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Objectives, Instruments, and Institutions

DIETER HELM*

1. Introduction

The current approach to environmental policy in the UK dates from the 1990 White Paper, *This Common Inheritance*, which set the prime objective as sustainable development. Though neither the concept nor many of the themes in the paper were new, it marked a significant break with the past, in that it recognized for the first time the pre-eminence of global pollution and, in particular, global warming and biodiversity loss. It also recognized that these 'new' problems were of a different scale and importance. From 1990 onwards, governments would take environmental matters much more seriously.

Taking the environment seriously is a necessary but not sufficient step towards an environmental policy. To provide coherence, the policy requires clear objectives and targets that derive from them. It also requires an appropriate set of instruments and a set of institutions capable of implementing it.

In theory, the overarching sustainability principle provided a clear guide to policy formulation. All government policy was to be subject to this test, with the consequence that the piecemeal, *ad-hoc* treatment of each individual environmental problem which characterized the British approach for most of the century would be replaced by a tough, predictable, and measurable set of coherent policies. Where there was scientific doubt, the precautionary principle dictated a risk-averse approach.

In practice, although there has been significant legislation, the impact of the sustainability policy has been somewhat muted. The recession of the early 1990s dampened political enthusiasm, and successive governments failed to give any precise definition to the concept.

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Targets were adopted without much regard to it, except by way of lip service, and many of these were relatively easy to achieve. The definition of sustainable development was widened, first by the Conservatives to include economic growth and development, and then by Labour to include social considerations, leaving the inevitable trade-offs with the environment ambiguous.

With the exception of the social component, the 1997 General Election has not yet fundamentally affected the broad thrust of environmental policy.[1] Labour's White Paper (DETR, 1999*a*) added a host of targets and indicators, from the level of crime to wild birds, but did little to explain how these might be achieved. Of the major decisions facing the Labour administration in its first years in office, four have illustrated the political and practical difficulties of applying the sustainability concept. The transport White Paper, *A New Deal for Transport, Better for Everyone* (DETR, 1998*a*) was perhaps the most environmentally driven, but had to balance the desirability of a switch to public transport against the practical obstacles to the use of hypothecated charges on road-users to pay for it. The decisions on water quality (DETR, 1998*b*) required balancing perceived customer hostility to rising water bills with the costs of improving water quality and sewerage treatment, and signalling the need to conserve water resources through the price mechanism. Perhaps most difficult, the politics of coal led to explicit intervention to slow the decline of its market share through the energy White Paper, *Conclusions of the Review of Energy Sources for Power Generation* (DTI, 1998), despite the major environmental problems created by its mining and burning. Finally, the Department of Environment, Transport and the Regions (DETR)'s housing plans have had to reconcile the need to protect the green belt, while providing for changing social needs and economic development (DETR, 1998*e*). All are claimed to be examples of sustainable development in action, but just how these policies 'protect and enhance our environment so that the country we hand on to our children and our grandchildren is a better place in which to live' (Labour's Manifesto, p. 29) has not been explained. Making sustainable development an operational concept which enables policy choices to be made requires these sorts of hard trade-offs. Such explicitness is already proving as hard for this government as for its predecessors.

There are problems, too, in implementing policy—in setting targets and choosing instruments. Economics offers tools to assist, but, as with the sustainability concept, there is a reluctance to use them. An example

[1] Labour's manifesto simply reaffirmed the sustainability principle and claimed that an integrated transport policy was the most important component. The only explicit commitment was to a parliamentary environmental audit committee.

is provided by the commitment to a 20 per cent reduction in carbon-dioxide emissions from their 1990 level by 2010. While a tough target might be represented as 'environmental leadership' in Europe and globally, just why this number is more sustainable than the Kyoto target (12.5 per cent of a basket of greenhouse gases) or some other number, say, 30 per cent, is far from clear.[2] Although government is committed to taking account of the costs and benefits of environmental policy, for major decisions such as these, there is little evidence that it has done so.

On policy instruments, the 1990 White Paper again marked a turning point,[3] and both the Conservative and Labour governments in the 1990s have supported the principle of greater use of economic instruments, such as taxes and tradable permits, to ensure that the polluter pays. The current government has come forward with major new initiatives—notably in energy, with the climate change levy, and the prospect of trading green credits for renewables—but formidable obstacles remain to their effective implementation. Proposals for pesticide and aggregate taxes have proved politically even more difficult.

The gulf between the potential for greater use of economic techniques and current practice provides a major opportunity to improve resource allocation and hence achieve environmental goals at lower cost. But there are considerable barriers to further take-up of such opportunities. Some of these are *technical*, many of which can be overcome. Some are political, and need to be explicitly incorporated into policy design, if there is to be any significant progress. First-best economic policies rarely pass such tests, especially when there are significant distributional consequences. (See Goulder, 2000, on the second-best context, and Smith in chapter 8 of this volume.) Finally, there are institutional barriers, which need to be addressed if the environmental concerns are to be fully incorporated in policy design. This chapter provides a critique of current environmental policy and considers the scope for improving resource allocation.

2. The Sustainability Objective and the Global Context

(a) *The Origins of Sustainability*

While the concept of environmental stewardship has a long history, rooted in agricultural practices before the age of artificial fertilizers,

[2] The climate change consultation paper (DETR, 2000) provides no further illumination of the rationale for the 20 per cent number.

[3] Annex A to the White Paper (pp. 271–8) provides a concise case for the wider use of economic instruments.

herbicides, and pesticides, as the 1990 White Paper recognized, the modern idea of 'sustainability' has grown out of concerns about global environmental pollution and degradation. In its simplest form, sustainability is a recognition that without intervention, the global environment will not be able to provide a reasonable standard of living for future generations. In the now famous Brundtland definition, sustainable development is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987).

That definition has a 'warm glow' to it, which helps to explain why so many governments and individuals have felt able to sign up to it and why it has been so effective as a means of rallying public support for environmental causes. It can be made to fit with a wide range of ethical standpoints on rights, equity, and (possibly) efficiency. To it have been married a number of subsidiary notions—the use of 'best science', the precautionary principle where uncertainty arises, and the 'polluter pays' principle in assigning costs.[4] All find ready political and public approval, but the relationship between the general good intentions and the specific implications is less clear. As Solow (1993) aptly put it: 'the less you know about [sustainability] the better it sounds . . . [it is] an essentially vague concept.'

The reasons for this divergence are multiple, but two broad difficulties can be identified. First, the science remains far from settled: the global problems and their consequences are only weakly understood. Scientists cannot tell us with much precision what levels and types of economic activity are 'sustainable', because the global environment and its reactions to pollution are of immense complexity and the interdependency between its constituent parts poorly understood. 'Best science' is therefore a very uncertain basis for policy. Second, the politics and economics are hotly contested: the trade-offs between economic growth and development now, and the environment now and in the future, are hard to define, given that there is no consensus about whether economic growth is consistent with environmental protection and, if so, in what form and at what level, and because the political process is inherently more short-termist than the scale of environmental problems.

[4] These factors are explicit in the (substantial) 1994 White Paper, *Sustainable Development: The UK Strategy* (HMSO, 1994).

(b) *The Global Problem: Biodiversity, Global Warming, and Population Growth*

Recognizing the uncertainty of scientific evidence is important in policy design. As we learn more, policy can be better directed. But there is a cost to waiting, and the trade-off depends very much on the sources of the uncertainty. It is, therefore, helpful to set out some of the broad parameters—or what economists might describe as stylized facts—upon which sustainability is to be grounded. First, on biodiversity, the total number of known species of plants, animals, and micro-organisms is estimated to be of the order of 1.4 million, give or take 100,000 (Wilson, 1992, pp. 124–5), but the total is likely to be many times greater. Thus it is hardly surprising that, if most species are not even yet known, the rate of species loss is very uncertain. Wilson has suggested that by 2022 'a 20 per cent extinction in total global diversity, with all habitats incorporated, is a strong possibility if the present rate of environmental destruction continues' (p. 226). It is thought that this rate of species loss is sufficiently fast to rank among the four or five great species extinctions of geological history. The recovery times from previous extinctions are estimated to be in the range 10–100 million years: new species creation, notwithstanding advances in genetic engineering, is not relevant to human historical time spans.

On global warming, a few scientists still dispute the direction of temperature change, but an element of consensus has been built up around the work of the Intergovernmental Panel on Climate Change (IPCC), which suggests that, in the absence of any intervention, global temperature would rise between 1 degree and 3.5 degrees Celsius by the end of the twenty-first century. The UK Climate Impacts Programme (UKCIP, 1998) reports for the UK an 0.5 degrees Celsius warming in the twentieth century, and presents four scenarios of climate change for the next century, with rates of warming between 0.1 and 0.3 degrees Celsius per decade. Its main findings are that warming will be greater in the south-east, with wetter winters in all regions, and that changes in climate variability and extreme events are likely to be more important than simple changes in average climate.[5]

Biodiversity loss and climate change are linked by a more fundamental trend—the growth of the world population. Cohen (1995) summarizes the statistics as follows. Until 1750, global population growth rates never exceeded 0.5 per cent per annum. Since 1950, they have never fallen below 1.6 per cent per annum, with a peak of 2.1 per cent between 1965 and 1970. The result is a current population of around

[5] See Carson (1996) for a non-technical summary of the science.

6 billion, increasing at around 100 million per year. Cohen points to the implausibility of these trends being physically sustained by quoting UN projections to the effect that:

> if human populations continued to grow, in each major region of the world, at the rate presently observed in each, then the population would increase more than 130-fold in 160 years, from about 5.3 billion in 1990 to about 694 billion in 2150. . . . A clear conclusion from the United Nations' conditional prediction is that population growth rates must decline very substantially in some parts of the world within the next century and a half, or people must learn to eat without growing plants that transpire water back to the skies. (Cohen, 1995, p. 15)

Though the arithmetic is relatively straightforward, we know much less about the causes of population growth. As Dasgupta (1995) notes, a general theory of fertility behaviour is not currently available. But even if we had such a theory, changing the causes of population growth would be a very long-term project, and hence the next doubling is almost inevitable, and the depletion of biodiversity and increasing fossil-fuel burning are likely to continue for some time to come. The global environment is bound to get worse, even if it eventually gets better (and that is far from certain).

Among environmentalists, there are two broad responses to these trends. For some policy optimists, population growth is a serious but essentially transitional problem. On this view, the falling death rates will eventually be matched by falling birth rates, allowing the world population to stabilize during the course of the next century. Energy production can gradually be made independent of greenhouse-gas emissions, through technological switching to non-fossil fuel sources. Eventually, as population growth slows, so too will energy demand, while supply-side technical substitutions will ameliorate the emissions. Biodiversity loss will also slow down with the population trend, and better science will enable more of the existing biodiversity to be salvaged in reserved areas. On this view, the task of policy-makers is to design instruments that encourage the supply-side substitutions and preserve as much as possible of natural habitats,[6] so that, in the new stable world, environmental damage can begin to be reversed. It might even be possible to use advances in genetic science to help to re-establish endangered species.

The second response is more pessimistic. On this view, the convenient assumption (for which there is limited evidence) of population

[6] For an analysis of species protection policies—and, in particular, the US Endangered Species Act—see Brown and Shogren (1998).

stabilization through declining birth rates is questioned, and the economic growth—and, hence, energy demand—of the developed nations is traced through to greater use of natural resources. With the USA producing one-quarter of the world's carbon-dioxide emissions, and showing no clear signs of a significant switch from fossil fuels, and with China and India's population growth projections for the next century and their associated fossil fuel development plans, the environmental pessimists emphasize a scenario in which greenhouse-gas emissions continue to rise, global warming raises sea levels, birth rates hold up, and, eventually, the Malthusian check applies to humans as it does to animal populations.[7] The policy task is then more fundamental—to reassess the desirability of economic growth and to adjust to lower consumption levels now, to head off disaster in the next century.[8]

(c) *The Environment, Economic Growth, and Sustainability*

The scientific uncertainty is unlikely to be quickly or suddenly resolved. But even if it were—even if we knew for certain the relationship between greenhouse-gas emissions and climate change, the impact of climate change on the environment, and the consequences of biodiversity loss—that in itself would not determine the appropriate national or international environmental policy response to these formidable threats. Science is a necessary but not sufficient input. Environmental policy also requires that trade-offs between competing (economic) ends are defined, and between generations. Sustainable development purports to be the central organizing principle to internalize and resolve both of these.

That it cannot provide an easy answer is hardly surprising. There are both theoretical and practical reasons for this. Let us begin with the theory. What does the concept of sustainable development tell us? There are numerous definitions, but little consensus. Economists have, unsurprisingly, attempted to reconcile the concept of sustainable development with the framework of welfare economics. The conventional approach was to rely on the discount rate to connect generations.[9] Modern approaches regard sustainability as adding something 'new' to

[7] Kennedy (1993) discusses the prospects for a Malthusian check in the next century.

[8] These have been variously stylized as strong vs weak sustainability arguments in the economic literature, and their advocates as 'dark' and 'light' greens in the political literature. There is much confusion in the politics and economics literature on the definitions of these terms.

[9] Beckerman (1994) discusses the merits of this traditional optimizing approach in comparison with sustainability. See also Dasgupta and Heal (1979) for the standard treatment of exhaustible resources, and chapter 2 Atkinson in this volume.

the optimization framework, by introducing additional intergenerational constraints. Where these constraints are binding, they can act as 'trump cards' in policy debate. Thus, while all market failures need to be taken into account, some (environmental) ones are to be given more prominence, with the implication that other policy interventions are subsidiary to environmental concerns, which must be met first.

The most obvious way of capturing the Brundtland Commission's intuition is to require that consumption in future is at least as great as at present. The limiting case is constant consumption, and the conditions required have been developed by Solow (1974) and Hartwick (1977, 1978*a*). These turn on the assumption made about the substitutability between different types of capital, in particular renewable and non-renewable resources. Put simply, non-renewable resources (both physical and biological) can be used up provided they are converted into renewable (productive) capital efficiently enough.

It is important to bear in mind that the substitutability of the natural environment is an *assumption* in the Solow–Hartwick literature: consumption (and hence utility) can be sustained through either type of resource, and there is no overriding limitation to growth as non-renewable resources are depleted. In principle, then, the loss of biodiversity and depletion of fossil fuels can be compensated for by other forms of produced capital. Science can enrich the concept further by building in physical feedback mechanisms and the interdependencies within the environment. The economic literature tries to incorporate these features by distinguishing between use and non-use value, existence values, and irreversibility.[10] Not surprisingly, this is a complex and controversial area: in part because the economic distinctions are at best crude approximates of the rich complexity of the environment, and in part because they are only weakly understood. The sharpest controversy relates to biodiversity: can the welfare benefits of biodiversity be substituted for by anything else? Or is it unique? If it is, then the Solow–Hartwick approach defaults to a much harder constraint.

More radical approaches to defining sustainable development rest upon a rejection of the concept of Pareto optimality as the basis of welfare economics, by arguing that welfare judgements should be based upon wider informational sources, and that these are relevant to the design of environmental policy. Additional information on equity, rights, and capabilities then bears upon the policy evaluation. On this view, our obligations to protect and conserve the natural environment

[10] The concept of total economic value (TEV) attempts to link the science to the economics.

go beyond our own narrow interests, to incorporate the rights of others, and its value cannot be expressed merely in terms of the ability to generate utility.

Much of the philosophical literature on the environment takes this line, and as a consequence, debates between environmentalists of this persuasion and economists on policy matters are often a dialogue of the deaf. The differences are fundamental, and hence do not easily admit of policy trade-offs. Some philosophers widen the informational base to incorporate the idea that nature itself has intrinsic value and, hence, there can be cases where no trade-off between produced and natural (non-renewable) capital is sanctioned. Elliot (1997), for example, argues that we cannot 'fake' nature, and hence its destruction represents a permanent loss.

From a policy perspective, the problem with the philosophical literature is that there are a very large number of alternative welfare bases, and there is a dearth of well worked-out implications from this literature for operationalizing the sustainability criterion. Policy-makers want to know how resources should be used, and hence how trade-offs are to be made. Much of the philosophical literature motivates our concern for the environment, providing reasons why it should be valued. However, it gives little guidance as to *how* it should be valued, and which actions should be taken.[11]

It is clearly beyond the scope of this chapter to summarize the voluminous literature upon which these approaches are based.[12] However, two main points emerge: first, the further one travels towards the view that sustainable development reflects something 'special' about the environment, the more demanding it becomes as a policy objective; second, that the more demanding definitions typically include the more conventional ones. Thus, it is almost always relevant to know which outcome is the most economically efficient, even if it is to be trumped by additional constraints, and where non-utility information is used, it is useful to know the efficiency cost of pursuing these other concerns. This leads directly into the question of measurement and the role of cost–benefit analysis (CBA), the traditional efficiency tool, which we consider below in section 3. But before turning to this, let us first note how the UK has chosen in practice to interpret sustainable development in environmental policy.

[11] This is also true for much of the political literature. See, for a survey, Goodin (1992).

[12] For a succinct recent survey of the economic literature, see Atkinson *et al.* (1998, ch. 1) and chapter 2 below.

(d) *The UK Approach*

Since the 1990 White Paper, successive British governments have wrestled with how to turn the sustainable development concept into an operational tool for policy design. It has been a process of broadening the scope in response to political and practical pressures. The environmental enthusiasm of the 1990 White Paper was tempered by the recession of the early 1990s. The Major government was concerned to show that economic growth and environmentalism were not incompatible, and in its substantive 1994 White Paper, *Sustainable Development: The UK Strategy* (HMSO, 1994), took a pragmatic line. It claimed that

> sustainable development does not mean having less economic development: on the contrary, a healthy economy is better able to generate the resources to meet people's needs, and new investment and environmental improvement go hand in hand. Nor does it mean that every aspect of the present environment should be preserved at all costs. What it requires is that decisions throughout society are taken with proper regard to their environmental impact. (p. 7, para. 12)

This approach has the merit of flexibility. It takes the environment seriously but avoids prescriptive rules. The environment is a resource to be properly incorporated in the economic calculus. In consequence, the priorities are to ensure that it is properly accounted for in national income accounts,[13] to introduce environmental assessment into all major policy processes, and to design instruments (often based upon price, following the 'polluter pays' principle) and institutions to implement the outcome of assessments.

But even the Major government's definition does not grant complete freedom of action. Having 'proper regard' to environmental impacts is hard to reconcile with many politically sensitive activities. Taking policy decisions is not just about economic optimization, but also about the political reality of pressure groups, lobbying, party funding, and the process of making policy within a party system. Hence, it is unsurprising (as we shall see in the next two sections) that there has been less progress on economic assessment and economic instruments than many economists might want, and that politicians have sought to widen the definition of sustainable development to help justify decisions *ex post* which at first glance apparently fail to have such regard.

For Labour, the social dimension was given emphasis in the party's manifesto, and in consequence the definition was widened further:

[13] The concept of net national income has been an important theoretical input, and the Office of National Statistics has grappled with the practical measures, not wholly successfully (see Atkinson *et al.*, 1998, ch. 3).

> sustainable development is about ensuring a better quality of life for everyone, now and for generations to come. . . . The government's vision of the goal is based on four broad objectives:
> - social progress which recognizes the needs of everyone;
> - effective protection of the environment;
> - prudent use of natural resources; and
> - maintenance of high and stable levels of economic growth and employment. (DTI, 1998, para. 9.1)

Explicitly adding social factors on top of economic growth adds yet more flexibility, and in the absence of clarity about the weights on the components, allows many more policies to pass the test. With enough ingenuity, almost anything could be defined as 'sustainable'.

To give an example, with the 'right' weights, support for the coal industry and limits on gas-fired electricity generation are claimed to be consistent with sustainable development. Notwithstanding the environmental benefits of gas compared with coal, in this case, the requirements of security and diversity of supply took precedence. As the consultation paper on the UK Climate Change Programme (DETR, 1998*c*) stated:

> We inherited a situation which had exaggerated the advantages of gas-fired plant, and which took little concern of the need for security and diversity of supply. As a consequence, changes in the fuel mix for electricity made a disproportionate contribution to meeting the 2000 target [for carbon-dioxide reductions], relieving pressure from other sectors such as transport to reduce emissions. (para. 24)[14]

Even if the premise were correct (which it is not—see Helm, 1998*a*), there has been no overall *economic* (as opposed to physical) assessment of the contributions from different sectors, as the climate change consultation paper shows.[15] The inescapable general conclusion is that the objectives of energy policy overrode those of environment policy, and that, in particular, within energy policy the interest of coal miners has been given more weight than the environment (or even competition).[16] To describe the outcome as consistent with sustainable devel-

[14] See also DTI (1998, paras 2.47–2.53), where relaxations on sulphur controls and plans for further flue-gas desulphurization units (FGDs) are presented as part of the government's strategy to achieve 'sustainable energy supplies'.

[15] The paper is designed 'to stimulate a national debate on how we might meet our targets', providing a number of illustrations of possible quantity reductions, but presents virtually no information on costs, except for combined heat and power and energy efficiency. See also DETR (2000).

[16] It has been suggested that the energy White Paper merely provided for a longer transition towards the closure of the coal industry, and therefore a slower path of declining emissions. The paper does not, however, indicate that coal cannot hold on to its output. Indeed, that is precisely why it is argued to provide an option for longer-term security and diversity of supply.

opment might meet political imperatives, but is hard to reconcile with *any* of the approaches in the theoretical literature discussed above.

A further White Paper, *A Better Quality of Life*, was published in 1999, identifying the priority areas for action, as well as a set of indicators and targets (DETR, 1999*a*). The lists are long and varied, and any explicit attempt to aggregate the components into an index or measure of sustainable development is explicitly rejected. Sustainable development now incorporates anything from 'qualifications at age 19', 'the level of crime', and 'homes judged unfit to live in', through to 'populations of wild birds' and 'emissions of greenhouse gases'. The 1999 White Paper thus completed the transition of sustainable development from a primarily environmental concept capable of assessment, to a wish-list of things that government would like to achieve.

These domestic policies have been set within the context of internationally agreed objectives and targets which successive governments have signed up to. Notable among these has been the Rio 'Earth Summit' (1992) and Kyoto (1997). Rio saw the UK sign up to conventions on biodiversity and climate change, as well as to Agenda 21 on sustainable development.[17] Kyoto saw the adoption of targets for greenhouse-gas emissions for developed countries.

The form and content of such agreements are open to considerable question as means towards achieving sustainability at the global level. They are—as Barrett notes in chapter 6—the outcome of political negotiations largely in the absence of international institutions to ensure implementation and compliance (see also Barrett, 1991). As with the domestic policies discussed above, the tangency between the international targets and sustainable development is obscure: given the projections for biodiversity loss, climate change, and, above all, population growth, it is hard to see how Rio and Kyoto can be considered tough enough to be consistent with the Brundtland definition which motivated the agreements.

To summarize the argument so far, the environmental policy role of the concept of sustainable development has grown up as a reaction to major trends in the global environment, notably climate change, biodiversity loss, and, above all, population growth. At the physical level, the population growth rate cannot be sustained, in the sense that there are no good reasons for believing that there will be enough resources to feed all the mouths created, and that possibly before that point of physical saturation is reached, climate change and species loss may have (very) serious consequences for economic welfare. There is

[17] On the Rio biodiversity convention, see Swanson (1997) and Macdonald, chapter 7 below.

considerable dispute about the science, and about the appropriate policy response. Sustainable development *could* act as a guide to policy only insofar as it can be defined, measured, and then related to actual policy decisions. Although much progress has been towards an economic operational definition, the current literature remains a long way from providing an overarching and readily usable tool for policy design. These very real theoretical and empirical difficulties have not, however, stopped successive UK governments from broadening the definition to the point that it is in danger of becoming largely meaningless as a policy objective, or from adopting broad policy targets and commitments on climate change and biodiversity.

This rather unsatisfactory state of affairs is neither inevitable nor irreversible. Governments, having adopted the concept, now face the challenge of injecting it with more content—and, in particular, more empirical information. Fortunately, cost–benefit analysis (CBA) provides a set of tools which is not only a necessary input into sustainable development but also helpful in its own right.

3. CBA, Optimal Pollution, and the Efficiency Approach

Before environmental policy became global and the sustainability criterion was developed, the traditional economic answer to the objective of environmental policy was to maximize social welfare by correcting for the market failures which environmental problems represent. Pigou (1920) defined the optimal level of pollution consistent with maximizing social welfare, where the marginal costs of abatement equal the marginal benefits. On this view, environmental policy is about the pragmatic business of measuring marginal costs and benefits, and then using appropriate instruments—taxes, property rights, and regulation—to internalize the externalities. Each case is to be judged on its peculiar merits, and the application of policy depends upon the context. It is piecemeal, rather than guided by general rules.[18]

Optimal pollution is calculated by the application of CBA, which in essence has two fundamental components: the monetization of costs and benefits to create a common calculus to approximate utility; and reliance on consumer demand information to establish valuations. Neither of these has been widely accepted in environmental policy. Many non-economists adhere to the view that environmental assets

[18] The standard exposition in the Pigouvian tradition is Baumol and Oates (1988). Interestingly, Baumol and Oates do not mention sustainability at all in their textbook. See also Helm and Pearce (1990).

cannot be monetized: that they are strictly priceless. Habitats and species, it is argued, cannot be placed in a common calculus with factories, equipment, and offices. As noted above, this view is held by those who regard utility as too narrow a basis for measuring welfare,[19] and those who go beyond the informational argument to claim some intrinsic value to nature. Many scientists (and others) argue that to rely on consumer preferences is to devalue (superior) scientific knowledge. An additional objection is that, since future generations are not yet born, we cannot in any event know what their preferences will be.

While there are important ethical issues raised by these various critics, none undermines the use of CBA as an *input* into the setting of environmental targets. Those who reject monetization on ethical grounds often misconstrue the purpose of CBA. It (ethically) is not concerned with establishing the 'right' level of pollution, but only the efficient or 'optimal' level. The fact that the optimal level of pollution happens to be defined as one point does not imply that that is the 'right' level of pollution. It remains possible to choose inefficient outcomes. Whereas a change which is consistent with sustainable development is claimed to be desirable, one which passes the CBA test is merely more efficient than one that does not.

But more striking, perhaps, is the fact that, in making a choice, policy-makers are ranking alternatives, and that such rankings can be interpreted in cost–benefit terms. For example, when it was decided as part of an international negotiation to end the dumping of sewage at sea, an implication could be that the costs of the alternative do not exceed the environmental gain and, hence, it is worth expending resources on alternative methods of disposal.[20] To take another example, when it was decided not to build a tunnel under Twyford Down as part of the M3 extension, but instead to carve it in half to build a motorway, an implication could be that the Down is not worth the cost of the tunnel. The fact remains that those who oppose monetization necessarily make choices over the use of (scarce) environmental and other resources and, at least *ex post*, these can be monetized. The point holds too for the plethora of quasi-CBA techniques used in environmental appraisal, which frequently rely on using expert judgements, but fall short of monetization.

There are other more instrumental objections to CBA, many of which are documented by David Pearce in chapter 3. Notable among

[19] See Williams (1992) for a moral philosophy critique.

[20] International agreements pose special problems for such *ex-post* exercises, since agreements in a particular area may be necessary to gain advances in other areas. Nevertheless, even if this were the case in this example, it is still worth evaluating the efficiency consequences of the decision.

these at the policy level are two broad ones which have surfaced in British policy debates: that CBA often produces very uncertain answers, which are sensitive to small changes in assumptions (in particular, that consumers' valuations are extremely sensitive to new information), and that CBA studies are costly.

Each of these can be met. The fact that a valuation is uncertain is itself informative to policy-makers, and helps to clarify the specific characteristics of the problem. It is particularly helpful to know whether the major uncertainties lie on the cost or the benefits side, since this may influence the choice of instruments used (as Stephen Smith points out in his chapter in this volume; see also section 4 below). The problem of new information has led to innovations in the design of questionnaires, interviews and repeated sampling.[21] The costs of CBA studies relative to the project size will influence the scope and extent of the exercises, but do not undermine the rationale.

There remain many technical questions about the best way to conduct CBA (see again Pearce in this volume, and Johansson, 1993). These can be classified into three broad domains: those related to the valuation of non-market goods; those related to correcting for distorted prices, in the presence of other market failures; and discounting. Most of the CBA literature has focused on the first of these, and the techniques involved—mainly hedonic pricing, contingent valuation, and travel cost—represent a variety of different ways of trying to approximate people's valuations. Less attention has been paid to the presence of other market failures and, in particular, the counterfactual—what would have happened in the absence of other distortions in the particular market under consideration. Thus, for example, in considering a possible carbon tax as an instrument to abate air pollution, the monopoly elements in the electricity generation market need to be taken into account.[22] Establishing the 'correct' price of electricity before estimating the tax is not straightforward. Water regulation provides a further example: with the water price level set artificially low relative to the value of the assets employed, and, for many, price being unrelated to quantity consumed, consumer information on the desirability of higher water and effluent standards is likely to be distorted.[23]

Finally, the discount rate remains contentious and links the CBA debates with the concept of sustainability discussed in the previous section. Some—notably philosophers—object to discounting *per se* (e.g.

[21] See, for example, Arrow *et al.* (1992).

[22] The Marshall Report (1998) largely neglects this central issue.

[23] See Cowan's chapter in this volume for a general analysis of the regulatory issues.

Parfit, 1984; Broome, 1992). Others debate the rate, questioning in particular the extent to which market costs of capital should be used and endeavour to open a gap between individuals' and society's time preferences.

These technical debates will rumble on, helping to refine the estimates which provide an input into environmental policy formulation. Notwithstanding the difficulties, CBA helps to identify the efficient level of pollution: it is, in Pearce's words, the only show in town. To summarize: it is not a decision-making tool, but rather makes explicit the monetization, which is, in any event, implicit in virtually all environmental policy decisions. It builds upon consumer sovereignty as the fundamental component of valuation, and the practical problems that CBA encounters do not invalidate the technique.

Why, then, somewhat contrary to Pearce's view, has the application of CBA to the setting of environmental targets been largely the exception rather than the rule? Very few key environmental targets—in air, water, or land—have been subject to formal CBA scrutiny. To return to earlier examples, although a great deal of effort has gone into gathering information on carbon-dioxide emissions, no CBA has been conducted to support the claims that the 20 per cent carbon-dioxide target, and the interventions in the electricity industry to support coal are 'sustainable'.

In the cases where CBA has been used, the spur has been partially provided by the general requirement for the Environment Agency and the European Commission to take account of costs and benefits, and partially by political expediency. In the latter regard, a form of *à la carte* CBA is in danger of emerging, with the technique being used to justify targets already set, or which can easily be met, or to undermine the case for expenditure on public projects that might otherwise pass normal Treasury investment tests. It has also been used to assist in supporting revenue-raising environmental taxes, such as the landfill and the aggregates levies. CBA has not, however, frequently been used as an *ex-ante* tool on policy analysis to assist policy formulation.

This failure is as much political as economic. CBA is radical in the sense that it forces ministers to be explicit about the economic rationale for policies and, in making information transparent and public, can undermine the case for supporting sectional and lobbying interests. In the above energy example, CBA would probably not support the outcomes ministers have chosen: the 20 per cent target is essentially arbitrary; coal generation is environmentally much worse than gas; the flue-gas desulphurization (FGD) technology is not the most efficient method for reducing sulphur-dioxide emissions, and, indeed, makes other emissions worse.

To avoid the misuse of CBA, the appropriate response is to make a general rule, requiring its use for all major policies and projects, to become part of the standard menu, rather than remain *à la carte*. Some progress has been made in this area, through government guidelines for the conduct of environmental appraisal.[24] However, these have generally fallen short of the full endorsement of CBA, frequently relying on more subjective and qualitative approaches, based upon scoring and weighting (see below). There is considerable scope for further initiatives in this area, notably building on the requirement on the Environment Agency to take account of costs and benefits. Some economies of scale might be reaped by setting up a unit specializing in such studies to avoid the duplication of effort that has sometimes characterized existing approaches.

4. Instruments

Once the optimal level of pollution has been defined (or at least approximated), and targets set, environmental policy is then concerned with selecting appropriate instruments. The traditional and still overwhelmingly dominant approach is command-and-control regulation. Pollution 'experts' from the various institutions set maximum discharges through licensing processes, based on the application of top-down or bottom-up targets. These limits typically have had a strong technological content, being based on local environmental quality and on the best available technology (BAT). These should not entail excess cost (NEEC) but only where a transitional period is required to reach the BAT (see chapter 4 by Pearce in this volume). The licensing regime has been predominantly source-based and the current form derives from the Environment Act 1990, and in particular Integrated Pollution Control.

The problems with the traditional regulatory approach are numerous and well documented (Helm, 1993*a*, 1994). The regulators have their own interests, within an institutional framework, and will tend to adopt their own definitions of the public and environmental priorities. Technical capture and the advocacy of particular preferred solutions may give insufficient scope for new concepts. Regulators cannot know what best available technology is, and in any event, 'availability' itself depends on regulators' behaviour. For example, FGDs are, as noted above, economically inferior, but they were an 'available' technology.

[24] See DoE (1991*a*), and, for a review of subsequent guidance, DETR (1998*d*, Annex 1).

Forcing their application to coal-fired power stations altered the incentives to invest in combined-cycle gas turbines (CCGTs). Risk-aversion may lead to over-burdensome regulatory controls, and it is unlikely that least-cost solutions will be forthcoming. These difficulties are compounded by the problems of monitoring and enforcement. As Anthony Heyes, in chapter 5, argues, the design of optimal enforcement mechanisms is very different from the practice. Where there is regular interchange of personnel, regulatory capture may exacerbate such problems.

Economic instruments avoid many of these problems. The crucial difference is informational: economic instruments fix a price (taxes) or a quantity (permits) and then leave the market to sort out the response. The presence of uncertainty is essential to their rationale: if information was perfect, then command-and-control would, in principle, be at least as good. Economic instruments are themselves *information revelation mechanisms*: by setting the price or quantity, we can then observe the market effect, and adjust the instrument accordingly. The initial level of a tax need only be approximate, and, indeed, may be set fairly low to overcome the inevitable political difficulties. CBA can help to give an initial idea of the level and extent of uncertainty by testing the robustness of estimates to small changes in assumption. The choice between taxes and permits turns on whether it is the costs of abatement (taxes) over which we require greater control or the pollution level (permits).[25]

A second—related—advantage of economic instruments is the avoidance of the supply-side bias of command and control. Economic instruments set prices or quantities which encourage richer responses on both demand and supply sides, and allow the market to sort out the relative contributions of each, both in the short and the longer run. A carbon tax would, for example, encourage consumers to save on electricity and gas, and *also* encourage producers to switch to non-fossil fuels for generation. Research and development programmes would *also* respond.

Yet, despite an increasing recognition of the failures of traditional environmental regulation, and many official statements and reports on economic instruments, there have been few examples of the implementation of explicit mechanisms. The main ones have been the landfill tax and recycling credits. Water abstraction and pollution charges (DETR, 1997*a*), aggregates, and pesticides have all been proposed, but not yet implemented (Environmental Audit Committee, 1999).

[25] The classic treatment of prices and quantities is Weitzman (1974).

More progress has been made on *implicit* economic instruments. Most notable are taxes on petrol and the unleaded differential. Such taxes are, however, developed primarily for other reasons, notably raising revenue. As a consequence, their design does not map the shape of externality taxes, with the result that substitution effects are imperfect. The carbon-dioxide example illustrates this point well. Petrol is heavily taxed. Coal has been implicitly subsidized for the period 1990–8 by artificial contracts with the electricity industry to hold price and output up, paid for by electricity customers. As noted above, this support is being implicitly extended, and investment in gas-fired power stations has been, at least temporarily, halted. Nuclear power has been subsidized, as have renewables. In this confused context, the Marshall Report (1998) proposed an energy tax, along with a pilot tradable permits system, within the context of its restricted terms of reference—limited to the business sector, excluding domestic customers from any tax which might remotely resemble VAT on domestic fuel.[26] The subsequent tax—the misnamed Climate Change Levy—is based upon energy, not carbon. The confusions of objectives for the levy (protecting coal, supporting non-fossil fuels, maintaining competitiveness of large industrial firms, and avoiding tax increases on households) and the multiple existing interventions makes the design of environmental economic instruments a complex matter.

Why has it proved so difficult to introduce economic instruments? The reasons are partly related to the income effects and partly institutional. Polluting activities are frequently ones for which demand, at least in the short term, is price inelastic. Hence, to introduce an instrument that will have a significant impact on the level of pollution, the tax rate needs to be relatively high. For example, to persuade motorists to switch to public transport appears to require very sharp rises in petrol prices. Such high taxes on inelastically demanded goods will have substantial income effects, and it is typically impossible to prevent the burden falling on domestic customers. The political consequences are immediate, while the impact on pollution is longer term.[27]

Where many of the polluting activities also arise in the context of basic social primary goods, such as heating, lighting, water, and transport, there is inevitably a politically difficult trade-off between social and environmental policy. Thus, VAT on domestic electricity and gas proved difficult to impose, and, as noted above, subsequent

[26] The new energy tax in Germany, following the 1998 Federal elections, has some similar features.

[27] It is notable that the Conservative party has recently adopted a more pro-car policy stance in response to increases in petrol taxes and proposals for parking charges.

attempts to design an energy tax have been set within the context of explicitly excluding domestic customers.

In principle, the conflict between social and environmental policy can be solved by using two instruments—the environmental and the social—with economic instruments dealing with the former, and adjustments in social security addressing the distributional consequences. However, in practice, the macroeconomic constraint of the public-sector borrowing requirement has typically been binding—for both Conservative and Labour governments. Hence, the social security adjustment has not (politically) been an option, and the policy conflict has to be addressed directly when setting the environmental policy.[28] Widening the definition of sustainable development explicitly to include social considerations enables politicians to present such compromises as consistent with environmental policy.

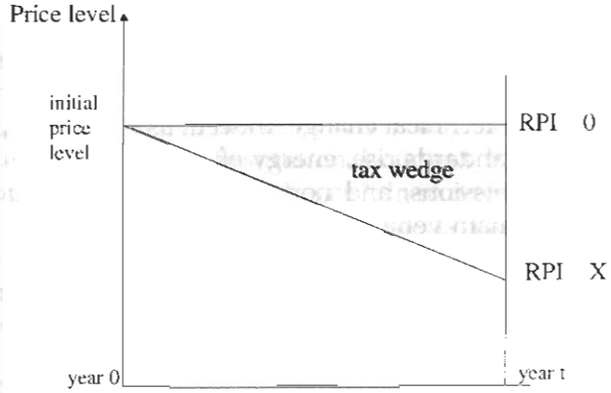
Environmental taxes are highly visible to the electorate, so it is hardly surprising that the government has been reluctant to opt for large-scale experiments when there are less visible alternatives. The use of regulation has the political merit that the economic incidence is much more opaque. Regulations act to drive up costs of the polluting activity, with the result that prices rise (in the absence of substitution on the supply side). These price rises represent implicit taxes, but are rarely linked back to environmental policy. If the price of paint, for example, goes up because the licensing policy on paint producers is toughened, few consumers are likely to link this to government action.

A politically attractive way of using implicit taxation for pollution abatement is through the regulation of privatized utilities, whose activities are closely associated with the main forms of pollution (energy and transport with air pollution; water with river and marine pollution). By placing additional environmental obligations on utilities, the costs can be passed through to customers in the form of disguised taxation. In effect, it is a form of regulated tax hypothecation. The 2000 utilities legislation provides for explicit guidance on social and environmental matters to be given to regulators, and it has included incorporation of the concept of sustainable development, as well as renewables policy and energy efficiency.

This opportunity is particularly politically attractive where the underlying costs of the basic utility services are falling owing to productivity improvements. Thus, where a utility can finance its functions with *real price reductions* matched by increases in efficiency, but consumers will accept *constant real prices*, a 'political' tax wedge emerges between the costs (RPI – X) and constant real prices (RPI – 0), as set out in Figure 1.

[28] An exception was the partial social security offset of VAT on domestic fuel.

Figure 1
The Utilities Tax Wedge



Given that the energy and water companies are closely associated as intermediaries in polluting activities, the *formal* incidence of pollution abatement expenditures on these companies can also be presented as being consistent with the 'polluter pays' principle. (The economic incidence depends upon the regulatory regime, but in practice is mainly on consumers.)

The most graphic illustration of the implicit tax wedge is in the 1999 water periodic review, where the Environment Agency encouraged a programme of environmental capital expenditure consistent with RPI – 0, as against the economic regulator's demand for substantial initial price cuts (Ofwat, 1997; Environment Agency 1998*b*). The DETR wanted both price cuts and extra environmental expenditure (DETR, 1998*b*). Though the two services provided by water companies—the standard utility provision and the environmental programme—could be separately addressed through utility charges and pollution pricing respectively, the economic instruments for pollution charging have not been implemented, despite numerous studies, as Simon Cowan shows in chapter 9. Thus, the approach has been to specify the required capital expenditure (command and control) and then consider what customers can afford as part of the monopoly pricing of water services.

Although politically expedient, such implicit taxation is likely to be economically inefficient in comparison with explicit economic instruments: by setting pollution prices, the market is left to sort out the most efficient solutions, whether on the supply or demand side.[29] A further

[29] Water companies have complex incentives on capital expenditure (see Helm and Rajah, 1994).

example—mentioned above—is the reduction in carbon-dioxide emissions to meet the 20 per cent target. A tax on carbon would elicit two responses: in the short run, the capital stock (cars, power stations, industrial plant, the transport infrastructure) is given and, hence, the main effects will fall on demand, through reduced use and energy efficiency measures. However, in the longer term, a supply response is to be expected from technical change. Indeed, as the global population grows and living standards rise, energy efficiency is unlikely to prove sufficient to cap emissions, and non-carbon energy production techniques will be the main vehicle to emissions control.

Two related conclusions emerge from the experience of economic instruments in the UK: that the political constraints are at least as important as the economic advantages; and that the incidence effects of many of the proposed pollution taxes tend to fall on domestic customers and, hence, create political obstacles to their application. These constraints are often ignored in the economics literature, but cannot be avoided in environmental policy design.

They give rise to two parallel responses: to refine the case for economic instruments, and to tailor such instruments to meet the multiple objectives, notably revenue raising and social equity. Whereas the economics literature focuses heavily on the substitution effects, the policy design needs to pay at least as much attention to the income effects of the instruments.

Although hypothecation of revenues would not necessarily be first best, there is considerable scope to utilize such approaches *within* sectors. Thus road charges may be used to subsidize rail transport. This sort of redistribution is to be sharply distinguished from recycling of revenue to polluters—i.e. within-industry hypothecation. Giving money back to polluters undermines some of the output adjustments the instrument is designed to bring about. It is not surprising that large energy companies favour permits over taxes to address carbon-dioxide emissions, where the grandfathering of initial permits limits such income effects, as compared with energy taxes. The income effects will be more easily absorbed if their introduction is gradual, and hence affected parties have time to adjust. This is a further reason for initial low levels of taxes—over and above the informational revelation rationale discussed above.

Most of these measures to accommodate political constraints weaken the efficiency of the economic instruments. However, the counterfactual is frequently not some ideal economic instrument, but command and control regulation, or even no intervention. An imperfect economic instrument may be second best, but still be much superior to current practice. And, once introduced, it can often be gradually improved,

while at the same time providing practical examples encouraging more widespread uses of such instruments.

5. Institutions

The design and implementation of any policy is conditioned by the institutional context. This institutional context has helped to shape British environmental policy and hence is in part responsible for the two major weaknesses identified above in sections 3 and 4—in the setting of targets and standards with too little regard to costs and benefits, and the strong bias towards command-and-control regulation over economic instruments. Neither CBA nor economic instruments has yet prospered in the British institutional setting.

There are two broad reasons why the design of British environmental institutions has led to this state of affairs. The first is historical, concerned with the administrative style of regulation developed since the creation of the Alkali Inspectorate in the late nineteenth century. The British approach to pollution control can be characterized as piecemeal, pragmatic, technically driven, and conducted by experts largely free from the reach of the courts. Put simply, in the UK, regulation is conducted by inspectors, directors general, and chief executives charged with pursuing general and ill-defined broad objectives. These individuals have traditionally sought out what they deem to be 'best available technologies' and, more recently, 'sustainable' solutions. There has been a high degree of interdependency between the polluter and pollutee, with the latter frequently recruiting its staff from the former. It is a classic example of what has been described in another context as 'good chaps regulation': provide a flexible and broad public-interest objective, and rely on selecting individuals with 'good' judgement. The corollary is that the quality and shape of regulation depends heavily on the personalities involved.[30]

The second reason for the reluctance to use CBA and economic instruments is more proximate, and lies in the design of the Environment Agency—in particular, the failure to merge the separate water, air, and land domains along functional lines, and the failure to focus on policy, regulation, and enforcement, rather than production activities.

When the then Conservative government endorsed the concept of integrated pollution control (IPC) in the 1990 White Paper (DoE, 1990*a*),

[30] These aspects of British environmental regulation are explored in Helm (1993*a*) and the parallel with utility regulation in Helm (1994). For a summary of the UK approach to pollution control, see Gouldson and Murphy (1998).

it considered the case for creating a new body which would be responsible for considering all the pollution media—land, water, and air. In July 1991 the government announced the intention to establish an Environment Agency, and a Green Paper was published in November 1991. The process of integration turned out to be a fraught one. There was an intense debate as between two main models for the Environment Agency: the functional model of Her Majesty's Inspectorate of Pollution (HMIP) (the successor to the Alkali Inspectorate), which was a small, tightly focused regulatory and enforcement body; or on the sectoral model of the National Rivers Authority (NRA), a large, federal, and broadly based producer, regulator, and enforcer.[31] Whereas HMIP had some 400 staff, the NRA had over 6,000, many of them engaged in flood defence and river basin management.[32] After a protracted debate, the solution adopted was to corral HMIP, the NRA, and the Waste Regulation Authorities together to create a major new institution, now with around 9,000 employees and a budget of over £500m, and to leave it to the Environment Agency to carry out the integration process *ex post*. In practice, the NRA dominated, with its Chief Executive succeeding to the leading position in the Environment Agency, and the Environment Agency has become predominantly an enlarged NRA.[33]

Since the Environment Agency is the body responsible for environmental regulation, the ways in which its structure and incentives have influenced its conduct are of great importance. One main weakness revealed has been a lack of managerial focus—given the conflicting pressures of a large operational work-force, the day-to-day business of pollution licensing, river basin management, the regulatory functions, monitoring pollution, enforcement and prosecution, and engaging in policy debates. The Environment Agency is responsible for such diverse activities as managing locks on rivers, prosecuting polluters, dealing with environmental emergencies, setting industrial emissions constraints, and advising the Secretary of State on the appropriate capital expenditure by water companies (Environment Agency, 1996). In economic terms, it is the loosely configured agent of many different principals whose objectives conflict, and, in consequence, it has had considerable freedom to develop its own agenda and managerial interests, under the general duty to promote sustainable development.

[31] See DoE (1991*b*, 1994*a*) and also Helm (1992). The Green Paper actually had four models, but the functional versus federal distinction was the most important.

[32] In 1996/7, the successor Environment Agency had around 3,500 staff classified as working on environmental protection, and over 5,000 on water management (3,400 of whom on flood defence, representing 45 per cent of expenditure).

[33] Eleven of the top 15 posts in the new Environment Agency went to officials from the NRA (*ENDS Report*, August 1995).

It is not, therefore, surprising that there have been a number of high-profile criticisms of its conduct, ranging from its performance over sulphur regulation through to the way it crisis-managed the floods in spring 1998. The Select Committee on Environment, Transport, and the Regions reported in June 1998 criticism of staffing and resources, inspection, and prosecution.[34]

The Environment Agency has been somewhat resistant to the use of CBA and has played little direct part in developing economic instruments. Although the Environment Act 1995, which set up the Environment Agency, required that it should take account of the costs and benefits of its activities,[35] in practice, the Environment Agency has not given such assessments a central role, and its senior staff have tended to reflect scientific and engineering interests, rather than economics. This reluctance has been reflected in the fact that, among the 10,500 employees, currently only about five are professional economists.

A recent example of this reluctance has been the Environment Agency's contribution to the 1999 periodic review of the water industry. Under pressure to justify water capital expenditure, it has recently developed its own multi-attribute technique (MAT) (see Environment Agency, 1998*a*,*b*). This technique relies upon the application of a scoring or rating system to predicted impacts, which are then weighted on the basis of the importance of one impact category over another, and the weighted scores then aggregated into an overall measure of impact. It is a somewhat belated attempt to assess the benefits of environmental expenditures which could be financed through the tax wedge discussed above, as a response to the challenge from Ofwat (Ofwat, 1997). Although there has been some attempt to use values from other CBA studies,[36] in practice, MAT continues to rely heavily on weights and scores provided by its own experts, rather than data from consumers. Making these expert judgement explicit has some obvious advantages, but it remains to be seen how far in practice it is used to justify the Environment Agency's preferred options, and how far it genuinely challenges them. For further insight into the Environment Agency's thinking on this, see *Guidance Note No. 29* (Fisher *et al.*, 1999).

[34] See DETR Select Committee 6th Report, 17 June 1998. For a critique of its regulatory practice, see ENDS (1998*a*).

[35] Clause 39(1,b) requires that the Environment Agency 'shall, unless and to the extent that it is unreasonable for it to do so in view of the nature and purpose or in the circumstances of the particular case, take into account the likely costs and benefits of the exercise or non-exercise of the power or its exercise in the manner in question'. This is then hedged by 39(2) which excludes its obligations and requirements placed upon it otherwise than in this section.

[36] Pearce, in chapter 3, notes that this has not always been appropriately conducted, particularly in regard to the Darent study transfers to the Kennet exercise.

The Environment Agency's reluctance to embrace CBA and economic instruments is not an accident: it reflects the incentives of the Environment Agency's management and employees. Scientists and engineers are unlikely to welcome the idea that pollution licences should be subject to detailed scrutiny of costs and benefits, and that economic valuations might help to determine the optimum level of pollution. Many current activities and decisions might be consequentially questioned. More threatening still are economic instruments, since their application removes much of the role of the experts in fixing and revising regulation, and would make the activities of some employees redundant.

Thus, at the heart of environmental policy is a principal–agent problem: the government's agent, the Environment Agency, has its own internal incentives, and the extent of the differences of objectives between government and the Environment Agency has been greatly exacerbated by the way in which the Environment Agency's institutional architecture built upon that of the NRA rather than HMIP. The implication is that reform of the Environment Agency's structure may be a necessary condition for the more widespread adoption and development of CBA and economic instruments. The detailed nature of these reforms is beyond the scope of this chapter, but suffice it to note that a separation between operational production activities (such as flood defence) from regulatory and enforcement functions would greatly alter the size and managerial focus of the organization, and in separating out around 5,000 of the employees, the producer-orientated incentives would be weakened.

However, if the structure of the agency is imperfect, then so too is that of its sponsoring government department. The Department of the Environment has been, since its inception in 1970, an amalgam of functions. It was created from the Ministries of Housing and Local Government, to which transport was added, and then subtracted in 1976.[37] After the general election in 1997, this large amorphous department became even bigger, with transport returning, and the regions added. Its Secretary of State, therefore, has to weigh up matters related to three sectors of the economy—housing and construction, transport, and water—oversee a host of quangos, as well as considering practical environmental issues. By contrast, energy, which is at least as environmentally sensitive as transport, resides at the Department of Trade and Industry, while agriculture has its own ministry. With, on the one hand, so many different sectors and interests to address, but, on the other, without energy or agriculture, the DETR is neither fully integrated to internalize environmental decisions, nor narrowly focused enough for

[37] See Hennessy (1989) for the historical detail.

the environment to have overriding dominance. The confusion between vertical, industry-driven and horizontal, policy-driven structures at the DETR mirrors the problems with the design of the Environment Agency discussed above. Vertical industry ministries are more prone to capture by the producer interest, whereas horizontal ministries are able to focus on policy. In the former case, the Ministry of Agriculture, Fisheries, and Food's capture by farmers' interests is perhaps the clearest example.[38] This might not matter too much if sustainable development could provide an overarching—and hence integrating—focus. But, as argued in section 2 above, it does not as yet do so.

A functionally designed Department of the Environment might be more likely to provide the appropriate focus for environmental policy within government in a consistent fashion across sectors than would the existing institutional architecture. Thus, from the perspective of environmental policy, the creation of the DETR can be argued to be a step in the wrong direction: rather than adding transport and the regions to the existing functions, it may have been better to subtract many housing and local government activities, and to focus the department around the core environmental policy activities.

6. Conclusions

The promise of the 1990 White Paper has proved harder to deliver than its authors can have expected. It promised a coherent environmental policy, based upon a recognition of the gravity of global environmental threats, and built upon a thoroughgoing use of economic techniques and markets, and new institutions. Almost a decade later, it would be hard to argue, notwithstanding Rio and Kyoto, that the global environment is in better shape: that the Brundtland ambition has been met. Biodiversity loss is probably accelerating, and emissions of greenhouse gases continue to rise at the global level.

The central organizing principle of environmental policy in the UK is the pursuit of sustainable development, at a global as well as national level. That concept has had two political advantages. First, it is capable of engendering wide support without, second, greatly exposing government to public scrutiny for failing to implement policies consistent with it. Almost any policy—including even supporting the coal industry—can be claimed to be consistent with sustainability, since the

[38] These problems of institutional design are not confined to environmental policy. Recent debates about merging economic regulatory bodies into sectoral bodies, or even one large body, raise many similar issues.

definition has been stretched by government to be sufficiently wide to be practically almost meaningless. And without an organizing concept and a clear objective, environmental policy in practice collapses into a series of *ad hoc* measures, driven as much by the relative political weight of other considerations, as by environmental concerns.

This policy vacuum could be filled in one of two ways: either the government could give sustainability content by explicitly addressing the trade-offs between the environment, social issues, and economic growth and development; or the concept could be abandoned in favour of a more conventional economic optimality framework, concentrating on correcting for environmental externalities and public bads.

Developments in measurement techniques hold out the promise of empirical tests of policy options, and green national income accounts may help to demonstrate whether the environment is getting better or worse over time. As an efficiency concept, sustainability can be given a fairly precise set of definitions, and it can help to encourage a better understanding of the relationship between the science and the economics. But, as yet, the temptation of politicians to stretch its definition to bask in the concept's 'warm glow' has proved too seductive to permit hard tests to be applied to environmental policy design. The 1999 White Paper added lots of targets and indicators, but did not facilitate rigorous analysis. It is still not possible to say whether the government's transport, energy, water, and housing policies meet the criterion or not.

But whichever course is adopted, there is a strong case for using CBA to increase understanding of the efficiency characteristics of policy, and to harness the market through economic instruments to minimize the resource costs of improving environmental quality. Policy should not, of course, be restricted to efficiency considerations, and other wider welfare considerations clearly have a place. But where policy departs from economic optimality, it is at least worth knowing the price.

The fact that government and policy-makers have so far failed to harness the full potential of these economic tools is partly due to technical problems in their development and application. But these technical difficulties can easily be overstated: the more challenging task is to incorporate political constraints into environmental policy design. Having proper regard to the income effects of economic instruments, adopting gradualist approaches, and focusing on those areas where public concern is greatest, is more likely to be conducive to enlarging the role of such instruments. But to make much progress will require an element of institutional reform. It is a necessary condition towards the development of a more efficient design and implementation of environmental policy and it is here that we should start.

2

Sustainable Development and Policy

GILES ATKINSON*

1. Introduction

The call for countries to pursue policies aimed at achieving 'sustainable development' was established both in the Brundtland Report and at the Earth Summit in 1992. Sustainable development has since been adopted as an over-arching goal of economic and social development by international agencies, individual nations, local governments, and even corporations, and, further, has generated a huge literature. While there are legitimate questions about what these bodies have signed up to, the focus on sustainability broadly embodies the goal that development policy deliver improvements in the prospects of people both now and into the future. However, what really matters, once terms have been defined, is what has to be done to secure this. One decade after the early formulation of the problem, there have been great advances in the theoretical aspects of sustainable development. Much of the ongoing debate has focused on the need to manage sustainably a portfolio of diverse assets and, within this portfolio, on which assets merit 'special attention' with regard to the conservation of critical stocks. The continuing weak versus strong sustainable development controversy embodies many of these issues. This has also led to significant and parallel advances being made on the ways in which sustainable development might be indicated. Indeed, this indicator work often has been at the forefront of much of the broader debate. Alerting decision-makers to the underlying 'true' trends in the economy and to the way in which their policies may affect those trends is a prerequisite to informing decision-making that is not systematically biased towards environmental degradation and over-extraction of resources. Formidable challenges confront policy-makers who have publicly stated their commitment to sustainable development and many governments have begun to respond to this responsibility primarily by the development of numerous indicators by which rhetoric can be judged against the