay tax for residual emissions as well as abatement costs. This can encourage technological developments and new processes offering greater environmental protection. This contrasts with regulation, where there is usually no incentive to do better than the regulatory standard which has been set. Regulations do often raise costs for polluters, by requiring them to take action to reduce the level of pollution. However, there is no additional cost beyond this, and consequently regulations give less of a dynamic incentive to reduce emissions further. Economic instruments may also be more effective in tackling economic activities such as energy use where there is a limit to which regulations can play an effective role.

6.11 Taxes and tradable permit schemes where permits are auctioned raise revenue which can be used to offset other taxes. However, given the uncertainties about some long-term environmental issues and the difficulties in predicting the behavioural response to particular measures, environmental taxes can sometimes give the appearance of being a 'back door' route for government to raise revenue or to achieve other objectives through their distributional impact. This makes it important that there is widespread understanding of the reasons for a measure and the considerations which inform design, as well as regular reporting on progress following implementation.

² A tax which is set at a level which internalises environmental costs is referred to as a Pigouvian tax, after the economist Pigou who first proposed the rationale for this type of tax. Pigou A.C., 'The Economics of Welfare', 4th edition, 1932.

³ Baumol, W. J., 'On Taxation and the Control of Externalities', *American Economic Review*, June 1972, 62 (3).

Taxes

6.12 The Statement of Intent on environmental taxation sets out the Government's objectives for using environmental taxes, given their benefits which are set out above.

6.13 By internalising environmental costs into prices, environmental taxes help to signal the structural economic changes needed to move to a more sustainable economy. However, in some cases environmental taxes which fully internalise environmental costs may impose unacceptable costs given the current capital stock of the economy, which was put into place in the absence of such taxes. It may therefore be necessary to introduce taxes at a rate below the economically-efficient level and then increase them over time as the capital stock is replaced in the expectation of increased tax levels in the future. However, given the life of much of the capital stock, including buildings (and their impact on energy use, for example), the process of adjustment may need to take a considerable period of time.

6.14 In such cases, there may also be benefits in using part of the revenue from an environmental tax to help facilitate the desired response to the tax. The benefits of this approach would depend upon a range of factors, including the period of warning given before the introduction of the tax (or before increases in rates) and the ability of taxpayers to respond to the tax quickly. Where the short-term response is relatively inelastic, recycling revenue in this way can help to increase the elasticity of the response in the longer term. Support for innovation and technology development can play a key part in this process⁴. Where a low price elasticity reflects a lack of knowledge among polluters about alternatives, providing information may help to increase the response.

6.15 This approach can also have efficiency benefits where a tax is set at a level below the cost of the environmental externalities as a result of other constraints. In such cases, the tax will not achieve the environmentally and economically-optimum outcome on its own, and providing support for behavioural change in this way can help to overcome this.

6.16 As well as using tax to internalise external environmental costs, the Government can also use taxes to encourage changes in behaviour through changes in relative tax rates. For example, the Government introduced reductions in the rate of fuel duty for ultra low-sulphur fuels between 1997 and 2001 and this led to a rapid phasing-out of higher sulphur fuels. This built upon the successful differentials favouring lead-free petrol. Where a tax is used to achieve a specific target or objective, its rate will need to be set at an appropriate rate based on an assessment of the likely response to the tax

6.17 In some cases, the Government may decide not to use a tax because of other constraints, such as those set out in the Statement of Intent. An example is domestic energy use: the Government has reduced VAT on domestic fuel and power to 5 per cent and has no plans to introduce a tax on domestic energy given the number of households which remain in fuel poverty. The Government is also considering the role of other possible economic instruments in this area.

⁴ Anderson D., Clark C., Foxon T., Gross R., Jacobs M., 'Innovation and the Environment: Challenges and Policy Options for the UK', Imperial College Centre for Energy Policy and Technology and the Fabian Society, January 2001.

Tax – examples 6.18 Examples of environmental taxes include the climate change levy, aggregates levy and the landfill tax. These are described further in Chapter 7. As well as taxes such as these, which have been introduced to address specific environmental problems, the Government has also reformed or changed a number of other taxes so that they give greater environmental incentives.

Fuel duty 6.19 Tax on transport fuels creates incentives for more fuel-efficient vehicles and driving, and creates incentives to reduce unnecessary mileage. This leads to reductions in the externalities imposed by road transport, including congestion, pollution, noise, accidents and damage to the road infrastructure. For example, it is estimated that the real increases in fuel duty between 1996 and 1999 will produce carbon savings of between 1 and 2.5 million tonnes per year by 2010. In the 1999 Pre-Budget Report, the Government announced that the revenues from any real terms increases in fuel duty will in future go to a ring-fenced fund for improving public transport and modernising the road network.

Lorry road user charging 6.20 The Government is committed to modernising the taxation of the haulage industry and ensuring that lorry operators from overseas pay their fair share towards the cost of using UK roads. It has consulted on options for introducing a road-user charge that would apply to lorry operators regardless of their nationality⁵. The consultation revealed a strong preference for a distance-based lorry road-user charge from a range of organisations, including haulage associations, environmental groups and other business organisations.

6.21 The Government has therefore decided to introduce a distance-based lorry road-user charge that will also be able to take account of other costs such as road track costs and environmental costs of lorries. The Government remains committed to ensuring that the UK haulage industry does not pay any more as a result of the introduction of a new charge and will at the same time introduce offsetting tax reductions for the industry. It aims to introduce the scheme in 2005 or 2006. It published a first progress report in April 2002⁶ and will be publishing a further progress report around the turn of the year.

Vehicle excise duty 6.22 Vehicle excise duty (VED) was originally created to finance the cost of road developments in the 1920s. Over time it became a general revenue-raiser for government spending. Since 1997 the Government has sought to use VED to send signals to consumers about more environmentally-friendly vehicles. For example, Budget 2000 reformed car VED to relate it to carbon dioxide emissions and provide incentives for more efficient cars. Budget 2001 reformed lorry VED to provide incentives to use cleaner and less damaging lorries, based on an independent environmental evaluation of the impact of different lorries. Budget 2002 has reformed van and motorcycle VED along the same lines.

Company car tax 6.23 The Government has also reformed company car tax in 2002 to remove the distortionary tax incentive for company car drivers to undertake additional business miles. Instead, the tax is based upon the carbon dioxide emissions of cars. This has provided a further incentive to choose more efficient cars, which is important as company cars account for around a half of all new cars.

⁵ 'Modernising the Taxation of the Haulage Industry - a consultation document', HM Treasury, November 2001.

⁶ 'Modernising the Taxation of the Haulage Industry - Progress Report One', HM Treasury, DTLR and HM Customs & Excise, April 2002.

Trading Schemes

6.24 Trading schemes share many features with environmental taxes. There are two key differences:

- taxes fix the value assigned to pollution but leave the quantity undetermined, while trading schemes fix the quantum and leave the value to be determined; and
- the distributional consequences can vary depending how permits for a trading scheme are allocated⁷.

6.25 Regardless of how permits are allocated, a tradable permit scheme will create the same marginal efficiencies as a correctly-set efficient tax, provided that government can determine the efficient level of pollution. Such a tax would allow the market to find the cheapest way of meeting the objective. Using a trading scheme means government can avoid the adjustments for inflation and economic growth that may be necessary to maintain the efficacy of taxes used for the same purpose.

6.26 A key issue with trading schemes is the initial allocation of permits. Approaches include:

- auctioning permits – in which case the distributional consequences will be similar to those of a tax;
- allocating or ‘grandfathering’ permits to existing polluters, based on their historic levels of pollution; and
- giving polluters a financial incentive to agree to a limit on pollution.

6.27 If permits are auctioned, the revenue can be used to reduce other taxes in the same way as for environmental taxes. Auctioned permits also have the benefit of internalising the social costs of actions into prices, with the same consequential static and dynamic benefits as for taxes.

6.28 Grandfathered permits are effective in providing an efficient way of bringing pollution to set levels. However, because firms do not pay for their initial permits, there are reduced impacts on prices and consequently on consumer behaviour. Similar arguments apply where firms obtain financial benefits for a reduction in pollution. There are also equity issues regarding new entrants to a market, who do not have a history of emissions. In addition, grandfathered permits can act as a barrier to entry, impeding effective competition.

6.29 The same considerations apply to introducing a trading scheme with auctioned permits as those that apply to environmental taxes, as set out in the Statement of Intent on environmental taxation. In addition, in deciding whether to adopt a trading scheme it is necessary to determine whether there is likely to be a well-functioning market to allow permit trading, and whether the costs of administering the trading system are likely to be low in proportion to the potential benefits.

6.30 In some circumstances there may be a case for combining taxes and trading schemes where they achieve greater net benefits, or benefits can be achieved with more acceptable impacts. For example, a tax may help to reduce the regulatory burdens of a tradable permit scheme and provide incentives for behavioural changes, which might help to ensure that the objectives are met at lower overall cost.

⁷ ‘The Energy Review’, Cabinet Office, 2002.

6.31 However, there is also a concern about potential confusion and overlap between tax and trading schemes, particularly in the area of energy use. The Government's principal mechanism for tackling the business use of energy is the climate change levy, but it has also introduced a voluntary emissions trading scheme to encourage companies to volunteer additional emissions savings. Negotiations are also currently progressing on the proposed EU emissions trading scheme. This is intended to cover large energy users in industry and the electricity generation sector. The Government will keep the relationship between tax and trading schemes under review as these schemes progress, but it is unlikely that a trading scheme will cover the majority of business energy users in the foreseeable future.

Box 6.3: Tax versus tradable permits

In many cases, there is a choice between using a tax or tradable permit scheme. The choice between the two will depend on a number of questions including:

- is it essential to bring pollution down to a set quantity, or is the aim to internalise a known externality?
- what is the relationship between the marginal benefits of reducing emissions and the marginal costs of abatement? Where emissions above a certain level are associated with very high damage, there is a higher risk of a large welfare loss with a tax, as the outcome cannot be guaranteed. With sharply increasing marginal costs of abatement and constant marginal benefits of reducing emissions, setting a maximum quantity of emissions with a permit trading system risks imposing welfare losses via too strict emissions targets, given that government is unlikely to have perfect information; and
- can a trading scheme be implemented at reasonable cost and is there likely to be a well-functioning market in permits?

Trading schemes – examples

Greenhouse gas emissions trading scheme

6.32 The Government launched the world's first economy-wide greenhouse gas emissions trading scheme in April 2002. The scheme has been designed so that participants can join it through three routes:

- by bidding for permits in the auction held in March 2002;
- by joining one of the negotiated agreements for eligible energy-intensive sectors under the arrangements for the climate change levy; or
- by developing approved carbon-saving 'projects' to deliver accredited emissions reductions.

6.33 The emissions trading scheme allows participants to find the cheapest means of making emissions reductions. The scheme has given the UK an early lead in emissions trading and will allow the City of London to become a centre for trading. It is also enabling the Government to gain experience of emissions trading and to use that experience to inform negotiations on the development of international emissions trading schemes.

Box 6.4: Auction for permits for UK emissions trading scheme

The Government made available an incentive of £30 million per year (after tax) for five years to encourage companies and other organisations to enter into the emissions trading scheme and to agree to binding emissions targets. Prospective participants could bid for a share of the incentive payment in return for agreeing to emissions targets in an auction which was held on 11 and 12 March 2002. The auction resulted in 34 organisations agreeing to targets which will result in a reduction of 1.1 million tonnes carbon per annum after five years. The successful bidders include major energy companies, a range of companies from industry and the service sector, and bodies from the public sector¹.

¹ 'Auction Success for UK Emissions Trading Scheme', DEFRA news release 99/02, 13 March 2002.

6.34 The proposed EU emissions trading scheme will allow the benefits of trading to be extended across EU member states. This will help to equalise prices of emissions abatement across businesses in all member states.

6.35 Inclusion of projects under the Kyoto Protocol's Clean Development Mechanism within trading schemes will also allow the benefits of emissions reduction projects to be extended to countries in the developing world.

Renewables Obligation **6.36** The Renewables Obligation applies to electricity suppliers in England and Wales (a similar scheme also applies in Scotland). The Obligation requires electricity suppliers to purchase specified proportions of their electricity from qualifying renewable sources, or else pay a 'buy-out' price per unit of electricity. Once electricity is generated by qualifying renewable sources it may be sold into the electricity market with a 'Renewable Obligation Certificate' (ROC). ROCs are tradable and this allows electricity suppliers to meet their Renewable Obligations at minimum cost.

6.37 The Renewables Obligation effectively provides a subsidy from consumers to generators of renewable energy. One administrative advantage of such an approach is that it does not involve the transfer of state resources and is therefore not classified as a state aid.

Acid gas trading scheme **6.38** The Environment Agency is developing proposals for a trading scheme for emissions of nitrogen and sulphur oxides from major combustion installations. This is intended to be similar to a 'grandfathered' trading scheme, and would allow polluters covered by the scheme to reduce emissions at lowest overall cost.

Subsidies, regulation and voluntary agreements

Subsidies **6.39** In some instances there may be a case for using subsidies to improve environmental performance. However, Box 6.1 sets out some of the disadvantages of subsidies relative to other instruments, and their use therefore needs to be considered carefully.

6.40 Subsidies might have a role where the polluter cannot afford to reduce the pollution or where equity or distributional issues make tax or similar measures unacceptable. For example, the Government and the Devolved Administrations have a goal of seeking to end the problem of fuel poverty and are carrying out spending programmes to improve the energy efficiency of low income households.

6.41 Subsidies might also have a role to play where it is not possible to identify the polluter sufficiently accurately to use other measures such as a tax or regulation, or to accelerate the response to other measures.

6.42 Subsidies can be designed to take a number of different forms:

- public spending;
- tax incentives; or
- payments by consumers, such as the Renewables Obligation and the Energy Efficiency Commitment which apply to energy suppliers.

6.43 However, subsidies have disadvantages. Where there are negative externalities they are contrary to the polluter pays principle. If they are not properly designed they can set up poor incentives in the long term. In addition, subsidies usually require revenue to be raised from distortionary taxes.

6.44 Tax incentives to encourage environmental innovation which have been introduced by the Government include:

- enhanced capital allowances for investment in energy-saving technologies which were introduced with the climate change levy;
- reduced rates of VAT for certain energy-saving products in the domestic sector;
- enhanced capital allowances as part of the Green Technology Challenge for investments in low-emission vehicles and infrastructure for alternative fuels such as compressed natural gas and hydrogen;
- reduced duty rates for road fuel gases and for biodiesel; and
- a 150 per cent tax credit for costs incurred in the remediation of contaminated land.

6.45 The Government has also announced that it will introduce fuel duty exemptions for three pilot projects under the Green Fuel Challenge:

- a hydrogen fueling infrastructure for fuel cell buses;
- the capture, compression and use of landfill gas (biogas) in a range of vehicles; and
- the testing of methanol in various vehicles, and in the refueling infrastructure.

6.46 The Government has also introduced tax incentives to promote research and development (R&D) across all sectors, including the environment sector. To help raise the level of R&D in the UK, the Government introduced a tax credit for small and medium-sized companies in Budget 2000, and extended this to all companies in Budget 2002.

6.47 An example of direct public spending on environmental technology innovation is the Government's support for renewable energy technologies. This support is worth over £260 million between 2001 and 2004, and includes £55.5 million for research and development.

Regulation 6.48 There are some instances where economic instruments are not an appropriate option, particularly where local quantities of emissions are important or where it is essential that emissions do not exceed specified limits on any individual site. In these cases, the problem will probably need to be addressed through regulation, or possibly through voluntary agreements. Regulation or voluntary agreements may also be more appropriate where there is a limited number of polluters, so the costs of setting up a scheme based on an economic instrument may outweigh the benefits.

6.49 Producer responsibility is a particular form of regulation which gives the producer of goods responsibility for them over the life-cycle. This creates incentives on the producer to reduce the environmental impact of the product and to facilitate recycling and reuse.

6.50 Box 6.5 sets out some examples of regulation.

Box 6.5: Regulation

An example of good regulation is the EU National Emissions Ceiling Directive which sets binding targets for the main emissions affecting air pollution, but provides Member States with flexibility about the means to deliver them. The Directive is based on robust science and proper assessment of costs and benefits. It addresses the problem at the right level given that the transboundary nature of some of the pollutants is at EU level, and it takes account of non-EU countries. It reflects Member States' different situations and different costs and does not seek a 'one size fits all' approach.

Another example of good regulation is the Montreal Protocol which aimed to phase out all the main ozone-depleting chemicals. The cost of not taking action was high (potential damage to crops and skin cancer for people and animals), there was international agreement to act, business was given a clear signal of the need for action, and regulations in all major industrialised countries ensured that there were no free-riders. The Montreal Protocol was implemented in the UK through regulations, resulting in a complete phasing out of production and consumption of the most harmful ozone depleting substances between 1994 and 1996, at relatively low cost to industry.

The Building Regulations requirements for energy efficiency in new and refurbished buildings are an example of regulations which are set within the UK (separately for England and Wales, Scotland, and Northern Ireland). Revisions to the regulations are made following a comprehensive evaluation of the costs and benefits. The latest amendments to the regulations for England and Wales took effect from April 2002 and are expected to yield significant benefits in terms of lower heating bills, which may be cut by up to 25 per cent in the case of new dwellings. They will also reduce carbon dioxide emissions from energy use in buildings.

An example of poor regulation is the EU Directives on bathing waters. These are based on poor science, are out of date, and do not take proper account of public health effects. The cost of action is disproportionate to the benefits, while the benefits were not properly established before targets were set. The regulations are driven at EU level even though the benefits only apply to those who choose to bathe in UK waters. And the standards are unnecessarily uniform; there is no reason in principle why little-used beaches should need to have the same standards as others with much greater levels of usage.

Voluntary approaches

6.51 As an alternative to direct intervention, government can work with other stakeholders to develop voluntary solutions. Voluntary approaches can be divided into two broad groups – formal agreements and altruistic voluntary action.

6.52 Formal voluntary agreements are usually most effective if there is the threat of a tax or regulation. Without such a threat, there are likely to be 'free riders' who do not play any part in meeting the obligations which are agreed to. The structure of voluntary agreements may therefore be informed by game theory⁸. Voluntary agreements can have the advantage of speed and a lower regulatory burden, provided the parties involved are willing to act.

⁸ 'Signed, Sealed and Delivered? The Role of Negotiated Agreements in the UK', Green Alliance, April 2001.

6.53 Individuals are also willing in many cases to take voluntary action to improve the environment, even though they may gain no direct benefit. For example, people voluntarily recycle waste even though there is no direct reward for doing so. However, such voluntary action on its own is unlikely to be sufficient to address significant environmental problems.

6.54 An example of a voluntary approach is the package of measures agreed by the pesticides sector to reduce the impact of pesticides on the environment. This is described further in Chapter 7. Another example of a voluntary measure is the agreement which the EU has entered into with European, Japanese and Korean car manufacturers. Through this agreement, the car manufacturers have agreed to reduce the average carbon dioxide emissions of new cars to 140g/km by 2008-09. The average figure in 1999 was 175.9 g/km and in 2000 it was 172.0 g/km. This agreement will involve a significant improvement in environmental performance and was delivered far more quickly than would have been possible by regulation.

Information schemes **6.55** Where there are information barriers to better environmental performance, the Government can use information schemes to overcome them. The Government runs the 'Are You Doing Your Bit' campaign aimed at householders, and schemes such as the Carbon Trust's Action Energy programme aimed at business. The EU energy labelling scheme is another example of information helping to encourage environmentally friendly purchasing. Information provision and fiscal measures may be effective where they reinforce each other. For example, graduated vehicle excise duty for cars is also linked with the labelling of the environmental impact of cars. The price signal reinforces the information on environmental performance, while clear information allows people to take account of vehicle excise duty when making purchasing decisions.

INTRODUCTION

7.1 The Government regards the process of developing measures to tackle environmental issues as an important part of effective policy. All environmental policy measures should be developed in line with good practice on policy-making¹.

7.2 The process can benefit significantly from dialogue between Government and other stakeholders. This will allow a common understanding of the objectives to be achieved and information to be shared on the costs and benefits of different options. The final decisions and the reasons behind them should be clear. Where compromises are made, explaining the reasoning behind them will help in developing understanding and acceptance of the final policy design.

Establishing the long-term goal

7.3 As set out in Chapter 4, the first step is to establish the environmental objective. This will result from scientific research. Sometimes targets are then set as a result of international commitments, such as the Kyoto Protocol targets to tackle climate change. In other cases, the Government will undertake its own research to establish the environmental impacts of particular activities.

Consultation

7.4 If a case for action is identified, at the same time as undertaking its own analysis of possible policy measures, the Government will also engage in a process of consultation with stakeholders to seek the views of different groups on the most effective steps to take. There may be formal or informal consultation about possible policy measures. In some instances, the Government has set up formal task groups to evaluate the options for action. For example, before announcing the climate change levy, the Government asked Lord Marshall to lead a task force which considered economic instruments and the business use of energy. At this stage the choice of possible instruments will begin to be apparent, and this will allow business and other affected bodies to start considering how best to respond.

Early signal

7.5 The next step is usually for the Government to review the evidence gained and take a view on the most appropriate form of policy measure to introduce. There may be further discussion with stakeholders on, for example, the options for voluntary measures as alternative to a tax. The Government engaged in lengthy discussions before deciding on the course of action leading to both the aggregates levy and the voluntary agreement on pesticides.

Choice of instrument

7.6 However, the Government will eventually reach a decision and announce its proposals. When introducing economic instruments, the Government always aims to have a substantial period between this point and the date when the measure is introduced so that those affected can prepare for it and begin to take action. This helps to encourage more innovative responses, which may take longer to be developed and implemented.

7.7 For some environmental taxes, there may also be benefits in phasing in increases in the rates of tax over a period of time. This allows a clear long-term signal to be given about future expectations, making clear that the activity in question is not going to get cheaper in the future. It also gives time for taxpayers to adjust, including replacing existing capital assets with less environmentally-damaging alternatives in order to be prepared for the higher rates of tax when they are introduced. This approach is one means of addressing the difficulties which taxpayers might have in changing their behaviour in the short term, while still ensuring that the required adjustments are made in the longer term. The Government has taken this approach for the landfill tax, where it is currently phasing in increases and has signalled that rates will need to be increased substantially in the medium term.

¹ 'Good Policy Making: A Guide to Regulatory Impact Assessment', Cabinet Office, 2000.

Voluntary approach **7.8** Where appropriate, the Government will consider the role of voluntary measures. In some instances, if a voluntary package can achieve at least the same environmental improvements as the alternative options, the Government may agree to a voluntary approach. Alternatively, voluntary agreements may be part of the package, with certain sectors paying a reduced rate of tax in return for agreeing to improve their environmental performance.

Recycling revenue **7.9** If a tax or other economic instrument is to be used, it is necessary to consider how best to use the revenue. The overall design of the package will determine the impact on individual taxpayers and on sectors. But it is neither feasible nor desirable to design a package which ensures the outcome is revenue neutral for every taxpayer. In any case, such a package would lack incentives to reduce emissions or pollution and would prevent polluters from facing the full cost of their actions.

7.10 In principle, revenue can be used to:

- reduce other taxes such as taxes on employment;
- increase public spending or reduce borrowing; and
- more specifically, increase spending related to environmental objectives.

7.11 Reducing other taxes can improve the overall efficiency of the tax system. The UK and other countries which have introduced environmental taxes have often used the revenue to reduce employment taxes. For example, the introduction of the landfill tax, climate change levy and aggregates levy were all accompanied by a reduction in employers' national insurance contributions.

7.12 The dynamic effects of revenue recycling need to be considered in addition to the immediate effects. The ultimate incidence of changes in tax and spending will depend on the elasticities of supply and demand in different parts of the economy, and these may mean the final impact is not the same as the initial effects.

7.13 If there are other market failures such as information failures, there may be benefits in recycling some of the revenue from a tax to tackle these. The climate change levy, aggregates levy and landfill tax all have an element of revenue recycling related to the objectives of the respective tax. This can help to increase the response to a tax by encouraging innovation as well as to increase acceptability. However, if all the revenue is spent in this way there will be an increase in the overall burden of tax and no benefits from the possibility of reducing other taxes.

New technologies **7.14** There may also be a case for recycling part of the revenue from an environmental tax to assist taxpayers to adjust to the tax by supporting investments in environmentally-friendly technologies, or by supporting the development of new technologies. For example, the climate change levy was accompanied with the scheme of enhanced capital allowances for investments in energy efficiency measures, and funding for the Carbon Trust to provide advice and support for new low-carbon technologies.

Links between measures **7.15** In many areas of environmental policy, there may be several policy instruments involved, including taxation, regulation, and spending measures. Different measures may be required to tackle different market failures. Regulation may have a role to play in ensuring that minimum standards are met, and other measures such as a tax, voluntary agreement or information scheme could then help to address the environmental impacts which still remain. Even where there is regulation, this does not usually entirely eliminate adverse environmental costs and there may be a case for addressing these through other measures.

7.16 However, packages of measures need to be as consistent as possible and avoid unnecessary duplication. The most efficient package will also avoid being too prescriptive about the actions which should be undertaken, rather than simply giving incentives to achieve the desired objectives.

Distributional impact **7.17** The ways in which revenue is recycled will affect the overall impact of a change in environmental taxes on the taxpaying population. As set out in the Statement of Intent on environmental taxation, the distributional impact must be acceptable and care must be had to implications for international competitiveness.

7.18 Impacts on competitiveness can also be addressed by applying environmental taxes to imports and relieving exports. If this approach is adopted, it has to be applied on a transparent and fair basis in order to be consistent with rules on international trade. It should also be done in a way which is consistent with the environmental aims of the tax. The aggregate levy is applied to imports of aggregate for commercial use in the UK, while exports of virgin aggregate are relieved from the levy.

State aid considerations **7.19** In designing package approaches, the Government also needs to consider whether the package involves any state aid. State aid involves transfers of state resources to undertakings such as businesses. Reduced rates of tax or subsidies for certain sectors or regions are likely to involve state aid. This may be justified in order to protect the competitiveness of sectors following the introduction of a tax (for example, the discounts from the climate change levy for energy-intensive sectors of industry) or to encourage the deployment of environmentally-beneficial technologies which would otherwise not be cost-effective (such as the five-year exemption from the climate change levy for the natural gas network in Northern Ireland, designed to support the development of the network). Such measures need to be approved by the European Commission under the relevant state aid guidelines, usually those applying to aid for environmental protection². However, the rules on state aid preclude governments from recycling revenue from environmental taxes directly back to business in the form of general subsidies.

Monitoring and evaluation **7.20** Good environmental policy does not stop with the introduction of a measure. Implementation needs to be monitored and evaluated. The Government undertakes cost-benefit analysis to assess the effectiveness of interventions and, if necessary, to inform changes to the objective or to the approach. Evaluation should take account of experience and of improved knowledge, building, for example, on improved scientific understanding. The review of the Government's National Air Quality Strategy provides a good example of this, with new scientific evidence and improved information on the costs and benefits of air quality measures informing new standards.

Future flexibility **7.21** Where new taxes are being introduced, there may be the risk of unintended consequences or that new issues will arise. The Government recognises that maintaining contact with stakeholders is important in identifying and remedying any significant problems. It also recognises that for some consumers and businesses there will be difficulties and costs in adjusting, though this may be a consequence of everyone having to take account of the wider costs and impact of their actions.

7.22 Good quality evaluation is important to demonstrate the benefits of the intervention to those affected, particularly where there are also distributional effects. It also plays an important role in helping to test the robustness of the cost benefit analysis techniques that are used. Evaluation will help to inform future policy development and contribute to the quality of the wider policy debate.

7.23 The Government reports on progress with evaluation of environmental tax measures in Pre-Budget Reports and Budget documents.

² 'Community Guidelines on State Aid for Environmental Protection', Official Journal of the European Communities, C 037 03//02//2001.

Examples of implementing environmental policy measures

7.24 Some key environmental policy measures and the ways in which they have been developed are set out below.

Climate change levy

7.25 The climate change levy was introduced in April 2001. It is a tax on electricity, gas, coal and liquefied petroleum gas (LPG) used by the non-domestic sector. The combustion of fossil fuels is the principal source of greenhouse gas emissions, which cause climate change. Understanding of the effects of greenhouse gases on the environment developed throughout the 1990s, and led to the negotiation of the Kyoto Protocol at the end of 1997. The climate change levy was implemented following a lengthy period of consultation with business and other groups about the best approach to take.

7.26 The Government first announced that it would consider the case for a tax on the business use of energy in Budget 1998. Lord Marshall was appointed to lead a taskforce to consider the issues involved with taxes and other economic instruments. Lord Marshall's taskforce issued a formal consultation paper on the options and met with a wide range of stakeholder groups to discuss the issues involved. Lord Marshall then reported on his conclusions in the autumn of 1998³. In his report, Lord Marshall recommended that there was probably a role for a tax on the business use of energy if businesses of all sizes and from all sectors were to contribute to improved energy efficiency and to help meet the UK's climate change emissions targets. He also recommended that:

- any tax should be designed in a way that protects the competitive position of the British economy, with revenues recycled in full to business with at least some channelled into schemes aimed directly at promoting energy efficiency and reducing greenhouse gas emissions;
- consideration should be given to the energy intensive sectors of industry, with the aim of reducing the overall impact on these sectors while retaining some form of incentive to save energy at the margin;
- any measures should be subject to detailed consultation on the design; and
- any tax should not disadvantage combined heat and power systems and should aim, where possible, to increase incentives for the take-up of renewable sources of energy.

7.27 The Government considered Lord Marshall's conclusions and announced proposals for the climate change levy in Budget 1999, based on his recommendations. There was then a further consultation during 1999 on the detailed design of the levy. Based on the responses to this consultation and discussion with business and other stakeholders, the Government announced further changes to the levy design in the 1999 Pre-Budget Report and in Budget 2000.

7.28 The levy is intended to encourage business to use energy more efficiently in order to help meet the UK's targets for reducing greenhouse gas emissions. The levy also includes an exemption for most forms of renewable energy and for fuel used by good quality combined heat and power systems, to encourage these environmentally-friendly energy technologies. In order to protect the competitiveness of the most energy-intensive sectors of industry, the levy includes an 80 per cent discount for these sectors provided they enter into agreements to meet energy efficiency targets. Forty four sectoral agreements have been entered into covering around 13,000 individual facilities. These agreements require significant improvements in energy efficiency and reductions in carbon emissions, but without the deleterious impact on their competitiveness that the full rate of levy would have entailed. The firms and sectors covered by the agreements will be able to use emissions trading to help them meet their targets at the end of each target period.

³ 'Economic Instruments and the Business Use of Energy', HM Treasury, 1998.

7.29 The levy was accompanied by a 0.3 percentage point cut in employers' NICs and support for energy efficiency measures and renewable sources of energy. The package entailed no net gain to Government finances. The principal mechanism for providing support for energy efficiency is the Carbon Trust, which was set up in 2001 for this purpose. The Carbon Trust is responsible for developing programmes to assist business to improve its energy efficiency and for supporting the development of new low-carbon technologies.

7.30 Following the first year of the levy's implementation, and following further consultation with business and environment groups, a number of further changes were announced in Budget 2002. These included an exemption for all electricity produced by good quality combined heat and power systems or from coal mine methane, subject to EU state aid approval, and an exemption for certain secondary recycling processes.

7.31 Several reviews of the levy have been published recently. Surveys published by the Federation of Small Businesses (FSB)⁴ and by the Confederation of British Industry (CBI) and Engineering Employers Federation (EEF)⁵ have tended to focus on the change in the level of tax paid by businesses as a result of the introduction of the levy. These have reported that for the industrial sector as a whole the levy paid is greater than the reduction in employers' NICs, although these figures do not take account of the revenue which is recycled to provide support for energy efficiency. The CBI and EEF survey shows that 87 per cent of energy-intensive firms which have entered into agreements to improve energy efficiency had taken action or were planning to do so, along with 42 per cent of other firms. 74 per cent of firms with over 250 employees had improved energy efficiency or planned to do so, compared with 43 per cent of firms with less than 250 employees.

7.32 The CBI and EEF review recommends that the Government should allow more sectors to be able to enter into energy efficiency agreements in return for an 80 per cent discount from the levy. However, a review published by the Green Alliance⁶ recommends that exemptions from the levy should be gradually phased out. These two reviews both recommend that there should be a simpler and improved package of support measures to aid businesses to improve their energy efficiency and thereby reduce the amount of levy which they pay. This will be a key role for the Carbon Trust. The Government will continue to keep the levy package under review.

Aggregates levy

7.33 Proposals for tackling the environmental impact of aggregate extraction were discussed with the aggregates industry and environmental groups over the period from 1997 to 2000. Research into the environmental costs of aggregate extraction was carried out in two phases, between September 1997 and March 1998, and between September 1998 and February 1999. At that stage the Government was willing to consider a voluntary approach as an alternative to a tax.

7.34 In response, the aggregate industry proposed a voluntary package of measures to improve its environmental performance in July 1999. The Government decided that this package was insufficient to deal with the problem and in the 1999 Pre-Budget Report it said that it was minded to introduce an aggregates levy in Budget 2000 unless the industry came forward with improvements to its voluntary package. The industry subsequently made further changes to its package but the Government decided that the package was not acceptable. It therefore announced proposals for the aggregates levy in Budget 2000.

⁴ 'The climate change levy: another cost for small businesses', Federation of Small Businesses, Research Paper No. 2, July 2002.

⁵ 'The climate change levy: first year assessment', Confederation of British Industry and Engineering Employers Federation, October 2002.

⁶ 'Next steps for energy taxation: a survey of business views', Green Alliance, November 2002.

7.35 The tax was introduced in April 2002 and set at a rate of £1.60 per tonne following the research to assess the environmental costs of aggregate extraction. The research had estimated these costs to be £1.80 per tonne, weighted by type of output. The levy was accompanied by a 0.1 percentage point cut in employers' NICs and a £35 million per year Sustainability Fund to promote alternatives to virgin aggregate and to reduce the environmental impact of aggregate extraction.

7.36 As the levy applies to the commercial exploitation of rock, sand or gravel in the UK, it applies to imports of aggregate as well as to aggregate extracted in the UK. Exports of aggregate are not subject to the levy. The levy on aggregate used in processed products in Northern Ireland is being phased in over a period of five years in order to allow the industry there time to adapt to the levy.

Landfill tax 7.37 The landfill tax was introduced in October 1996. It is a tax on waste disposed of to landfill. Under an escalator announced in 1999, the standard rate of tax, which applies to 'active' waste, has been increased by £1 per tonne per year since 2000, and is currently £13 per tonne. When the tax was introduced it was offset by a 0.2 percentage point cut in employers' NICs. The introduction of the tax was accompanied by the setting up of the Landfill Tax Credit Scheme, which allows landfill operators to allocate up to 20 per cent of their tax liability to approved environmental projects.

7.38 The Government recognises that further measures are necessary in order to improve sustainable waste management, as well as to achieve the targets set by the EU Landfill Directive and its own targets for increasing recycling. The Government has therefore signalled that it expects to make significant increases in the standard rate of landfill tax in the medium term. Such increases will help to give a clear signal about the need to reduce the volume of waste sent to landfill, and help to provide an economic incentive for alternative forms of waste disposal. The Cabinet Office Strategy Unit has also undertaken a review of waste policy, involving extensive consultation with business, Local Authorities and others. The Government has also recently consulted on the future of the Landfill Tax Credit Scheme.

Pesticides 7.39 In recognition of public concern about the environmental effects of pesticides, the former DETR produced a report⁷ on addressing pesticide use through the use of economic instruments in 1999. The report identified that the environmental impacts of pesticides included water pollution and damage to biodiversity. The report also examined options for a possible economic instrument relating to pesticides, in order to minimise their use, consistent with adequate crop protection. It concluded that it would be possible to design a tax to do so.

7.40 The Government then consulted with other stakeholders on the issues raised in the report, including the possibility of introducing a pesticides tax. The largest number of responses was received from farmers and other agricultural organisations. In the 1999 Pre-Budget Report the Government said it believed that, along with other measures, a tax could be a useful tool in addressing the environmental impact of pesticides. However, it also said it would explore with the agrochemical industry whether its objectives could be better achieved through a voluntary approach.

7.41 In April 2000 the industry published proposals for a voluntary package. There was then a period of further consultation and discussion with stakeholders and a revised package was submitted in January 2001. In Budget 2001 the Government agreed the voluntary package as an alternative to a pesticides tax. The Government continues to keep progress on the voluntary package under review. If it is not successful in achieving its objectives the Government retains the option of introducing a pesticides tax.

⁷ Ecotec, 'Design of a Tax or Charge Scheme for Pesticides', Report to DETR, 1999.

- Food and Farming 7.42** Following the outbreak of Foot and Mouth Disease in 2001, the Government asked Sir Donald Curry to undertake a review of the food and farming sector. He produced his report in early 2002. One of his recommendations was that the Government should increase modulation of payments to farmers under the EU Common Agricultural Policy (CAP) to increase funding for environmental improvements. The Government responded to this recommendation in the 2002 Spending Review by announcing that it would provide funding for a 'broad and shallow' agri-environment scheme which will be piloted for two years and then rolled out from 2005-06. This approach will allow lessons to be learned from the pilot schemes and enable future policy to be adapted accordingly.
- Summary 7.43** Table 7.1 summarises the approach to policy development which the Government has taken for the first four measures described above. This indicates how the features of policy development and implementation described in this Chapter have been applied in practice.

Table 7.1: Development and implementation of economic instruments

Environmental measure	Climate change levy	Aggregates levy	Landfill tax	Pesticides voluntary agreement
Establishing the long-term goal.	To meet Kyoto and Government climate change targets.	To tackle environmental costs of aggregate extraction including noise, dust, visual intrusion, biodiversity loss. Research between 1997 and 1999.	To internalise environmental costs of landfill e.g. methane emissions, nuisance, groundwater pollution; to give better price signals for alternatives to landfill; and to assist in meeting waste targets in most efficient way.	DETR report in 1999 floated a possible pesticides tax. Aim to minimise pesticide use, which has impacts including water pollution and damage to biodiversity, consistent with crop protection.
Long consultation period.	Advisory Committee on Business and the Environment report early 1998. Followed by Marshall task force in 1998 and consultation on tax design in 1999 to 2000.	Extensive consultation with the industry from 1998.	Tax originally introduced in 1996. Present policy based on review and consultation of tax announced in January 1998.	Consultation with the British Agrochemicals Association on possible voluntary action from 1999 to 2001.
Early signal that new or additional intervention likely to be necessary.	Announcement of Marshall task force in March 1998.	Likelihood of intervention evident following research phase in 1999.	1998 review of landfill tax signalled that increases likely to be necessary.	Evident following DETR report in 1999.
Active evidence collection.	Marshall task force in 1998.	Independent research and consultation with the industry followed by extensive work with the industry on design and practical implementation.	Continued evidence collection on the tax and the effects of the credit scheme.	Independent research followed by consultation with the industry.
Early signal of choice of economic instrument.	CCL announced in Budget 1999 for implementation in 2001.	Levy announced in Budget 2000 for implementation in 2002.	Escalator announced in 1999 Pre-Budget Report to take effect from April 2000.	Voluntary package agreed by Budget 2001.
Recycling of revenue.	Introduction of levy accompanied by a 0.3 per cent employer NICs cut and support for energy efficiency and renewables.	Introduction of levy accompanied by a 0.1 per cent employer NICs cut and £35m sustainability fund.	Introduction of tax accompanied by a 0.2 per cent employer NICs cut. Revenue also recycled through the landfill tax credit scheme.	Likely to be part of any tax measure (if voluntary package is not successful).
Willingness to consider a voluntary approach.	Negotiated agreements with energy intensive sectors in return for reduced rate of levy.	Option of a voluntary agreement discussed with the industry but final proposal for a voluntary package was not acceptable to the Government.	All decisions taken following consultation with the industry.	Voluntary approach has been adopted rather than a tax.
Commitment to support investment in new technology to ease adjustment.	Enhanced capital allowances for investments in energy saving technologies for 2,500 products and £50m per year for Carbon Trust and renewables.	£35m per year Sustainability Fund to reduce demand for virgin aggregates by promoting greater use of alternatives and deliver local environmental benefits.	Landfill tax credit scheme, currently of some £135m per year, recycles funds to projects including sustainable waste management projects.	

Table 7.1: Development and implementation of economic instruments *continued*

Environmental measure	Climate change levy	Aggregates levy	Landfill tax	Pesticides voluntary agreement
Compensation and reliefs for hard hit groups.	Revenue neutral for manufacturing as a whole, exemptions for renewable energy and CHP, ¹ 80 per cent discounts for energy intensive sectors that have entered into negotiated agreements to increase energy efficiency and reduce emissions. Levy does not apply to domestic sector given problems with fuel poverty.	Revenue recycled via a 0.1 per cent employer NICs cut. Phasing in levy in N. Ireland for aggregate used in processed products.	0.2 per cent employer NICs cut offsets costs to business.	
Commitment to ongoing monitoring and evaluation.	Rates reviewed annually as part of Budget process. Levy's impact will be evaluated by Customs and environmental outcomes will be published in Pre-Budget Reports and Budgets.	Rates reviewed annually as part of Budget process. Levy's impact will be evaluated by Customs and environmental outcomes will be published in Pre-Budget Reports and Budgets.	Rates reviewed annually as part of Budget process Strategy Unit report on waste policy. Consultation on the landfill tax credit scheme in 2002.	Voluntary package overseen by a steering group involving a range of stakeholders. Reports on progress in Budgets and Pre-Budget Reports.
Commitment to future flexibility in policy.	e.g. Budget 2002 announced complete exemptions for electricity generated from CHP or coal mine methane, and certain recycling processes. The world's first economy-wide greenhouse gas emissions trading scheme was launched in April 2002 including link to CCL negotiated agreements.	Government keeping the tax under review.	Budget 2002 signalled that the Government anticipates a significant rise in the landfill tax in the medium term to meet sustainable waste management goals. Considering the case for a tax on incineration.	Depending on the success of the voluntary package.
Commitment to work internationally if possible.	Promotion of the UK approach on tax and emissions trading at European and international level, including taking an active role in negotiation of relevant EU directives.			

¹ CHP.

8.1 Improving the environment and delivering sustainable development is one of the crucial challenges facing all governments, businesses and consumers. Delivering the economic, social and environmental objectives that comprise sustainable development requires innovative and efficient approaches.

8.2 The Government's approach to achieving environmental improvement is based on tackling market failures. Environmental taxes and other economic instruments are particularly effective in correcting market failures where there are negative externalities which are not currently reflected in prices. Economic instruments can also be used to address other market failures, such as the positive externalities related to research and development across all sectors of the economy, as well as public good and information failures.

8.3 Taxes and other economic instruments therefore have a central role to play. They can improve economic efficiency and promote resource productivity in ways which other possible policy measures cannot. They can provide incentives for behaviour that protects or improves the environment, and deter actions that are damaging to the environment. They enable environmental goals to be achieved in the most efficient way. And they can send out a clear signal to markets to encourage innovation and the development of new technology. Revenues can be used to reduce the level of other taxes or, in some cases, encourage responses to the tax by strengthening incentives for positive action or mitigating adverse impacts.

8.4 Economics provides a useful framework for assessing the extent and nature of government action to deal with environmental issues, helping to inform judgements on how to balance environmental, economic and social impacts. So far as possible, the actions that the Government takes and the targets that it sets or agrees to need to reflect the costs and benefits of those actions.

8.5 The Government believes that the principles set out in the 1997 Statement of Intent on environmental taxation have worked well in practice. This paper has described the approach which the Government has taken in considering and implementing economic instruments. It confirms the Government's commitment to this approach and its commitment to continue to develop it in the light of experience.

8.6 The next steps in this process are:

- the Government will continue to explore the use of economic instruments to achieve its environmental and sustainable development objectives and to improve resource productivity, drawing upon the experience of existing taxation and trading measures;
- the Government will continue to keep the impact of environmental policy on innovation in environmental technologies and systems under review, and consider how best to provide incentives for further progress;
- the Government will continue to engage with stakeholders on the use and design of economic instruments;
- the Government believes that the principles and the lessons from the UK's experience with environmental economic instruments should be used in the EU and internationally to help frame policy responses to the next key environmental challenges. It will continue to work with others to promote the

benefits of market based approaches and encourage the use of economically and evidence based policy formation;

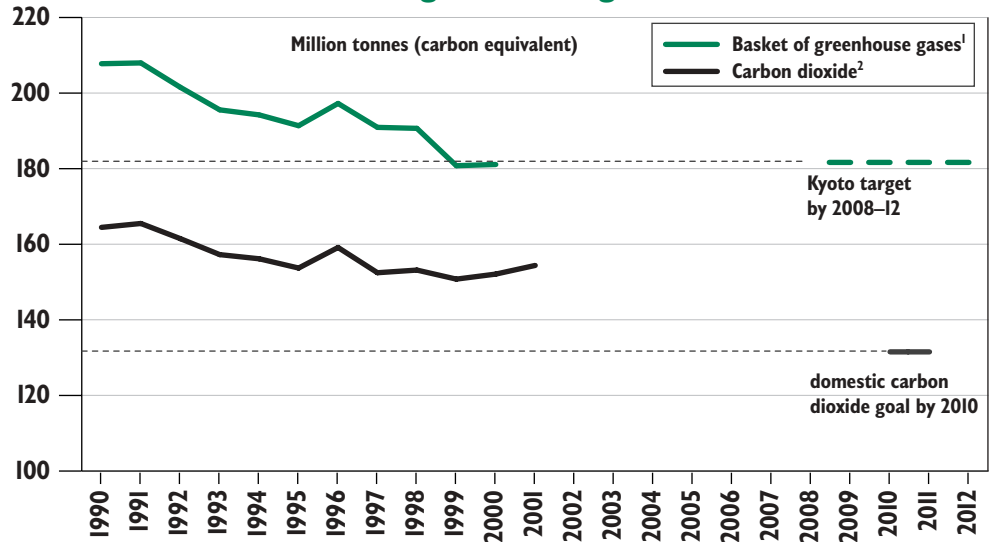
- the Government will continue to take a vigorous approach to tackling the key environmental challenges including addressing the problems of climate change, improving air quality, dealing with the environmental impacts of agriculture and transport, and managing waste more sustainably by using economic instruments; and
- the 2002 Pre-Budget Report has outlined a number of areas where further work is being undertaken on the use of economic instruments to tackle environmental issues including waste, agriculture, transport, and domestic energy efficiency.

A

SUSTAINABLE DEVELOPMENT INDICATORS

Climate Change

Chart A.1: Emissions of greenhouse gases 1990–2012



Notes:

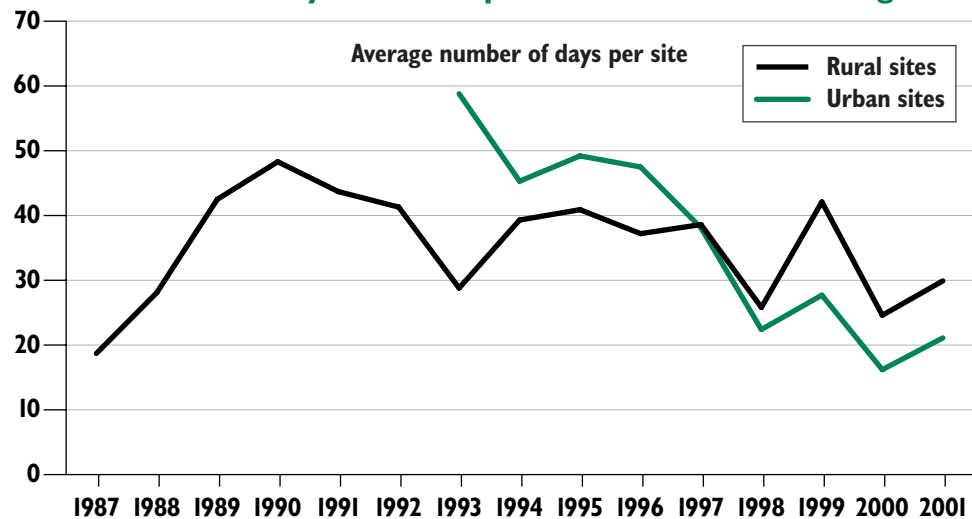
¹ Kyoto 'basket greenhouse gases' target: 12.5 per cent reduction on 1990 level by 2008–12 (181.66 million tonnes – in equivalent carbon weight).

² Domestic CO₂ target: 20 per cent reduction on 1990 level by 2010 (131.53 million tonnes – in equivalent carbon weight).

Source: DEFRA.

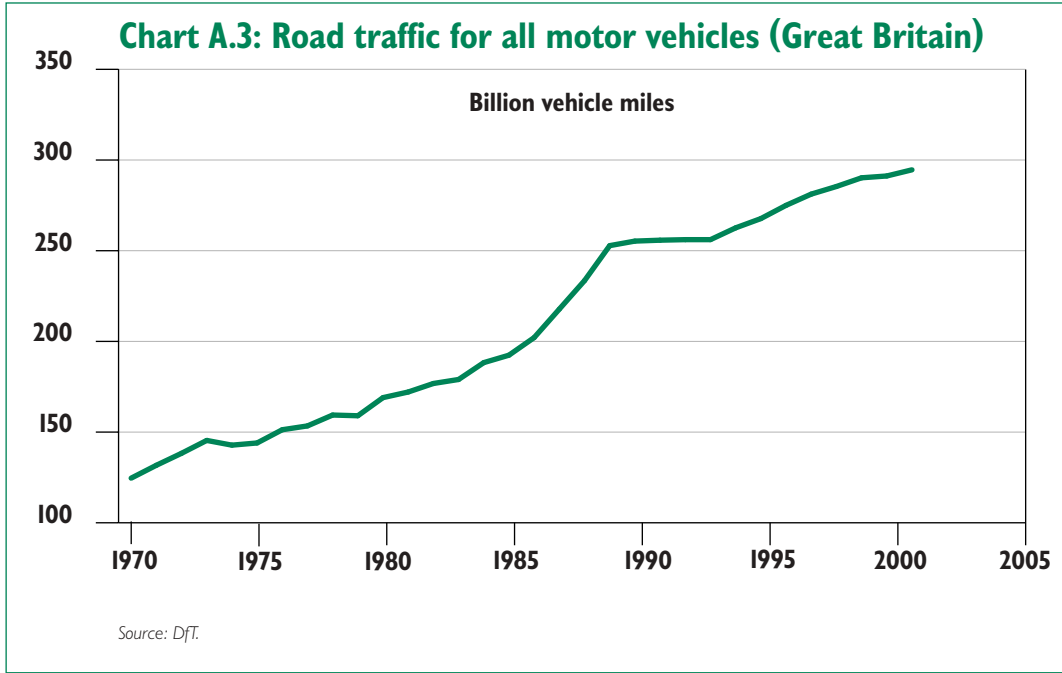
Air Quality

Chart A.2: UK days when air pollution is moderate or higher

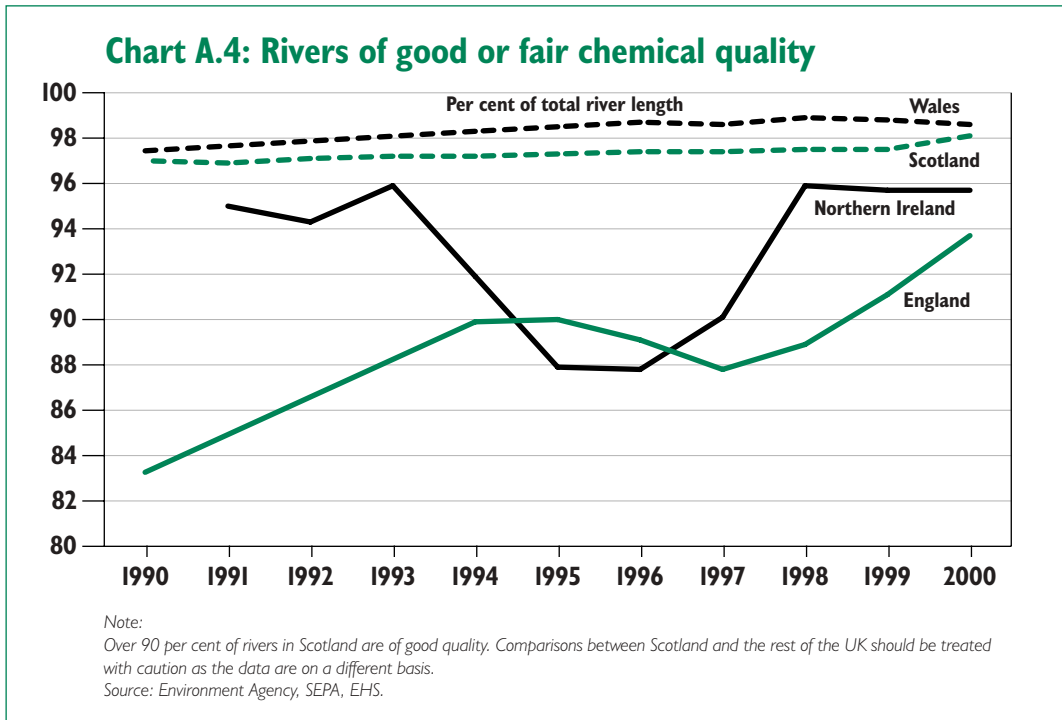


Source: NETCEN, DEFRA.

Road Traffic

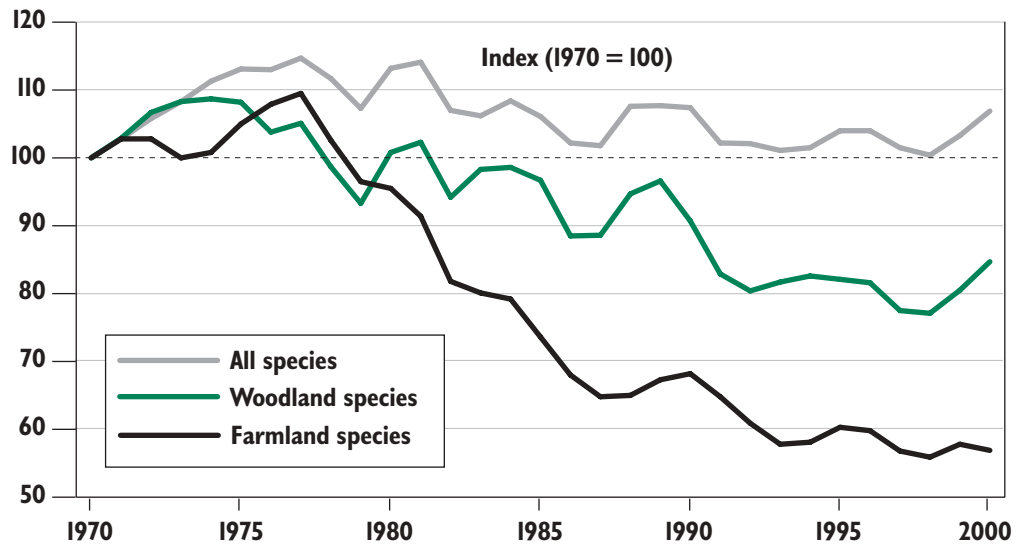


River Water Quality



Wildlife

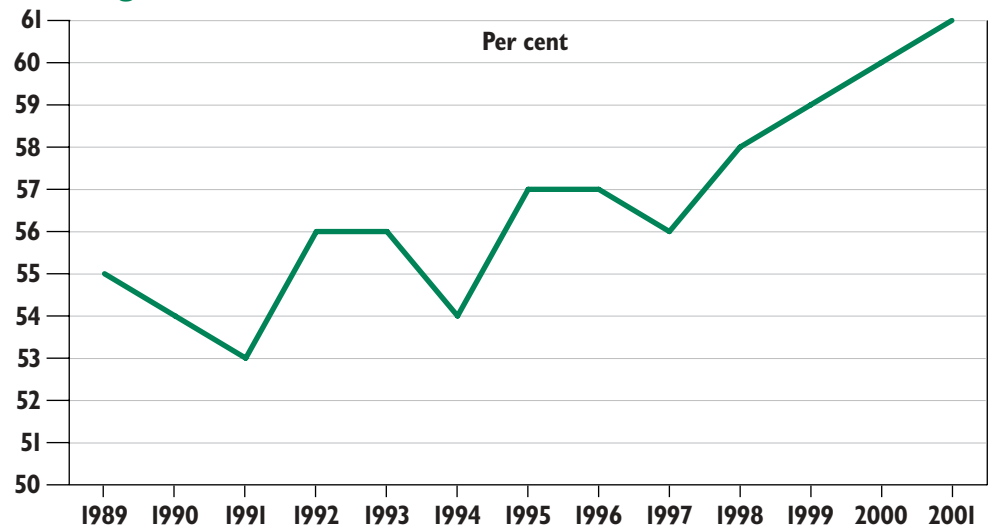
Chart A.5: UK populations of wild birds



Source: RSPB, BTO, DEFRA.

Land Use

Chart A.6: New homes built on previously developed land (England)

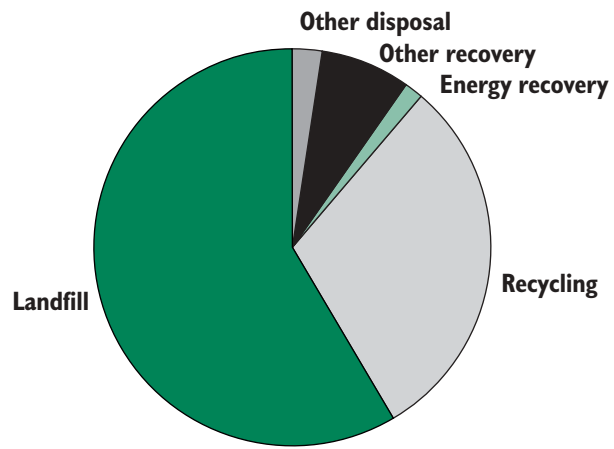


Source: ODPM.

Waste

Chart A.7: UK waste arisings and management 1997-98

Total waste: 170–210 million tonnes



Source: DEFRA and others.

B

PUBLIC SERVICE AGREEMENTS

Key Public Service Agreements relating to the environment are set out below.

HM Treasury

Protect and improve the environment by using instruments that will deliver efficient and sustainable outcomes through evidence-based policies.

Department for the Environment, Food and Rural Affairs

Promote sustainable development across Government and the country as a whole as measured by achieving positive trends in the Government's headline indicators of sustainable development.

Improve the environment and the sustainable use of natural resources, including through the use of energy saving technologies, to help reduce greenhouse gas emissions by 12.5 per cent from 1990 levels and moving towards a 20 per cent reduction in carbon dioxide emissions by 2010. **Joint target with DTI.**

Care for our natural heritage, make the countryside attractive and enjoyable for all, and preserve biological diversity by: reversing the long-term decline in the number of farmland birds by 2020, as measured annually against underlying trends; bringing into favourable condition 95 per cent of all nationally important wildlife sites by 2010; and opening up public access to mountain, moor, heath and down and registered common land by the end of 2005.

Deliver more customer-focused, competitive and sustainable food and farming as measured by the increase in agriculture's gross value added per person excluding support payments; and secure CAP reforms that reduce production linked support, enabling enhanced EU funding for environmental conservation and rural development.

Enable 25 per cent of household waste to be recycled or composted by 2005-06.

Reduce fuel poverty among vulnerable households by improving the energy efficiency of 600,000 homes between 2001 and 2004.

Improve air quality by meeting our National Air Quality Strategy objectives for carbon monoxide, lead, nitrogen dioxide, particles, sulphur dioxide, benzene and 1-3 butadiene. **Joint target with Department for Transport.**

Department for Transport

Reduce congestion on the inter-urban trunk road network and in large urban areas in England below 2000 levels by 2010.

Secure improvements in rail punctuality and reliability with a 50 per cent increase in rail use in Great Britain from 2000 levels by 2010.

Secure improvements to the accessibility, punctuality and reliability of local public transport (bus and light rail), with an increase in use of more than 12 per cent by 2010 compared with 2000 levels.

Cut journey times on London Underground services by increasing capacity and reducing delays. (Specific targets will be agreed with the Mayor after the Public Private Partnership has been established.)

Office of the Deputy Prime Minister

Achieve a better balance between housing availability and the demand for housing in all English regions while protecting valuable countryside around our towns, cities and in the greenbelt – and the sustainability of existing towns and cities – through specific measures to be set out in the Service Delivery Agreement.

The Government continues to keep its strategy on environmental taxation under review. Following Budget 2002, it initiated a process of discussion with other stakeholders to gain wider views on its strategy, and to inform development of this paper.

A series of meetings was held during summer 2002 involving environmental groups, business organisations and government departments and agencies. At these meetings the principles underpinning environmental taxation and the process of developing tax measures in practice were discussed in detail. The Fabian Society also held a seminar with key stakeholders specifically to address these issues. The Government has also had direct input from a number of individuals with detailed knowledge of the environment and taxation.

The Government would like to thank all those who contributed to this process, which has revealed a wide range of insights on the issues involved and has helped to widen and deepen understanding of policy in this area.

The Government will continue to work with stakeholders as it takes forward its strategy to ensure that measures are developed and implemented as effectively and efficiently as possible.

LIST OF BOXES

Box 2.1	Statement of Intent on environmental taxation
Box 3.1	Headline sustainable development indicators
Box 3.2	Sustainable development and the 2002 Spending Review
Box 4.1	Example of environmental costs
Box 5.1	Contingent valuation for the aggregates levy
Box 5.2	Valuation of lorry track and environmental costs
Box 6.1	Polluter pays principle
Box 6.3	Tax versus tradable permits
Box 6.4	Auction for permits for UK emissions trading scheme
Box 6.5	Regulation

LIST OF TABLES

Table 6.1	Examples of Government policies to address market failures
Table 7.1	Development and implementation of economic instruments

LIST OF CHARTS

Chart 3.1	UK resource use (total material requirement)
Charts in Annex A	Sustainable development indicators
Chart A.1	Emissions of greenhouse gases 1990-2012
Chart A.2	UK days when air pollution is moderate or higher
Chart A.3	Road traffic for all motor vehicles (Great Britain)
Chart A.4	Rivers of good or fair chemical quality
Chart A.5	UK populations of wild birds
Chart A.6	New homes built on previously developed land (England)
Chart A.7	UK waste arisings and management 1997-98

LIST OF ABBREVIATIONS

CAP	Common agricultural policy
CBI	Confederation of British Industry
CCL	Climate change levy
CHP	Combined heat and power
DEFRA	Department of Environment, Food and Rural Affairs
DETR	Department of Environment, Transport and the Regions
DTI	Department of Trade and Industry
DTLR	Department of Transport, Local Government and Regions
EEF	Engineering Employers Federation
EPC	Economic policy committee
EU	European Union
FSB	Federation of Small Businesses
GDP	Gross domestic product
LPG	Liquefied petroleum gas
NICs	National insurance contributions
OECD	Organisation for Economic Cooperation and Development
PSA	Public service agreements
ROC	Renewable obligation certificate
UK	United Kingdom
UN	United Nations
USA	United States of America
VAT	Value Added Tax
VED	Vehicle excise duty
WTA	Willingness to accept
WTP	Willingness to pay

REFERENCES / BIBLIOGRAPHY

- Anderson D., Clark C., Foxon T., Gross R., Jacobs M., 'Innovation and the Environment: Challenges and Policy options for the UK', Imperial College Centre for Energy Policy and Technology and the Fabian Society, January 2001
- Arthur W.B., 'Increasing Returns and Path Dependence in the Economy', University of Michigan Press, 1994
- Baumol W.J. and Oates W.E., 'The Theory of Environmental Policy', second edition, 1988 [p52]
- Baumol W.J., 'On Taxation and the Control of Externalities', American Economic Review, June 1972, 62 (3)
- Cabinet Office, 'Good Policy Making: A Guide to Regulatory Impact Assessment', 2000
- Cabinet Office, 'Resource Productivity: Making More With Less', 2001
- Cabinet Office, 'The Energy Review', 2002
- Clarkson R., and Deyes K., 'Estimating the Social Cost of Carbon Emissions', Government Economic Service Working Paper 140, 2002
- Confederation of British Industry and Engineering Employers Federation, 'The Climate Change Levy: First Year Assessment', October 2002
- Department of Environment, 'Making Markets Work for the Environment', HMSO, 1993
- DEFRA, 'Achieving a Better Quality of Life – Review of Progress towards Sustainable Development', 2002
- DEFRA, 'Auction Success for UK Emissions Trading Scheme', News release 99/02, 13 March 2002
- DETR, 'A Better Quality of Life: a Strategy for Sustainable Development in the United Kingdom', 1999
- DETR, 'UK Climate Change Programme', 2000
- Dodgson et al, 'Lorry Track and Environmental Costs', Report to DEFRA, National Economic Research Associates, AEA Technology and Transport Research Laboratory, April 2000
- Ecotec, 'Design of a Tax or Charge Scheme for Pesticides', Report to DETR, 1999
- ECOTEC Research and Consulting, 'Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the EU and its Members States', 2001, available at http://europa.eu.int/environment/enveco/taxation/environmental_taxes.htm
- EPC, 'Economic Policy Committee Annual Report on Structural Reforms 2002', February 2002
- European Environment Agency (EEA), 'Environmental Taxes: Recent Developments in Tools for Integration', EEA, 2000
- Federation of Small Businesses, 'The Climate Change Levy: Another Cost for Small Businesses', Research Paper No. 2, July 2002
- Foxon T., 'Technological and Institutional Lock-in as a Barrier to Sustainable Innovation', Imperial College Centre for Energy Policy and Technology, 2002, available at <http://www.iccept.ic.ac.uk/public.html>
- Gollier C., 'The Precautionary Principle', Economic Policy, October 2001
- Green Alliance, 'Next steps for energy taxation: A survey of business views', November 2002
- Green Alliance, 'Signed, Sealed and Delivered? The Role of Negotiated Agreements in the UK', April 2001
- HM Treasury, 'Appraisal and Evaluation in Central Government', 1997
- HM Treasury, 'Appraisal and Evaluation in Central Government Draft under Consultation', 2002
- HM Treasury, 'Economic Instruments and the Business Use of Energy', 1998
- HM Treasury, 'Modernising the Taxation of the Haulage Industry' – a consultation document, November 2001
- HM Treasury, 'HM Customs & Excise, Modernising the Taxation of the Haulage Industry – Progress Report One', April 2002
- HM Treasury, 'Productivity in the UK: The Evidence and the Government's Approach', 2000
- HM Treasury, 'Realising Europe's Potential : Economic Reform in Europe', HM Treasury White Paper, February 2002
- HM Treasury, 'Spending Review 2002 Public Service Agreements', July 2002
- HM Treasury, 'Sustainable Development at the Heart of Government Policy Development', Press notice 123/01, 14 November 2001
- HM Treasury, 'Tax Measures to Help the Environment', News release, 2 July 1997

REFERENCES / BIBLIOGRAPHY

- Kemp R., 'Technology and Environmental Policy: Innovation Effects of Past Policies and Suggestions for Improvement', paper presented to OECD Conference on Innovation and Environment, Paris, June 2002, available at <http://meritbbs.unimass.nl/rkemp/>
- London Economics, 'The Environmental Costs and Benefits of the Supply of Aggregates', Report to DETR, 1999
- Moffatt I., Hanley N., Allen S., Fundingsland M., 'Sustainable Prosperity: Measuring Resource Efficiency', Report to DETR, 2001
- North D. C., 'Institutions, Institutional Change and Economic Performance', Cambridge University Press, 1990
- Official Journal of the European Communities, 'Community Guidelines on State Aid for Environmental Protection', C 037 03/02/2001
- OECD, 'Environmentally Related Taxes in OECD Countries Issues and Strategies', 2001
- Pigou A.C., 'The Economics of Welfare', 4th edition, 1932
- Pretty J.N., Brett C., Gee D. et al, 'An Assessment of the Total External Costs of UK Agriculture', Agricultural Systems, vol. 65, pp. 113-136, 2000
- Tietenberg, T.H., 'Spatially Differentiated Air Pollutant Emission Charges: An Economic and Legal Analysis', Land Economics, Aug 1978
- Unruh G.C., 'Escaping Carbon Lock-in', Energy Policy 30, pp317-325, 2002
- Wuppertal Institute, 'Resource Use and Efficiency of the UK Economy', Report to DEFRA, June 2002