

DESIGNING SMART REGULATION*

Neil Gunningham and Darren Sinclair

Introduction

One of the crucial issues of our time is how to avoid serious, and perhaps cataclysmic, damage to the natural environment. The causes of such damage are both complex and controversial, and arise from a wide variety of social and economic pressures. The results, however, are more readily apparent. The evidence that pollution, land degradation, de-forestation, ozone depletion, climate change, and the loss of biological diversity are inflicting serious and in some cases irreversible damage to the planet which sustains us, is increasingly compelling.¹ Indeed, it is arguable that the window of opportunity for averting major ecological disaster is a rapidly shrinking one, and that, in some cases, it may already be too late to prevent ongoing environmental degradation.

For policymakers, a variety of strategies are available that might, subject to political and economic constraints, enable serious environmental damage to be slowed down, halted, or ideally reversed. This article is about one of the most important of those strategies: environmental regulation. We use this term, deliberately, in the broadest sense, to include not just conventional forms of direct ("command and control") regulation but also to include much more flexible, imaginative and innovative forms of social control which seek to harness not just governments but also business and third parties. For example, we are concerned with self-regulation and co-regulation, with utilising both commercial interests and Non-Government Organisations, and with finding surrogates for direct government regulation, as well as with improving the effectiveness and efficiency of more conventional forms of direct government regulation.

Regulation - even broadly defined - is not the only means of addressing environmental problems but will, in the very large majority of cases, undoubtedly be a crucial one. However, most existing approaches to regulation, are seriously sub-optimal. By this we mean that they are not effective in delivering their purported policy goals, or efficient, in doing so at least cost, nor do they perform well in terms of other criteria such as equity or political acceptability.

The major task of this article is to demonstrate how environmental regulation could be designed so that it would perform successfully in terms of those criteria (or at least come a lot closer to it). The central argument will be that, in the majority of circumstances, the use of multiple rather than single policy instruments, and a broader range of regulatory actors, will produce better regulation. Further, that this will allow the implementation of complementary combinations of instruments and participants tailored to meet the imperatives of specific environmental issues. By implication, this means a far more imaginative, flexible, and pluralistic approach to environmental regulation than has so far been adopted in most jurisdictions.

Towards principle-based regulatory design

Because threats to the environment take many forms, the appropriate strategies to address environmental degradation are likely to be context-specific.² What sorts of policies work will be highly dependent upon the characteristics of the environmental issue under consideration. The strategies most effective in addressing point-source pollution from manufacturing are likely to be very different from those most suited to remedying land degradation or overfishing, as are the likely array of available instruments and institutional actors, and the political and economic contexts in which

* This article is an abridged version of the concluding chapter in *Smart Regulation: Designing Environmental Policy* (N Gunningham & P Grabosky, Oxford University Press, Oxford, UK, forthcoming 1998).

policy mixes must be designed. As a result, it would be futile to attempt to construct a single optimal regulatory solution that would be applicable to a wide variety of circumstances.

Does this mean that nothing of value can be said at a general and abstract level and that the most we can ever do is focus on solutions to particular types of problems (point-source pollution, land-clearing, soil degradation etc) with little hope of learning any wider lessons or of extrapolating from one policy area to another? We believe that such a conclusion is too bleak, and that, notwithstanding the context-specific nature of most environmental problems, it is possible to build a *principle based framework* for designing environmental regulation in any given circumstances. By this we mean an approach which, while falling short of providing determinative regulatory solutions, leads policymakers to assess their decisions against a set of design criteria which form the basis of reaching preferred policy outcomes.

In the remainder of this article, we address two elements we believe are crucial to successful regulatory design. First, and comprising the bulk of the article, we identify a series of *regulatory design principles*. We argue that adherence to these principles is at the very heart of successful policy design. Not least, we argue that policymakers should take advantage of a number of largely unrecognised opportunities, strategies and techniques for achieving efficient and effective environmental policy. These include:

- the desirability of preferring complementary instrument mixes over single instrument approaches while avoiding the dangers of smorgasbordism (ie wrongly assuming that all instruments should be used rather than the minimum number necessary to achieve the desired result);
- the virtues of parsimony: why less interventionist measures should be preferred and how to achieve such outcomes;
- the benefits of an escalating response up an instrument pyramid (utilising not only government but also business and third parties) so as to build in regulatory responsiveness, to increase dependability of outcomes through instrument sequencing, and to provide early warning of instrument failure through the use of triggers;
- empowering third parties (both commercial and non-commercial) to act as surrogate regulators, thereby achieving not only better environmental outcomes at less cost but also freeing up scarce regulatory resources which can be redeployed in circumstances where no alternatives to direct government intervention are available; and
- maximising opportunities for win-win outcomes, by expanding the boundaries within which such opportunities are available and encouraging business to go "beyond compliance" with existing legal requirements.

Second, we stress the importance of *instrument combinations* and discuss how such combinations might be inherently complementary, inherently counterproductive, or essentially context specific in nature. In recent years, policymakers begun to explore a much wider range of environmental policy instruments. However, there has been little systematic enquiry into how conceptually different instruments might interact with each other. Overall, there remains a tendency to treat the various policy instruments as alternatives to one another rather than as potentially complementary mechanisms.³ As a result, policy analysts have tended to embrace one or other of these regulatory approaches without regard to the virtue of others.

It is important to earmark the issues we do not address in this article. First, we are not directly concerned with the debate on compliance. The extent to which different instruments are capable of being, or under a particular enforcement approach likely to be, effectively enforced, is obviously an important consideration in relation to their effectiveness and efficiency.⁴ However, it is not necessary to enter into this debate in order to address our central concerns identified above. Second, we do not find it necessary to enter the debate concerning the prevailing regulatory culture of different

jurisdictions and their relative effectiveness although this too, is likely to influence regulatory outcomes.⁵ As we will see, our design principles can be applied successfully against the backdrop of a variety of enforcement practices and across a range of cultures.

Regulatory design principles

In this section we identify the core principles which should underpin regulatory design. Although these do not purport to prescribe specific solutions to specific environmental threats, our principles provide the guidelines and roadmaps which will enable policymakers to arrive at those solutions. The five principles described below are intended to be addressed sequentially.

Principle 1. Prefer policy mixes incorporating instrument and institutional combinations

There are very few circumstances where a single regulatory instrument is likely to be the most efficient or effective means of addressing a particular environmental problem. Certainly such circumstances exist. For example, a ban on the manufacture of certain highly toxic substances may be a highly effective way of preventing their use, without the need to invoke additional instruments. In the majority of circumstances, however, individual instruments have both strengths and weaknesses and none are sufficiently flexible and resilient to be able to successfully address all environmental problems in all contexts.

Command and control regulation has the virtues of high dependability and predicability (if adequately enforced), but commonly proves to be inflexible and inefficient. In contrast, economic instruments tend to be efficient but, in most cases, not dependable. Information-based strategies, voluntarism and self-regulation have the virtues of being non-coercive, unintrusive and (in most cases) cost-effective, but also have low reliability when used in isolation. Their success also depends heavily on the extent of the gap between the public and private interest.

Our general conclusion is that the best means of overcoming the deficiencies of individual instruments, while taking advantage of their strengths, is through the design of combinations of instruments. Similar arguments for regulatory pluralism apply with regard to regulatory participants. In most jurisdictions, the regulatory process been artificially restricted to government and industry. This reinforces outmoded notions of government as an omnipotent source of regulatory authority. A greater range of actors, including commercial third parties, such as banks, insurers, consumers, suppliers and environmental consultants, and non-commercial third parties, can assist in taking the weight off government intervention. Thus government can redirect its limited resources to those companies which are genuinely recalcitrant, and increasingly assume the mantle of facilitator and broker of third party participation in the regulatory process. An additional benefit is that a multiplicity of regulatory signals have the potential to be mutually reinforcing.

If one accepts this general approach of using combinations of instruments and participants, then there may be a temptation to succumb to a "kitchen sink" approach to policy design,⁶ throwing in every conceivable policy combination on the assumption that the severity of the environmental problems we confront, and their likely consequences for humankind, are such as to justify almost any level of resource input. However, this approach is likely to be seriously sub-optimal for a variety of reasons. First, there are practical limits to the capacity of industry to comply with a large range of regulatory and quasi-regulatory requirements - regulatory overload is now a well recognised phenomenon.⁷ Second, the imposition on the public purse and the demand on public resources would also be excessive. Third and finally, not all combinations of instruments or institutions are likely to be complementary. On the contrary, a considerable number of combinations are either inherently, or in particular contexts, counterproductive, duplicative or sub-optimal (this issue is explored below).

Principle 2. Prefer less interventionist measures

Intervention has two principal components: *prescription* and *coercion*. Prescription refers to the extent to which external parties determine the level, type and method of environmental improvement. Coercion, on the other hand, refers to the extent to which external parties or instruments place negative pressure on a firm to improve its performance. By way of example, it may be argued that industry self-regulation is higher in terms of its prescriptiveness than its coercion. That is, firms may be required to address specific issues and adopt certain behaviours, but there is little by way of external enforcement to ensure that their obligations are met.

In contrast, some economic instruments such as taxes and charges are high on coercion and low on prescription. That is, coercion is exercised through a price signal, which firms by and large cannot avoid. How they respond to that price signal, however, is independent of outside influence - they may choose to pay the higher tax or change their behaviour so as to limit its impact. If they choose the latter, then they also have total control over the type of remediation implemented. Ranking instrument categories according to the level of intervention therefore requires a balancing or assessment of the respective contributions of the two constituent components, prescription and coercion.

There are a variety of reasons why less interventionist approaches should be preferred to more interventionist ones. In terms of *efficiency*, highly coercive instruments usually require substantial administrative resources for monitoring and policing, without which they are likely to be ineffective. Highly prescriptive instruments lack flexibility and do not facilitate least cost solutions. They may also result in the unnecessary deployment of resources to policing those who would be quite willing to comply voluntarily under less interventionist options. Good performers may be inhibited from going beyond compliance with such regulation.

High intervention is unlikely to be as *effective* as alternative approaches essentially because conscripts generally respond less favourably than volunteers. Highly coercive measures may cause resentment and resistance from those who regard them as an unjustifiable and intrusive intervention in their affairs, rather than the constructive resolution of environmental problems. Unsurprisingly, high intervention also tends to score very badly in terms of *political acceptability*. This is particularly the case in sectors with a history and culture of independence from, and a strong resentment of, government regulatory intervention.

In contrast to the problems of high interventionism described above, low interventionist options, to the extent that they are viable, have the considerable advantages of providing greater flexibility to enterprises in their response, greater ownership of solutions which they are directly involved in creating, less resistance, greater legitimacy, greater speed of decision making, sensitivity to market circumstances and lower costs.⁸ From a regulator's perspective, a focus on less interventionist approaches also has the attraction of freeing up scarce regulatory resources which may be redeployed against those who are unwilling or unable to respond to such measures and against whom there is no viable alternative to the deployment of highly intrusive instruments.

Implicit in this principle of "starting with the least interventionist policy measure" is the assumption that the measure *actually works*. That is, the instrument must be capable of delivering the identified environmental outcomes. In some cases, this will mean that "what works" requires a relatively high level of intervention, but even in such cases it should still be possible to apply the principle.

In applying the principle of least intervention, policymakers should bear in mind the capacity to raise the level of intervention, if and when required, with various instruments and/or instrument combinations. That is, it is not necessarily a matter of choosing one instrument in preference to another in a static sense, but rather that of invoking a temporal sequence of instruments, as described in the next principle below. Alternatively, firms may be segregated into different streams of regulatory intervention, for example, one might introduce a "green track" of low intervention regulation for leading edge environmental performers, while retaining a more interventionist track for those firms which are merely complying with minimum standards or are recalcitrant.

Principle 3. Escalate up an instrument pyramid to the extent necessary to achieve policy goals

We asserted in the previous principle that preference should be given to the least interventionist measure(s) that will work. However, it is not always apparent to policy designers whether a particular measure they contemplate using will work or not, principally for two reasons. First, a given instrument may be effective in influencing the behaviour of some, but not of others (suggesting the need for regulation to be responsive to the different behaviour of different regulatees). Second, a particular instrument which, prior to its introduction, seemed likely to be viable in its entirety, may in the light of practical experience, prove not to be so (suggesting the need for instrument sequencing to increase dependability).

A window into solving the first problem is provided by John Braithwaite, whose "enforcement pyramid" conceives of responsive regulation essentially in terms of dialogic regulatory culture in which regulators signal to industry their commitment to escalate their enforcement response whenever lower levels of intervention fail.⁹ Under this model, regulators begin by assuming virtue (to which they respond with cooperative measures) but when their expectations are disappointed, they respond with progressively punitive/coercive strategies until the regulatee conforms.

Central to Braithwaite's model is the capacity for gradual escalation from low to high intervention, culminating in a regulatory peak which, if activated, will be sufficiently powerful to deter even the most egregious offender. It is possible to reconceptualise and extend this enforcement pyramid in two important ways. First, beyond the state and business, it is possible for third parties to act as quasi-regulators. Similarly, second parties in the form of business may themselves perform a (self) regulatory role. In our expanded model, escalation would be possible up any face of the pyramid, including the second face (through self-regulation), or the third face (through a variety of actions by commercial or non-commercial third parties or both), in addition to government action.

To give a concrete example of escalation up the third face, the developing Forest Stewardship Council (FSC) is a global environmental standards setting system for forest products. The FSC will both establish standards that can be used to certify forestry products as sustainably managed and will "certify the certifiers". Once operational, it will rely for its "clout" on changing consumer demand and upon creating strong "buyers groups" and other mechanisms for institutionalising green consumer demand. That is, its success will depend very largely on influencing consumer demand. While government involvement, for example through formal endorsement or through government procurement policies which supported the FSC, would be valuable, the scheme is essentially a free standing one: from base to peak (consumer sanctions and boycotts) the scheme is entirely third party based. In this way, a "new institutional system for global environmental standard setting" will come about, entirely independent of government.¹⁰

Second, Braithwaite's pyramid utilises a single instrument category, specifically, state regulation, rather than a range of instruments *and parties*. In contrast, our pyramid conceives of the possibility of regulation using a number of different instruments implemented by across a number of parties. It also conceives of escalation to higher levels of coerciveness not only within an single instrument category but also across several different instruments and across different faces of the pyramid.

A graphic illustration of exactly how this can indeed occur, is provided by Joe Rees' analysis of the highly sophisticated self-regulatory program of the Institute of Nuclear Power Operators (INPO), which, post Three Mile Island, is probably amongst the most impressive and effective such schemes worldwide.¹¹ However, even INPO is incapable of working effectively in isolation. There are, inevitably, industry laggards, who do not respond to education, persuasion, peer group pressure, gradual nagging from INPO, shaming, or other instruments at its disposal. INPO's ultimate response, after five years of frustration, was to turn to the government regulator, the Nuclear Regulatory Commission (NRC). That is, the effective functioning of the lower levels of the pyramid may depend

upon invoking the peak, which in this case, only government could do. As Rees puts it: "INPO's climb to power has been accomplished on the shoulders of the NRC".

This case also shows the importance of integration between the different levels of the pyramid. The NRC did not just happen to stumble across, or threaten action against recalcitrants, rather there was considerable communication between INPO and the NRC which facilitated what was, in effect, a tiered response of education and information, escalating through peer group pressure and a series of increasingly threatening letters, ultimately to the threat of criminal penalties and incapacitation, the latter being penalties government alone could impose, but the former being approaches which in these circumstances at least, INPO itself was in the best position to pursue. Thus, even in the case of one of the most successful schemes of self regulation ever documented, it was the presence of the regulatory gorilla in the closet, that secured its ultimate success.

We do not wish to give the impression, however, that a coordinated escalation up one or more sides of our instrument pyramid is practicable in all cases. On the contrary, controlled escalation is only possible where the instruments in question lend themselves to a graduated, responsive and interactive enforcement strategy. The two instruments which are most amenable to such a strategy (because they are readily manipulated) are command and control and self-regulation. Thus it is no coincidence that our first example of how to shift from one face of the pyramid to another as one escalates and of how to invoke the dynamic peak, was taken from precisely this instrument combination. However, there are other instruments which are at least partially amenable to such a response, the most obvious being insurance and banking.

A combination of government mandated information (a modestly interventionist strategy) in conjunction with third party pressure (at the higher levels of the pyramid) might also be a viable option. For example, government might require business to disclose various information about its levels of emissions under a Toxic Release Inventory,¹² leaving it to financial markets and insurers (commercial third parties) and environmental groups (non-commercial third parties) to use that information in a variety of ways to bring pressure on poor environmental performers.¹³

In contrast, in the case of certain other instruments, the capacity for responsive regulation is lacking, either because an individual instrument is not designed to facilitate responsive regulation (ie its implementation is static rather than dynamic and cannot be tailored to escalate or de-escalate depending on the behaviour of specific firms) or because there is no potential for coordinated interaction between instruments. For example economic instruments have both these characteristics. In essence, either an economic instrument is in place and must be responded to, or it is not. An environmental tax (or the level of tax) for example, cannot be imposed depending upon whether or not an enterprise has responded positively to less intrusive instruments, but rather, is intended as a uniform price signal which will apply to all members of the target group equally, irrespective of their past behaviour. By the same token, there are significant limits to the extent to which broad based economic instruments, such as pollution taxes and tradeable emission permits, can be designed to interact in a coordinated and complementary fashion with other instruments, except by means of temporal sequencing as described below.

Another limitation for those aspiring to a coordinated and gradual escalation of instruments and coerciveness, is the possibility that in some circumstances, escalation may only be possible to the middle levels of the pyramid, with no alternative instrument or party having the capacity to deliver higher levels of coerciveness. Or a particular instrument or instrument combination may facilitate action at the bottom of the pyramid and at the top, but not in the middle levels, with the result that there is no capacity for gradual escalation. For example, lender liability gives banks and other financial institutions a considerable incentive to scrutinise the environmental credentials of their clients very closely before lending them money, and at this stage they may counsel a client towards improved environmental performance. However, subsequent to providing the loan, the only available sanction may be to foreclose, without credible intermediate options. In any of these circumstances,

our proposed dynamic instrument pyramid still has some value but it will operate in a less than complete fashion.

In the substantial range of circumstances when coordinated escalation is not readily achievable, a critical role of government will be, so far as possible, to fill the gaps between the different levels of the pyramid, seeking to compensate for either the absence of suitable second or third party instruments, or for their static or limited nature, either through direct intervention or, preferably, by facilitating action or acting as a catalyst for effective second or third party action, as described in design principle five. In effect, a major role for government is thus to facilitate second and third parties climbing the pyramid.

Finally, there are two general circumstances where it is inappropriate to adopt an escalating response up the instrument or enforcement pyramid, irrespective of whether it is possible to achieve such a response. First, in situations which involve a serious risk of irreversible loss or catastrophic damage, then a graduated response is inappropriate because the risks are too high: the endangered species may have become extinct, or the nuclear plant may have exploded, before the regulator has determined how high up the pyramid it is necessary to escalate in order to change the behaviour of the target group. In these circumstances a horizontal rather than a vertical approach may be preferable: imposing a range of instruments, including the underpinning of a regulatory safety net, simultaneously rather than sequentially.¹⁴ Second, a graduated response is only appropriate where the parties have continuing interactions - it is these which makes it credible to begin with a low interventionist response and to escalate (in a tit for tat response) if this proves insufficient. In contrast, where there is only one chance to influence the behaviour in question (for example because small employers can only very rarely be inspected), then a more interventionist first response may be justified, particularly if the risk involved is a high one.

Instrument sequencing to increase dependability

In the event that an instrument (or instrument combination) that seems viable in its entirety turns out not to be so, our proposed solution is to introduce instrument sequencing: enabling escalation from the preferred least interventionist option, if it fails, to increasingly more interventionist alternatives. For example, a particular industry sector may be allowed to conduct a voluntary self-regulation scheme *on the proviso* that if it fails to meet the agreed objectives, mandatory sanctions will be introduced. Such a solution is not only consistent with design principle 3 above, it also avoids a slide into smorgasbordism: rather than using all instruments and participants simultaneously, it is only when the least interventionist (viable) instrument(s) have demonstrably failed that one escalates up the pyramid and invokes a broader range of instruments and parties, and even then, only to the extent necessary to achieve the desired goal.

The precise nature of sequencing arrangements will be determined by the level of discretion that is associated with their implementation. That is, some sequencing arrangements will entail the automatic application of more interventionist measures if and when earlier measures fail, thus reducing the level of discretion, while others will require some further action by first, second, or third parties prior to their implementation, thus increasing the level of discretion. Minimising the amount of discretion, once certain defined parameters have been breached, sends a powerful message to industry to deliver on less interventionist forms of regulation. Of course this does not preclude lobbying by business, but this is less likely to succeed if government has already publicly committed itself to a specified course of action. The following scenarios illustrate how the level of, for example, government discretion can be varied to address different environmental problems.

(i) The United States Climate Action plan aims to reduce the level of greenhouse gas emissions. The plan is based on a series of low intervention voluntary agreements with industry. Implicit in the plan is a commitment to legislated targets if industry does not deliver on its promises. This redundancy

provision contains a high level of discretion because the threat is: (a) implicit not explicit; (b) undefined; and (c) linked to a particular administration.

(ii) The New Zealand government has made similar voluntary arrangements with industry to reduce greenhouse gas emissions. It has, however, implemented a sequencing provision with far less discretion. If industry fails to achieve pre-specified reduction targets, a carbon tax will be introduced. This provision contains far less discretion because (a) it is explicit; and (b) it is defined. It is, however, still linked to a particular administration.

(iii) The Australian response to phasing out the use of ozone depleting hydrochlorofluorocarbons (HCFCs) is similarly based on an industry wide voluntary self-regulation scheme. The sequencing provision in this case is in the form of a legislated tradeable quota scheme. If industry fails to meet pre-specified HCFC reduction targets, the tradeable quota scheme automatically comes into effect. This provision contains even less discretion than either of the previous two examples because (a) it is explicit; (b) it is defined; and (c) it is included in legislation, thus reducing opportunities for further political discretion. It would still be possible for a subsequent government to amend the relevant legislation. However, this is likely to require the expenditure of considerable political capital.

Triggers and buffer zones

Our proposed methods of sequencing are dependent on *triggers* to warn the authorities when less interventionist measures have failed. For example, under a scheme of self-regulation, the industry itself may invite government intervention. Alternatively, government and industry may agree to defined performance benchmarks. A failure to comply with these benchmarks would automatically trigger tougher regulations. Or it may be that public interest groups are able to identify serious breaches which would warrant intervention from governments or other third parties, possibly insurers.

In order to increase the dependability of sequencing provisions, several possible triggers would be preferable, though precisely which ones are most appropriate will depend upon the particular context. In broad terms, appropriate triggers might include: random government inspections; independent auditors; mechanisms for industry association reporting; in-house whistle blowers; community oversight; and compulsory firm reporting.

In relying on triggers to invoke sequencing, it is important that the triggers pre-empt unacceptable levels of environmental harm. That is, there needs to be a *buffer zone* between the point at which a trigger is set off and the level of environmental harm that is being monitored. For example, with Australia's self-regulatory scheme to phase out the use of HCFCs, the level at which mandatory quotas kick-in is well below that which is required to meet our international commitments under the Montreal Protocol - creating an effective buffer zone. The greater the degree of effectiveness that is required for a particular environmental issue, the greater the size of the buffer zones. This is similar to the concept of "precautionary regulation", where tougher regulation acts as a safety net if and when other policies fail. The regulation is enacted, but the expectation is that it won't be used.

Circuit breakers

Another strategy, related to that of sequencing, is the use of *circuit breakers*. A circuit breaker is an instrument which is introduced as a short term measure (and ultimately withdrawn), the purpose of which is to pre-empt the anticipated failure of another instrument. Circuit breakers tend to be low intervention instruments introduced in anticipation that certain high intervention instruments, introduced in isolation, have a high chance of failure. For example, a ban on land clearing in South Australia was regarded as essential to halt widespread environmental degradation, but was also politically unacceptable and largely unenforceable in the absence of some complementary positive inducement. Compensation was introduced for those who were refused a permit to clear, in order to overcome both these problems and to facilitate the cultural change that was needed in the long term

(ie from a belief that all landowners had an unencumbered right to clear, to a sustainable land use). Once this had been achieved (or at least that opposition to clearing bans had been largely overcome), the right to compensation was withdrawn.¹⁵

Circuit breakers are similar to sequencing in that there is an ordering of policy responses, beginning with less interventionist and then moving up to more intrusive regulations. The difference is that with sequencing, escalation up the enforcement pyramid occurs only when lower policies fail, whereas with circuit breakers, there is an expectation that they are only a short term measure, eventually to be replaced by other more conventional policy responses. It is important to recognise that the use of circuit breakers is a direct violation of the polluter pays and/or user pays principles (it may, nevertheless, be consistent with the precautionary principle). In some circumstances, however, this pragmatic approach may be necessary to achieve real progress in areas where regulatory resistance is high and external monitoring is difficult.

Principle 4. Empower participants which are in the best position to act as surrogate regulators

We argued earlier that there are a range of second and third parties, both commercial and non-commercial, which may play valuable roles in the regulatory process, acting as quasi-regulators. These range from industry associations (administering self-regulatory programs) through financial institutions to environmental and other pressure groups. All too often, however, policymakers have avoided or ignored the potential contributions of such parties, treating government as the sole regulatory provider. Yet by expanding the regulatory "tool box" to encompass additional players, many of the most serious shortcomings of traditional regulatory approaches may be overcome.

There are several reasons why the recruitment of third parties into the regulatory process may provide for improved outcomes. First, in some instances third party quasi-regulation may be far more potent than government intervention. For example, the threat of a bank to foreclose a loan to a firm with low levels of liquidity is likely to have a far greater impact than any existing government instrument. Second, it may be perceived as more legitimate. For example, farmers are far more accepting of commercial imperatives to reduce chemical use than they are of any government mandated requirements. Similarly, participation by non-commercial third parties, in particular, may well be crucial in terms of political acceptability. Third, government resources are necessarily limited, particularly in an era of fiscal constraint. Accordingly, it makes sense for government to reserve its resources for situations where there is no viable alternative but direct regulation. The potential for Responsible Care to supplement government regulation of the chemical industry is a case in point.¹⁶ Finally, even if resources were more readily available, governments are not omnipotent. There are many areas of commercial activity which impact on the environmental performance of industry where direct government influence is impractical. For example, where there are a myriad of small players, such that it is impossible even for government to identify, let alone regulate all of them.

Applying the principle of empowerment

The participation of second and third parties, particularly commercial third parties, in the regulatory process is unlikely to arise spontaneously, except in a very limited range of circumstances where public and private interests substantially coincide.¹⁷ Such parties may have little existing interest in environmental performance, lack the necessary information even if they did, or indeed may have a commercial interest in maintaining or accelerating environmental degradation. For example, banks are unlikely to promote the conservation of remnant vegetation on farms where they perceive the clearing of land to provide increased earnings, nor are they likely to oppose the running of extra stock where this increases the ability to repay loans. There remains, therefore, a significant role for government in facilitating, catalysing and commandeering the participation of second and third parties to the cause of environmental improvement.

One powerful illustration of this principle can be drawn from Mitchell's work on pollution by oil tankers at sea.¹⁸ Mitchell demonstrates how the imposition by the state of penalties for intentional oil spills (pursuant to an international treaty) was almost wholly ineffective, due in no small part to difficulties of monitoring, and, in some cases, to a lack of either enforcement resources or political will. Nor, in the absence of government intervention, did third parties have incentives to contribute significantly to the reduction of oil spills. However, all this changed when a new regime was introduced, requiring tankers to be equipped with segregated ballast tanks. Despite the increased cost of the new equipment, this regime has been extremely successful, a fact owed substantially to the role played by a range of powerful third parties. First, the new regime facilitated coerced compliance by three powerful third parties, namely non-state classification societies, ship insurers, and ship builders. As Mitchell demonstrates, none of these parties had any interest in avoiding the new regime yet shipowners were critically dependent upon each of them.¹⁹ Together, and in conjunction with state action, they achieved far more than state action alone was ever likely to.

There are a variety of mechanisms through which government may seek to engage second and third parties more fully in the regulatory process. Most of these will require government to seek out lateral means of extending its reach through innovative market orderings. An obvious starting point is the provision of adequate information. Without reliable data on the performance of industrial firms, those third parties which may be in a position to exert influence, for example in the commercial sphere (eg investors and banks), will be unable to make objective judgments about preferred company profiles. For example, it was only when government mandated collation and disclosure of toxic releases that financial markets were able to factor this information into share prices, thereby rewarding good environmental performers and disadvantaging the worst performers.²⁰

Some strategies for empowering third parties will be specific to particular target groups. For example, Government may facilitate the activities of non-commercial third parties such as NGOs through the provision of funding support, the enactment of community right to know legislation and the provision of legal standing. In seeking to target banks, government might increase lender liability for a range of environmentally destructive behaviours. Insurers as regulators may be invoked by making insurance a condition of license, or a condition of authorisation to engage in activities which have a high environmental risk.

Governments could also harness the very considerable power of supply chain pressure. For example, governments may make it a condition of regulatory flexibility that firms over a certain size not only adopt environmental management systems (a form of process based regulation) but also ensure that their major suppliers also conform to a simplified version of the system. Alternatively, such a condition could be included in an industry wide self-regulation program, as is already the case under the Product Stewardship code of practice of the chemical industry's Responsible Care initiative.²¹ Thus the use of supply chain pressure by large firms to improve the environmental performance of smaller firms may be enhanced by a complementary combination with process based regulation or self-regulation.

Consistent with our design principles, the preferred role for government is to create the necessary preconditions for second or third parties to assume a greater share of the regulatory burden rather than engaging in direct intervention. This will also reduce the drain on scarce regulatory resources and provide greater ownership of environmental issues by industry and the wider community. In this way, government acts principally as a catalyst or facilitator. In particular, it can play a crucial role in enabling a coordinated and gradual escalation up an instrument pyramid (described in principle 3), filling any gaps that may exist in that pyramid and facilitating links between its different layers.

This role can be illustrated by example. Insurance has the potential to be a useful instrument in the middle layers of the pyramid. Insurers have the capacity to conduct site visits, engage independent auditors, vary the size of premiums, and if necessary, withdraw their services altogether. Insurers are, however, dependent on the availability of reliable information on which to make their initial and

subsequent assessments of firm performance, but commonly have great difficulty obtaining relevant information over and beyond that required to be disclosed by their clients.²² As a consequence, there is a necessary role for government (at the bottom layers of the pyramid) to ensure that this information is accessible, for example, through the provision of compulsory pollutant inventory reporting by industry. It may also be that insurers lack the necessary muscle at the top of the pyramid to deal with unrepentant recalcitrants. In such circumstances, insurers may advise government regulators of a firm's transgression and invite the full force of the law to be applied (whether they choose instead simply to cancel the insurance policy may depend substantially on the competitiveness of the market). Thus we have a combination of third party and government regulation coordinated between the different layers of the pyramid to provide the opportunity for coordinated enforcement escalation.

Principle 5. Maximise opportunities for win/win outcomes

A major criticism of conventional regulation are the lack of incentives for firms to continuously improve their environmental performance (for example an emission standard of 100 ppm gives no rewards for companies to substantially exceed this level) and the failure to encourage firms to adopt pollution prevention measures over end-of-pipe solutions (the same standard can be met by putting scrubbers on the chimney rather than developing cleaner technology).

The opportunities for both continuous improvement and pollution prevention will be considerably enhanced to the extent that firms can achieve higher levels of environmental performance at the same time as increasing productivity and/or profits: the classic win/win scenario. A key challenge for policymakers, therefore, is to ensure that regulatory solutions optimise the opportunity for win/win outcomes and facilitate and reward enterprises for going "beyond compliance", while also maintaining a statutory baseline and a ratcheting up of standards.

Will firms voluntarily go beyond compliance?

It is increasingly argued that it is in business's own self-interest to move *beyond compliance* with existing legislative requirements and adopt a "proactive" stance on the environment, voluntarily exceeding mandated minimum performance standards. According to its proponents, firms going down this path may (in addition to improving profitability) enhance their corporate image, position themselves to realise new environment-related market opportunities, generally improve efficiency and quality, foster a greater consumer acceptance of their company and products, and reduce potential legal liability. Moving beyond compliance also gives firms the incentive to develop new environmental technologies to which can be sold into the rapidly growing and lucrative global market for environmental goods and services.²³

And yet, despite the apparent benefits which may flow from improved environmental performance, the large majority of enterprises in the large majority of jurisdictions have taken very few steps to take advantage of them or to position themselves as environmental leaders. Assuming that considerable win/win opportunities do indeed exist (that is, even if proponents of this position may overstate the benefits, their basic position is sound), why have the majority of enterprises adopted a position which is, on the face of it, irrational? The most plausible answers are an emphasis on short-term profits, and bounded rationality.

The former is probably the single largest impediment to improved environmental performance.²⁴ Crucially, most environmental investments will only pay-off in the medium to long term, while the up-front investment is primarily short term. Because corporations are judged by markets, investors and others principally focussing on short-term performance, if they cannot demonstrate tangible economic success in the here and now, there may be no long term to look forward to.

Bounded rationality may also explain business' failure to adopt proactive environmental policies even when it is in their economic interests to do so. Bounded rationality assumes not that people are

irrational (although they sometimes are) but rather that they have neither the knowledge nor the powers of calculation to allow them "to achieve the high level of optimal adaptation of means to ends that is posited by economics".²⁵ For example, it is widely accepted that there are substantial energy efficiency improvements which industry could profitably adopt. And yet, most firms fail to take advantage of them. Only where energy is a large component of business input costs, have substantial investments in energy efficiency been made. In the least energy efficient industries where energy costs are only a minor component of overall business costs, energy efficiencies have been almost entirely ignored. This is bounded rationality at work: management focuses on core business functions and ignores lesser costs, even though these costs could be reduced through environmentally beneficial behaviour.

The role of government

Based on this analysis, the market, unaided, cannot be relied upon to deliver win/win outcomes. That is, a number of opportunities which would yield such outcomes are not, under present conditions, being taken up. Arguably, there is a role for government intervention to increase the uptake within firms of existing economically rational environmental improvements: in effect, seeking to compensate for both the inadequacy of markets (unaided) and of business rationality in order to maximise both the public (environmental) and private (economic) benefits.

But what form should this intervention take? Of course, government could simply mandate improved levels of business environmental performance. However, because there is a coincidence between self-interest and environmental improvement, other less interventionist measures should have a high chance of success, rendering prescriptive forms of intervention unnecessary or even counterproductive (see principle 2 above). Accordingly, the most appropriate role for governmental regulation lies in nudging firms at the margin towards cleaner production, heightening their awareness of environmental issues, and encouraging the re-ordering of corporate priorities in order to reap the benefits of improved environmental performance.

One way of increasing the chances of win/win outcomes is through the provision of information (eg cleaner production demonstration projects, technical support, databases and clearinghouses). A related strategy would be to encourage full cost accounting, on the assumption (for which there is much support) that unless business knows the costs and benefits, in environmental terms, of its current practices, its unlikely to change them. Such strategies may be particularly important in addressing the problem of bounded rationality. Not only can government provide information to industry, but other non-government sources of information can also be harnessed and, in some cases, may be more effective.

Sometimes, because of institutional inertia, even when firms are made aware of potential cost savings they still will not exploit win/win opportunities. In such cases information alone is not enough, but is a necessary prerequisite. Here, information strategies can be supplemented by other voluntary promotional schemes which attempt to elicit and formalise a commitment from management to cost-effective environmental improvement. Examples include government sponsored schemes such as Golden Carrots and Green Lights in the United States and the PRISMA project in the Netherlands.

Governments might also consider some form of financial inducements to "nudge" firms in the right direction, so overcoming narrow short-termism and bounded rationality. For smaller firms which may not have the internal resources and expertise to identify and implement win/win outcomes, government may subsidise the cost of external consultants preparing an environmental audit and management plan which seeks to exploit profitable environmental improvements. Again, once firms become aware of how to achieve win/win outcomes, and can easily access the consulting expertise and internal systems necessary to achieve them, they are far more likely to take action. Smaller firms may also require some assistance to cover up front costs and to more easily access capital.

However, it makes sense to target any financial inducements at those firms which are genuinely achieving beyond compliance rather than those firms that merely intend to comply with minimum standards. One way of achieving this is via a two-track, parallel regulatory system that provides incentives to those firms committed to higher levels of environmental performance which go substantially beyond compliance - increased flexibility, autonomy and public relations benefits less demanding administrative requirements, reduced license fees, preferential purchasing etc. The intention is to attract as many firms as possible to the "green track", but to maintain the conventional track as a fall back mechanism. Under this scenario it is not necessary for government to know the level of win/win opportunities available to each firm. Ultimately, it is up to each firm to determine whether financial benefits of minimal compliance are outweighed by the benefits of being a "green track" firm with higher levels of environmental performance. Firms should be able to move between tracks, but if they are placed on green track first, then deliberately fail to meet expectations, they should be regulated more harshly than if they had started off on the conventional track.

Moving the goals posts: turning win/lose into win/win

It is inevitable that even the most progressive companies will eventually reach a point at which win/win is no longer a viable option, and where any further spending on environmental protection will directly threaten corporate profits. Specifically, there are many circumstances under which the economic benefits of investing in environmental protection are tenuous or non-existent, and where the costs to business of implementing environmental protection measures will not be offset by any resulting savings from improved economic performance.²⁶

At this point, two strategies are available to government. The first is to recognise the tension between environment protection and corporate profit, and to design policy instruments and enforcement responses accordingly. Here we simply restate the importance of a pyramidal enforcement response such as we advocated at principle three above. Regulators start at the bottom of the pyramid assuming that business is willing to comply voluntarily. However, they also make provision for circumstances where this assumption will be disappointed, by being prepared to escalate up the enforcement pyramid to increasingly deterrence-orientated strategies. Critically, at the peak of the pyramid will be a deterrence-orientated approach that makes it no longer economically rational for firms to avoid their environmental responsibilities.

A second strategy is for government to push back the point at which win/win becomes win/lose.²⁷ Michael Porter suggests that countries that have the most rigorous environmental requirements often lead in exports of affected products.²⁸ While such markets may evolve in the absence of government intervention, their scope and success can be influenced by such action. For example, Germany has had perhaps the world's tightest regulations in stationary air pollution control, and German companies appear to hold a wide lead in patenting - and exporting - air pollution and other environmental technologies. Conversely, those who weaken their regulations will fall behind in environmental exports. Thus as the United Kingdom's environmental standards have lagged, so to has its "ratio of exports to imports in environmental technology fallen from 8:1 to 1:1 over the past decade".²⁹

However, Porter is at pains to emphasise that not all standards will lead to desirable trade outcomes, and that we need regulations that aim at outcomes rather than methods (that is, performance based rather than technology based standards), that are flexible and cost effective and which encourage companies to advance beyond their existing control technology. It must also be acknowledged that Porter's views have been strongly challenged from a variety of sources³⁰ and that empirical support for his position is somewhat tenuous.³¹

We agree with Porter that there is much that governments can and should do to encourage firms to develop environmental technologies and to harness environmental services markets. However, we disagree that more stringent regulation is necessarily the only or indeed the best means of achieving this outcome. Rather, there are a variety of other, less intrusive policy options than regulation,

utilising not just government, but also second and third parties, which could also serve to drive environmental technological innovation and serve to create or expand global opportunities and markets for environmental services. As we argued earlier, such less-interventionist solutions have considerable attractions in terms of costs, effectiveness and legitimacy. Accordingly, in our view, the Porter solution (since it comes at the peak of an instrument pyramid) should be regarded as a last rather than a first resort.

Take for example, the issue of pollution from the chemical industry. While it would certainly be viable, following Porter, to mandate tough standards, it would also be possible to adopt a self-regulatory scheme, as is the case with Responsible Care (with a proviso that if the scheme was not demonstrably achieving certain performance outcomes within a given period, government would intervene more directly). Such a scheme might be coupled with external audit, and government might itself require disclosure of results, enabling commercial third parties and to a lesser extent consumers and public interest groups to bring pressure on those who were achieving poorest results. Besides being less interventionist than the Porter solution, co-regulation has additional advantages of providing greater flexibility, giving industry ownership of the solution, and of avoiding much of the culture of resistance that may accompany government regulation.

Instrument combinations

In this article we have highlighted the importance of utilising combinations of instruments and parties to compensate for the weakness of stand-alone environmental policies. It cannot be assumed, however, that all instrument combinations will automatically be complementary. Some instrument mixes may indeed be counterproductive, while the outcome of others may be largely determined by the specific contexts in which they are applied. Unfortunately, the practical task of identifying which particular combinations are complementary, which counterproductive, and which context specific, is an especially daunting one. Not only is there an extremely large number of potential instrument combinations, but the answers to the question "which ones are complementary or otherwise, and why?" are themselves both complex and qualified. To engage in the encyclopaedic task of exploring the full implications of all instrument combinations would not only be impractical but would not, we suspect, make for riveting reading. Instead, we have chosen to provide a brief overview of potential instrument interactions with some selective examples in order to sensitise policymakers to the importance of selecting judicious policy mixes.*

Inherently complementary combinations

Certain combinations of instruments are inherently complementary. That is, their effectiveness and efficiency will be significantly enhanced by using them in combination, irrespective of the circumstances of the relevant environmental issue being addressed. As such, policy makers can be confident in choosing these combinations over others. An illustrative example can be drawn from the combination of voluntarism (in which individual firms without industry-wide coordination voluntarily seek to improve environmental performance) and command and control regulation.

Voluntarism will complement most forms of command and control regulation, particularly where levels of environmental performance "beyond compliance" are desired. In the case of performance based command and control regulation, a minimum performance benchmark is established, with voluntary based measures encouraging firms to achieve additional improvements. The United States EPA's 33/50 program is a good example of this approach.³² Under the 33/50 program firms are encouraged to reduce the levels of their toxic chemicals releases, often at substantial cost, on a purely

* A much more detailed exposition of instrument combinations is provided in "Regulatory Pluralism: Designing Policy Mixes for Environmental Protection" (N Gunningham & D Sinclair *Law & Policy*, forthcoming 1998).

voluntary basis. Existing command and control regulations that apply to toxic chemical releases remain in force, with the 33/50 program delivering additional benefits.

The combination of the two instruments means that participating firms go beyond the command and control baseline, but that non-participating firms must still comply with this baseline. If voluntarism were introduced alone, then there would be no guarantee that non-participating firms would not increase their levels of toxic chemical releases, thus free-riding on those committed to higher standards. The combination of voluntarism and performance based command and control (which defines environmental outcomes, but does not prescribe particular solutions) in this instance has produced environmental improvements additional to that which could have been achieved if either were employed in isolation. It is important to note that, in contrast to beyond compliance activities, if voluntarism and performance based standards were targeting the *same* level of behaviour then at best they would be a duplicative combination, and at worst, counterproductive.

Voluntarism may also work well with process based command and control regulation (where firms are required to adopt internal decision making processes designed to enhance environmental performance, but not guarantee it), for example, where the adoption of environmental management systems such as ISO 14001 have been mandated.³³ Because process based prescriptions tend to be qualitative in nature, and therefore more difficult to measure quantitatively than performance or technology based standards, their full potential is difficult to enforce externally unless the regulated firm is committed to the concept. Voluntary based measures which seek to change the attitude of managers and the corporate culture may serve to reinforce a commitment to process based standards.

In contrast, technology based command and control regulation (which prescribes particular technological solutions) is unlikely to produce complementary outcomes when used in combination with voluntary measures. This is because technology based standards are highly prescriptive - firms can either comply or not, resulting in little room for beyond compliance achievements. In effect, technology based standards restrict the way in which firms respond to an environmental imperative, in terms of the method of environmental improvement, whereas voluntary measures are in principle designed to provide additional regulatory flexibility.

Inherently counterproductive instrument combinations

Certain combinations of instruments are either inherently counterproductive or, at the very least, sub-optimal. That is, their efficiency and effectiveness is significantly diminished when they are employed in combination. The example of command and control regulation and economic instruments is illustrative. Most command and control instruments, specifically performance based standards (performance standards define a firm's duty in terms of the problems it must solve or the goals it must achieve) and technology based standards, seek to impose predetermined environmental outcomes on industry. That is, even if the standards are not uniform (in that different requirements apply to different sectors or indeed different firms) individuals firms are not free to make independent judgments as to their preferred method of environmental improvement (in the case of technology based standards) or their overall level of environmental performance (in the case of performance standards). Economic instruments, in contrast, seek to maximise the flexibility of firms in making such decisions - government influences the overall level of environmental performance by providing a price signal relative to the level of pollution or resource consumption, or by creating a purchasable right to pollute or consume resources.³⁴

If a command and control instrument were to be super-imposed on an economic instrument that targets the same behaviour, or vice versa, then to the extent that the command and control instrument limits the choice of firms in making individual decisions, the economic instrument would be compromised. That is, there will be a sub-optimal regulatory outcome. This is because economic instruments are designed to exploit differences in the marginal cost of abatement between firms. It makes economic sense for those firms which can reduce their levels of pollution most cheaply to carry

a greater share of the abatement burden, and for those were it is most expensive, to carry a lesser share of the same burden. The result is that the net cost of reducing the overall level of pollution (or resource consumption) will be lessened, or, for a given level of expenditure, a greater level of pollution reduction will be achieved. By simultaneously applying a prescriptive command and control instrument, for example a performance standard which mandates levels of energy efficiency for firms in tandem with a broad based carbon tax, free market choices would be artificially restricted thus undermining the basic rationale of the economic instrument.

There is, however, an extenuating circumstance which may justify the sub-optimal outcome in regulatory efficiency resulting from the combination of broad based economic instruments with prescriptive command and control. Where pollutants have highly localised impacts, through for example differences in assimilative capacities or proximity to local communities, effectiveness and equity issues may override the efficiency considerations. Localised impacts can be contrasted with global pollutants such as ozone depleting substances, greenhouse gas emissions, and to a lesser extent, sulphur dioxide emissions. In the case of highly localised pollutants, such as the run-off of agricultural chemicals into local river systems, it may be necessary to impose minimum levels of performance on firms/individuals in highly sensitive regions, or indeed a variety of different levels tailored to local conditions, even if there was a more general economic instrument in place. Although this would reduce the overall efficiency of the economic instrument, through the restriction of free market choice, this loss of efficiency may be justified on the grounds of effectiveness or equity.

One way of avoiding potentially dysfunctional results that can arise when applying incompatible instruments simultaneously (and of expanding the operational possibilities of compatible combinations) is to sequence their introduction. That is, certain instruments would be held in reserve, only to be applied if and when other instruments demonstrably fail to meet pre-determined performance benchmarks. One type of sequencing is when an entirely new instrument category is introduced where previous categories have failed. Another version is when only the enforcement component of a pre-existing instrument is invoked to supplement the shortcomings of another. Logically, and consistent with design principle 2, such sequencing would follow a progression of increasing levels of intervention. The benefit of this approach is that considerable utility can be derived from otherwise counterproductive instrument combinations, and in the process, the overall dependability of the policy mix can be improved.

Combinations where the outcome will be context-specific

In addition to inherently compatible and inherently incompatible combinations, there will be other instrument combinations where it is not possible to state in the abstract whether the outcome will be positive or negative. Rather, much will depend on the particular context in which the two instruments are combined. For example, this is the case with combinations of voluntarism and self-regulation. These two instrument categories overlap to a substantial extent, and indeed, the borderline between them is significantly blurred - the main distinction for our purposes being that self-regulation entails social control by an industry association, whereas voluntarism is based on the individual firm undertaking to do the right thing unilaterally, without any basis in coercion. There is no inherent reason why these two instrument categories should be used in combination with each other, but equally no compelling reason why they should not.

In light of this, it is important for policymakers to distinguish between different instruments combinations that are inherently antagonistic, and those instruments combinations which are dysfunctional essentially as a result of the contextual features surrounding their application. In many cases, the *latter* will arise because of the existence of competing policy goals (rather than any inherent incompatibility of the instrument combinations themselves). For example, in the case of biodiversity conservation in Australia, the introduction of policies to preserve biodiversity have historically been undermined by incentives for clearing native vegetation on private land. Also in Australia, the introduction of a voluntary agreements with industry to reduce greenhouse gas emissions are

compromised by the existence of generous tax subsidies for the use of diesel fuel. Where such conflicts exist, a priority for policymakers will be the removal of such perverse incentives.

Multi-instrument combinations

So far we have confined our discussion to bipartite mixes. There is of course, no reason why mixes should not be multipartite, and they commonly are. The benefit of our examination of bipartite mixes has been to identify complementary and counterproductive mixes, with the result that we know, in the case of multipartite mixes, what combinations to avoid, and which complementary combinations we might build upon. The possible permutations of multipartite mixes are very large indeed, and it is not practicable to examine such combinations here.

Conclusion

Our general conclusion is that not only is it desirable to use a broader range of policy instruments, but also to match those instruments: with particular environmental problems; with the party or parties best capable of implementing them; and with other compatible instruments. That is, it is in using complementary *combinations* of instruments and actors that policymakers can build on the strengths of individual mechanisms, while compensating for their weaknesses. And it is with government actively facilitating second and third party involvement that their potential as quasi-regulators is most likely to be realised. Thus the crucial policy questions became: how, in what circumstances and in what combinations, can the main classes of policy instruments and actors be used to achieve optimal policy mixes?

We have argued that successful regulatory design depends crucially upon adhering to a number of *regulatory design principles* which have hitherto not featured prominently on the policy agenda. In particular, we counselled policymakers not only to prefer combinations of instruments to "stand alone" instrument strategies, but stressed the importance of preferring the least interventionist measures *that will work*. We also introduced the heuristic device of a three dimensional pyramid, as a means of escalating regulatory responses, and consistent with the pursuit of pluralistic regulatory policy, argued the importance of harnessing resources *outside* the public sector. We further addressed the extent to which it is possible to design environmental policy in such a way as to encourage and facilitate industry in going "beyond compliance" with existing regulatory requirements.

Finally, we argued that, as not all regulatory instrument combinations are equal, it is incumbent upon policymakers, in seeking to introduce a broader range of regulatory solutions, to carefully select the most productive instrument combinations. We recognise that not all will necessarily agree with the precise conclusions we have arrived at, either in terms of design principles, nor preferred instrument mixes. Nevertheless, our intention is, in the first instance, to move the debate forward, and in the longer term, assist policymakers to introduce various forms of "smart regulation".

¹ OECD, *Environmental Data 1995: Compendium*, November 1995, OECD, Paris; World Resources Institute, *World Resources 1994-95: A guide to the Global Environment* (1994), Oxford University Press, New York; and OECD, *The State of the Environment* (1991), OECD, Paris.

² J B Opschoor and R K Turner (Eds), *Economic Incentives and Environmental Policies: Principles and Practice* (1994), Kluwer Academic Publishers, Dordrecht.

³ T Swanson, "Book Reviews: J B Opschoor & R K Turner (Eds) *Economic Incentives and Environmental Policies: Principles and Practice* (1994)" (1995) 4(1) *Review of European Community and Environmental Law (RECIEL)* 85.

⁴ M K Sparrow *Imposing Duties: Government's Changing Approach to Compliance* (1994) Praeger, Westport.

⁵ D Vogel *National Styles of Regulation: Environmental Policy in Great Britain and the United States* (1986) Cornell University Press, New York.

⁶ R Hahn, "Towards a New Environmental Paradigm (1993) 102 *Yale Law Journal* 1719.

⁷ D Osborne and E Gaebler, *Reinventing Government* (1992), Addison Wesley, Reading.

⁸ J A Sigler and J E Murphy, *Interactive Corporate Compliance: An alternative to regulatory compulsion* (1989), Quorum Books, New York.

⁹ I Ayres and J Braithwaite, *Responsive Regulation* (1992) Oxford University Press, UK.

¹⁰ E Meidinger, "Look Who's Making the Rules": The roles of the Forest Stewardship Council and International Standards Organisation in Environmental Policy Making" (1996), a paper presented to Colloquium on Emerging Environmental Policy: Winners and Losers, Oregon State University, Corvallis, Oregon, September 23.

¹¹ J V Rees, *Hostages of Each Other: The transformation of nuclear safety since Three Mile Island* (1994), University of Chicago Press, Chicago, US.

¹² N Gunningham and A Cornwall, "Legislating the Right to Know" (1994) 11 *Environmental and Planning Law Journal* 274-288.

¹³ J T Hamilton "Pollution as News: Media and stockmarket reactions to the Capital Toxic Release Inventory Data" (1995) *Journal of Environmental Economics and Management* 98-103

¹⁴ N Gunningham and M D Young, "Towards Optimal Environmental Policy: The Case of Biodiversity Conservation" (1997) 24 *Ecology Law Quarterly* 243-298.

¹⁵ N Gunningham and M D Young, "Towards Optimal Environmental Policy: The Case of Biodiversity Conservation" (1997) 24 *Ecology Law Quarterly* 243-298.

¹⁶ N Gunningham, "Environment, Self-Regulation, and the Chemical Industry: Assessing Responsible Care" (1995) 17(1) *Law and Policy* 58-109).

¹⁷ N Gunningham and J Rees, "Industry Self-regulation" (1997) 4 (19) *Law and Policy*.

¹⁸ R Mitchell, *International Oil Pollution at Sea: Environmental Policy and Treaty Compliance* (1994) MIT Press, Massachusetts.

¹⁹ R Mitchell, *International Oil Pollution at Sea: Environmental Policy and Treaty Compliance* (1994) MIT Press, Massachusetts, Ch 8.

²⁰ J T Hamilton, "Pollution as News: Media and stockmarket reactions to the Capital Toxic Release Inventory Data" (1995) *Journal of Environmental Economics and Management* 98-103.

²¹ N Gunningham, "Environment, Self-Regulation, and the Chemical Industry: Assessing Responsible Care" (1995) 17(1) *Law and Policy* 58-109.

²² P Freeman and H Kunreather, "The Roles of Insurance and Well Specified Standards in Dealing With Environmental Risk" (1996) 17 *Risk Management and Decision Economics* 513-530.

²³ N A Gunningham, Beyond Compliance: management of environmental risk in Boer, Fowler & Gunningham (Eds) *Environmental Outlook: law and policy*, ACEL, Federation Press, 1994 and references cited therein.

²⁴ A Rappaport and M Flaherty, "Multinational Corporation and the Environment" (1991), Centre for Environmental Management, Tufts University.

-
- ²⁵ H Simon, *Economics, Bounded Rationality and the Cognitive Revolution* (1992), Edward Elgar, UK, p 3.
- ²⁶ N Walley and B Whitehead, "Its Not Easy Being Green" (May-June 1994) *Harvard Business Review* 46-52.
- ²⁷ M Jacobs, *The Green Economy* (1991), Pluto Press, London, UK, p 157.
- ²⁸ M Porter, "America's Green Strategy" (1991) April, *Scientific American*, p 168.
- ²⁹ M Porter, "America's Green Strategy" (1991) April, *Scientific American*, p 168.
- ³⁰ N Walley and B Whitehouse, "Its Not Easy Being Green" (May-June 1994) *Harvard Business Review* 46.
- ³¹ J C Robinson, "The Impact of Environmental and Occupational Health Regulation on Productivity Growth in US Manufacturing" (1995) 12 (2), *Yale Journal of Regulation* 388.
- ³² S Aora and T N Cason, "An Experiment in Voluntary Regulation: Participation in EPA's 33/50 Program" (1995) 28 (3) *Journal of Environmental Economics and Management* 271.
- ³³ W L Thomas, "Using ISO 14001 to comply with the Management System Requirements of US EPA's RMP Rule and the EU's Seveso II Directive " (1988), *European Environmental Law Review* 335.
- ³⁴ T Schelling, *The Strategy of Conflict*, Harvard University Press, Cambridge.