Big Stick or Bendy Stick? Regulating for Energy Efficiency

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Governments use regulation as a means of setting standards and enforcing environmental action. But regulations do not simply reflect national environmental commitments. In building, as in other contexts, effective control depends upon technical consensus, commercial bargaining and negotiation between many different interests and industries.

Current research (funded by Britain's Economic and Social Research Council—Global Environmental Change Programme) suggests that regulation is not simply the ''big stick'' of government control. Rather, it involves constant negotiation between the regulators and those they seek to control. Illustrated with reference to the 1995 revisions to Part L (Conservation of Fuel and Power) of the United Kingdom's Building Regulations, the paper reflects upon the social, economic and political processes involved in constructing and implementing new standards of energy efficiency.

Building science and building economics have an important part to play in these negotiations but, as the paper suggests, such science is significant not as a neutral arbiter of what should be done, but as a tool used and exploited by players with different, sometimes competing interests. Shifts from prescriptive to performance based standards have further implications for relationships between industry and government. In developing these themes, the paper offers a new perspective on the process of regulation, and on the role of regulation in promoting new standards of energy efficiency.

INTRODUCTION: CONSTRUCTING REGULATIONS

In June 1995 the UK government revised Part L (Conservation of Fuel and Power) of the building regulations. Standards of energy efficiency improved overnight, this one legislative move, at a stroke, overcoming the reluctance and inertia of builders, owners and designers. Although set to increase the cost of domestic building by between 1 and 3 percent, and to add between £5 and £10 per metre square to the cost of non-domestic construction, the revised regulations are of real environmental significance. By these means alone, the government expects to reduce CO_2 emissions by an estimated 500,000 tonnes by the year 2000, which is 20 percent of the total 10 million tonne target. Taking the introduction of these new standards as a point of reference, this paper re-examines the role of regulation in promoting energy efficiency.

The aim is to focus on three aspects of regulation frequently addressed by academic commentators, but which have not yet been explored with reference to the specific case of energy-related building control. The first theme concerns the role of regulation as a last resort, only employed when other market-based instruments fail. The second relates to the link between government and industry, and the relationship between regulation and ''the market.'' The third focuses on national environmental policy and the degree to which increasing energy standards represent increasing political interest in energy efficiency and the reduction of CO_2.

In exploring these themes, further questions arise. For instance, what is the role of scientific research in the definition of new standards and how are technical and economic arguments developed and deployed in the regulatory process. Equally important, how do proposed regulations relate to current practice: can regulations be used to enhance knowledge within the construction industry or do they always lag behind accepted wisdom? As we shall see, the most recent revisions to the UK regulations extend the scope of government intervention. This has generated wide ranging debate about the legitimacy of environmentally inspired regulation as compared with that grounded in the more familiar territory of health and safety. And in the UK, as elsewhere, political commitments to energy conservation co-exist alongside contrary, but equally influential, commitments to deregulation.

These broad issues take on specific meaning for the government officials, advisory committee members, industry representatives and others involved in shaping the 1995 revisions to Part L of the building regulations. Interviews with these key players, undertaken as part of a current research project funded under the Economic and Social Research Council's Global Environmental Change Programme, provides a new perspective on the theory and practice of regulation, leading

us to challenge the terms in which energy related regulation is routinely understood, and setting the scene for a rather richer analysis of the role of government and industry in making and implementing environmental policy.

The first section of the paper reviews ideas about the definitive status of regulation, the relationship between government and industry, and the degree to which energy standards represent levels of political environmental commitment. Set against this theoretical background, the second section describes the historical, political, and technical context in which the UK building regulations were revised. Turning to the detailed drafting of Part L, we then discuss two key debates. The first concerns the assessment of cost and technical risk; the second, the development of alternative methods for demonstrating compliance centring on a new and controversial Standard Assessment Procedure (SAP). These two cases illustrate the negotiated quality of building control and the interdependence of government and industry. The concluding section explores the wider implications of these observations, suggesting that regulation is neither the big stick of government control nor the definitive expression of political will. Polarisation of debate in terms of market and non-market ''instruments'' of government control has, it seems, obscured critical questions about the production of technical consensus, and the role of government as one amongst other players in the business of regulation. By concentrating on the micro-politics and the negotiated realities of building control we begin to see environmental regulation in a new light.

REGULATING THEMES

Those who call for tougher legislation and tighter control generally do so in the belief that governments can establish, enforce, and in that way guarantee higher environmental standards if they so wish. Gentler strategies of persuasion and inducement have uncertain and often unpredictable consequences. Enticing financial incentives may also fail to function as anticipated, their effects being mediated by complicating networks of competing priorities and perceptions of relative value. By comparison, there is no escaping the power of regulation.

Whether viewed as an inherently restrictive and inefficient force, or as a means of protecting public interest, regulation has its place within the agenda of environmental economics (Pearce 1994) and within wider debate about the costs and consequences of alternative forms of government intervention. For the most part, regulation is seen as the last resort, to be used when persuasion is not enough: in the words of an OECD/IEA report on energy efficiency and the environment, ''Efficiency standards and regulations concerning energy-using appliances and installations have been introduced in most Member countries to overcome certain market barriers'' (OECD/IEA 1991, 155).

This opposition between market instruments and regulation colours the way in which the regulatory process is viewed. Preoccupied by the relationship between market barriers, energy prices and energy saving actions, energy analysts have tended to disregard the socio-economics of regulation and the essentially contested nature of the technical and economic conclusions on which they depend. In discussions of energy policy, building regulations fade away into the background, forming part of that typically invisible backdrop of normality against which market forces play themselves out (Schipper 1991).

The conceptual separation of regulation from ''the market'' has further implications. First, it reinforces the tacit notion that regulations belong to a world of policy, somehow set apart from the immediate pressures of commercial competition. In short, regulations are thought to reflect political ambitions rather than the vested interests of industry. Though there are some exceptions, notably David Wallace (1995), discussions of national regulatory styles (Boehmer-Christiansen and Skea 1991; Haas 1990; Jasanoff 1991; Vogel 1986) rarely explore the range of interests involved in the detailed development or the practical implementation of codes and standards. Regulations are instead taken at face value, compared and contrasted without reference to the specific contexts in which they are formed and enacted.

Second, this division lends credence to the notion that current codes and standards reflect the political will of the day. The observations of Peter Smith, organiser of a 1990 conference on The Architect, Energy and Global Responsibility, exemplifies this: ''There are specific areas . . . where the government must impose its Green will. By 1995 we should have raised insulation levels in building to current Danish levels. The 1990 amendments bring British regulations up to the level of Sweden in 1935'' (Polan 1990).

But the fact that regulation lies outside the realm of market economics should not obscure the active, indeed competitive, role of industry in the regulatory process. What is missing in theoretical debate about regulation versus economic influence, is an understanding of the negotiated quality of building control or of the limits to regulation within specific socio-cultural contexts.

UK BUILDING REGULATIONS IN CONTEXT

Our interview-based study of the interests of various players involved in defining and implementing the 1995 revisions to Part L of the UK building regulations goes some way to

filling this gap. Having presented an initial analysis of some of this material we shall revisit the themes outlined above. But first it is important to set the revisions to Part L in context.

Characteristics of building control

Academic discussion of environmental regulation tends to focus on such evidently nasty problems as chemical or industrial pollution, biotechnological hazards, and the contamination of natural resources (for example, current ESRC funded research by Irwin and Yearley 1994; also Boehmer-Christiansen 1988; Boehmer-Christiansen and Skea 1991; Ward, Buller and Lowe 1995). Studies of ''regulatory science,'' and of the management of regulation and inspection, have generally attended to relatively self-contained industries and processes.

By comparison, building is an especially complex case. In this instance, the emphasis is on regulation as a means of promoting a good cause—that of energy efficiency—rather than on containing recognised environmental hazards. Furthermore, promotion of energy efficiency depends upon the careful adoption of a range of different measures, and the modification of a range of normal design practices. Rather than residing in a single gadget, opportunities for energy conservation in building are distributed across the construction process and are deeply inter-dependent. As a result there is no single target on which the regulators can focus. The qualities of specific construction products, their combination within whole buildings and the ways in which these structures are used and occupied all make a difference to energy consumption.

Partly because of this, the mixture of commercial, environmental, and policy interests is truly impressive. Designers, house builders, block makers, manufacturers of insulation, suppliers of heating and ventilating equipment, sub-contractors and general contractors of all shapes and sizes: these and other groups have an immediate interest in the building regulations. So too do organisations (in the United Kingdom) such as the National Energy Foundation, the Association for the Conservation of Energy, the National House Builders Council and an assortment of trade associations and pressure groups.

Although building is an especially complex sector in which to develop effective environmental regulation, it is also a really significant sector in terms of both energy consumption and associated emissions of CO_2. Around half of all energy consumption is attributed to the energy used in buildings. While much of this depends on the energy standards of the existing stock, definitive regulation nonetheless promises significant environmental benefits. Recognising this potential, the U.K. government decided to revise the thermal regulations as part of its strategy to maintain CO_2 emissions at 1990 levels by the year 2000.

Building control and environmental regulation

The 1995 revisions were directly inspired by the Rio Convention (HM Government 1990; DoE 1992), which represents a significant departure for the basis of building control. Dating from the great fire of London, building regulation has traditionally been justified in terms of public health and safety (Knowles and Pitt 1972; Muthesius 1982). Initially introduced on grounds of national interest and fuel security in the mid 1970s, energy-related regulation remains one of the few exceptions. Moving away from their first grounding fuel security, these regulations are now legitimised in terms of government commitment to the reduction of *energy-related* emissions of CO_2 and the minimisation of global environmental harm.

At first sight, reference to ''the environment'' appears to provide unlimited licence to increase the range of regulatory influence. In practice, this has been kept in check by other competing pressures including a parallel commitment to deregulation and to the principle that the revised regulations should only promote ''cost effective'' measures (the implications of which are discussed below). Opportunities for regulation are also constrained by other more prosaic issues: by the practicalities of implementation, and by the present organisation of the construction industry.

A further critical factor is that revised regulations represent an incremental development of what went before. The historical emphasis on health and safety, and a parallel concern controlling aspects of a building which are difficult to modify once built, means that regulations have tended to concentrate on building structure and building fabric. Set against this background, the idea of using regulation to influence the energy efficiency of heating systems, or to limit the use of air-conditioning, represents a new and consequently contentious development.

Some protagonists, typically those involved in technical research and development, argue that governments can and should use regulation as a means of dragging the building industry ''forward.'' In making this case they explicitly acknowledge the role of regulation as an instrument of education as well as a means of enforcing specific technical standards. From this perspective, the process of devising and consulting on proposed standards may be as important as the end result. Others, typically those involved in implementing and managing regulation, are wary of enforcing unfamiliar practice, arguing that scientific uncertainty and technical competence set ''natural'' limits to the possibilities of regulatory control.

Either way, the fact that building regulations are mandatory ironically restricts their power and influence. If builders and designers are obliged to adopt totally unfamiliar practices so many will fail to comply that the regulatory system will simply grind to a halt. Our interviews suggest that images of ''the industry,'' and of what ''the industry can stand'' therefore have a powerful if intangible influence on the regulatory process.

NEGOTIATING PART L

These contextual features: the nature of the construction industry, the historical role of building control, the introduction of new environmental considerations, and the influence of competing interests in deregulation together shaped the detailed design and development of the revisions to Part L (Conservation of Fuel and Power) which came into force last year.

Revising Part L (Conservation of Fuel and Power) involved three years of drafting, consultation and re-drafting. The formal process is one in which officers at the Department of the Environment (DoE), the main Building Regulations Advisory Committee, and a specially formed technical working party (including independent members, representatives of different parts of the industry, observers, and technical officers) together assemble a draft consultation document. This is sent out to 200 or more organisations in ''the industry'' for comment and review. In this and in other ways, the industry informs both the drafting and the re-drafting of proposed standards. In addition, the Part L technical working party (which met approximately 20 times) draws upon research and advice from the government funded Building Research Establishment.

Study of this process and of the views of the many different players shows how the ambitions of the regulators are modified and negotiated through interaction with those they seek to control. The following discussions—first, of the evaluation of cost and technical risk, and second, of methods of demonstrating compliance with the regulations based on the new Standard Assessment Procedure (SAP)—illustrate the nature of the socio-political environment in which technical standards are determined. Further examples could be drawn from efforts to extend regulatory control to ''new'' areas such as air conditioning or lighting, or from detailed review of the uses of ''scientific'' argument. In choosing to focus on questions of cost, risk and compliance, our aim is to highlight different forms of industry-government interaction, not to provide an exclusive or comprehensive review of the regulatory process as a whole.

Cost and Risk

As noted above, the criteria of ''cost effectiveness'' provided a first filter in the evaluation of possible technical options. The guiding logic is clear enough: it would not be in the national interest to demand standards of energy efficiency or measures for reducing CO_2 emissions which were ''uneconomic'' and which endangered the commercial viability of the building industry. But the practice is rather more tangled. For one thing, costs are notoriously slippery: currently costly items might become less expensive if everyone were obliged to buy them; present rates are not an especially good guide to future prices; actual costs to builders, who benefit from bulk buying deals, do not match standardised rates quoted by building economists, and so on. Assessments of cost-effectiveness also depend on estimated energy and fuel-bill savings over the expected life of each measure. Alternative views about the life and future replacement costs of double-glazing units therefore led to different conclusions about the proper place of this measure within the regulatory framework.

Resulting debates are of real economic significance. Changes in the regulations as well as in the way they are implemented, affect the sale of materials such as bricks, blocks, glass, and insulation. With each change some companies gain while others lose out. Sectors dominated by a few large companies or represented by particularly strong trade associations appear have a better chance of influencing events and of gathering and presenting economic evidence than those which are less well organised.

The criteria of cost-effectiveness promises to provide a solid basis for discriminating between competing energy-saving proposals. On closer inspection it serves to focus, rather than eliminate, technical-economic debate between different players within the industry as well as between government and other interest groups. Assessment of technical risk illustrates a similar pattern.

Builders are reluctant to make what they see as technically risky changes. From their perspective, certain amendments were more worrying than others. Argument about fully filled cavities is a good example of a ''threshold'' case where ratcheting up energy-efficient standards just one notch threatened to require a major change rather than the anticipated incremental adjustment in ''normal'' practice. As described in the 1993 consultation document, the new Part L would require an increase in the thermal performance of external walls which could ''only be easily obtained by full cavity fill,'' a strategy which met with ''considerable resistance both by the builder and the house purchaser'' (Beazer Engineering Services 1993). Formal objections were made by the House Builders Federation (HBF) and the National House Builders Council (NHBC) on grounds that a fully-filled cavity would increase the risk of rain penetration. In this as in other instances, the interests of the NHBC, acting as the insurer of many private sector house builders, ran counter to those of others within the building industry—

notably, suppliers of insulation materials represented by trade associations like the National Cavity Insulation Association (NCIA).

The consultation process inevitably generates an assortment of conflicting technical evidence provided by different industry interests and by the government itself. The Department of the Environment spent 8.1 million pounds on Building Regulation Research in 1990-1991 (DoE 1992), approximately 1 million of which related to issues of energy efficiency. The hope is that this independent work, largely undertaken by the Building Research Establishment, will provide solid, scientific, grounds on which to arbitrate between competing claims about the costs, risks, and anticipated environmental advantages of proposed changes. In practice, the capacity to make use of this research depends on the earlier formation of the research agenda (what questions have been examined, what topics are thought to be important) and on industry's position with respect to controversial issues. In other words, effective and relevant regulatory science requires effective second guessing of industry interests.

This brief review of cost effectiveness and technical risk underlines two critical points. First, the industry—which includes building construction as well as the manufacture and provision of building materials—has different, often competing interests. Second, the organisation of the industry influences input to the regulatory process. Sectors which have effective trade associations, for example the house builders and the insulation industry, appear to have greater influence than builders, suppliers and sub-contractors involved in the non-domestic sector. Similarly, the contribution of building professionals, designers, building owners and building users reflects the fact that these diverse groups have little if any direct commercial interest in the outcome of regulatory debate. Taken together, these points suggest that the final details of the revised regulations depend, in part, on the relative positions of various actors within the building industry during the late 1980s and early 1990s.

Demonstrating compliance

Some regulations specify an end result *and* the way in which that result should be achieved, others merely specify the end result. The latter strategy, which appears to have the advantage of ensuring control without unnecessarily restricting choice, informed the design of the 1995 thermal regulations. As a result, designers and builders are free to meet an overall energy-related performance specification in any way they want—albeit, within certain limiting U-values.

Methods of demonstrating compliance with the 1995 regulations hinge around the Standard Assessment Procedure (SAP). SAP provides an index of energy efficiency ranging from 1, which is very poor, to 100 which is very good. Buildings with a SAP rating of 80 or over are deemed to satisfy the regulations. However, those with a rating lower than 80 can still meet the requirement. One possible route is to show that the calculated U-value for the building as a whole meets a specified target. The second is to meet standards of the traditional prescriptive sort which specify U-values for each construction element. Whatever the method chosen, SAP ratings have to be provided for all new homes as part of the procedure for seeking regulatory certification.

Amongst other things, this arrangement marks a real shift toward a performance based approach to regulation. This has important implications both for industry and for the business and practice of building control. Under the new system, designers can come to their own conclusions about the best method of meeting the required standards and can make trade-offs between different energy measures. This means that the new regulations have fewer *necessary* consequences for the sales of particular materials. It also means that designers, like the Local Authority building control officers or approved assessors who check compliance, must be able to evaluate the performance of the building as a whole (Atkinson 1993).

The paradox of the move to deregulation (which favours the use of performance-based standards) is that it seems to have generated more complex rules and more elaborate systems of inspection and evaluation. While SAP calculations can be done manually, builders will probably turn to one of the new firms providing software-based services for generating the mandatory ratings.

Flexibility in demonstrating compliance also has its price. Rather than working through the alternative methods offered by the 1995 regulations, building designers may actually prefer a prescriptive system based on a simple checklist of standardised, technically reliable solutions. Dominated by those who have immediate commercial interests in the outcome, the process of consultation on proposed regulations has focused on technical and economic consequences rather than on questions of implementation.

The introduction of SAP highlights other tensions between the parties involved in regulation, also illustrating the multiple motivations behind alternative regulatory strategies. SAP ratings represent a form of energy labelling. The idea of creating an energy label for new homes (equivalent to a miles per gallon rating for new cars) has its roots in a particular understanding of the market economy. The logic runs as follows: house buyers fail to demand or take advantage of cost-effective energy saving measures because they lack necessary information. They do not know whether one house is more energy-efficient than another. Energy labels provide such information in a simple, easily comparable

form. Once such knowledge exists, the distorting market-barriers of ignorance will fall away and house buyers will, of their own accord, demand the full range of cost-effective measures.

In practice, voluntary energy labelling schemes such as the National Homes Energy Rating Scheme and MVM-Starpoint have had very little success. Favoured by the government in its desire to promote energy efficiency via the market, these competing commercial schemes were both expensive and confusing to potential home-buyers. The demand for energy-labels was minuscule. By making home energy ratings mandatory, the government hopes to speed up the rate at which consumers respond to the information provided by energy labels in making house-purchase decisions. In this instance the power of regulation is being ''borrowed'' in the hope of ''kick starting'' the use of labelling, thereby stimulating market demand for energy efficient housing in both new and second-hand markets. It would be difficult to find a case in which the seemingly distinct instruments of market influence and regulatory control were more entangled.

In principle, the SAP rating depends on a wide range of factors including levels of fabric insulation, efficiency and control of heating systems, extent of ventilation, and price of fuel used for space and water heating, but does not take account of the location of the building. In practice, ''the biggest variation in SAP rating occurs as a result of changes to the heating system,'' (Oreszczyn and Gillott, 1995). The SAP is in effect a measure of annual fuel costs per m^2 of area. While this makes sense given its history as a consumer index, the difficulty is that the driving motivation for the revision of Part L was not the need to reduce consumers' fuel bills, but the rather different need to reduce emissions of CO_2. Further, the SAP rating has introduced a markedly new, and in some respects incompatible, rationale into the regulatory system, inadvertently extending rather than reducing the scope of government control.

As noted above, building regulations have traditionally focused on building fabric and structure. This is partly for historical reasons, partly because of the practicalities of building control (heating systems are likely to be replaced during the building lifetime and there is no way of controlling those replacements), and partly because of a more theoretical concern with the state of the nation's building stock, rather than with the condition of its heating systems or the costs of its fuel bills. Since SAP is sensitive to fuel costs, the revised Part L represents a significant shift of emphasis.

This shift brought about a storm of opposition from various groups consulted by the DoE on the proposed regulations. Traditionally pro-environment industries (i.e., manufacturers of energy efficiency materials) found themselves on the same side as the anti-environment Electricity Association. Both opposed the focus on heating systems, fearing that a mandatory SAP rating would decrease demand for their own products—insulation materials and electricity, respectively. Opinion among house builders was divided, but they were united in arguing that a mandatory rating for new houses should be balanced with a similar requirement for second-hand houses coming up for sale. Accustomed to regulations focusing on building fabric, the Building Regulations Advisory Committee recommended against the inclusion of the SAP rating.

Despite these objections, all parties claimed to support the principle of energy ratings and the idea of regulating to reduce CO_2 emissions. Much of the disagreement focused on the appropriateness of targeting short-term features as opposed to the permanent structure of buildings. However, a few parties made a more damning criticism. Cheaper fuels are not necessarily the most environmentally benign. Therefore, evaluations of energy efficiency in terms of fuel cost per m^2 may have no impact on the original policy goal of reducing energy-related emissions of CO_2!

SUMMARY

The specific consequences of the SAP rating have yet to emerge for it is a feature of performance-based systems that their detailed effects are, within limits, inherently unpredictable. The impact of information measures to influence consumer decisions is even more difficult to assess. By contrast, the inclusion of the SAP has made a real and immediate difference to the terms of debate and the medley of industrial interests in the building regulations.

Consumer oriented labelling systems, initially designed to stimulate market demand, are now embedded in government regulation. Though still contained by a safety-net of conditions and qualifications, one side effect has been a shift of emphasis away from the familiar territory of building fabric toward the more volatile world of heating systems and energy costs. Further, efforts to promote choice and flexibility have, paradoxically but perhaps inevitably, increased the complexity of the regulatory process. In each of these respects, the relationship between government and industry has taken a new turn.

In reviewing debate about cost and risk and in considering new methods of demonstrating compliance we have been able to explore the fine grain of industry involvement in forming and implementing what are generally taken to be the government's regulations. The construction industry contains different, often competing interests. The building regulations have the power to enhance and undermine the profitability, perhaps even the survival of specific companies and

in this environment, technical and economic evidence is an important resource in the battle for and against proposed changes.

CONCLUSIONS: BIG STICK OR BENDY STICK?

The 1995 revisions to Part L were designed in response to commitments to the UN Climate Change Convention. But how did the regulatory line come to be drawn where it is? Why didn't the government take this opportunity to radically upgrade standards overnight? Whatever else, this paper has pointed to the negotiated quality of regulation. Governments are clearly not free to devise and enforce new standards without reference to the industry they seek to control.

For this and other reasons there are real practical limits to the possibilities of effective environmental regulation. From our brief review of Part L, it seems that the environmental logic is placing increasing pressure upon a system initially set up to cope with the apparently simpler tasks of making sure that buildings do not collapse or catch fire too easily. Attempts to reduce CO_2 emissions threaten to extend the range of regulatory control, encompassing new aspects of building design. (For instance, the DoE's attempt to control the use of air-conditioning in office buildings met with much resistance from manufacturing and business property interests; its proposals are being radically revised to produce a solution acceptable to industry).

In political terms, the grounds for intervention have become more complex. Changes in the rationale for thermal regulation have in turn altered the nature of the debate, affecting both the substance of the argument and the evidence cited. Parallel commitments to deregulation complicate the picture even further, constantly challenging the terms of environmental regulation.

Marked by economic analysis and policy debate about the use of market and non-market instruments, commentators have tended to see regulation as something which is applied to industry. By comparison, our interviews suggest that regulation is a negotiated process, significantly shaped by different, often competing, industrial interests. The notion that Britain could achieve ''Scandinavian standards'' by simple adjustment of the regulatory dial now seems highly problematic. Such a proposition assumes that environmental policies can be made and implemented by governments acting alone, driven by the internal logic of their own scientific evidence. This is clearly not the case. Nor is it the case that the pure environmental ambitions of committed politicians are confounded, hindered and thwarted by reluctant and conservative industries. Rather, opportunities for regulation depend upon and are shaped by the necessary involvement of all sorts of different participants.

That is not to suggest that the environmental concerns of central government are irrelevant. Along the way identifiable and important policy changes have made a real difference to energy conservation in buildings since the late 1980s. The notion that amendments to the building regulations might be justified on grounds of environmental protection and the reduction of CO_2 emissions is one such development. But to understand the changing content of environmental policy we must attend to the gritty realities of micro political power within the building industry as well as to the more formal statements of government ambition. The recession, the number of new houses built and sold, the state of the insulation industry; the market share of lightweight block: these are critical parts of the regulatory equation. Formal and informal practices of agenda setting and ''non decision-making'' (Bachrach and Baratz 1963), are just as important, as is the lack of representation from less organised sectors of the industry, and from those who will be affected by the regulations but who do not have a direct commercial stake in their detailed design.

In conclusion, academic analyses of environmental politics tend to gloss over these local, industry-specific characteristics and in doing so inadvertently sustain a ''sledge-hammer'' theory of environmental regulation. In such debates regulation features as one amongst other measures which governments can employ in bringing about desired environmental action. In discussion of alternative policy options, regulation is generally presumed to be a blunt but effective instrument. It is a ''stick'' rather than a ''carrot.'' More than that, the scope of regulatory control is frequently taken to indicate the strength of political will. By contrast, this discussion suggests that regulations reveal as much about the relative negotiating powers of the various groups involved as they do about the determination of a single minded government. It also points to the multiple functions of regulation. Building regulation does represent a means of revising technical standards, but that is not the limit of its effect. As we have suggested, the process of regulation also serves to organise and orchestrate energy-related debate within and across industry. Furthermore, this process involves extensive wheeling and dealing. Negotiating positions are adopted, slogans deployed, evidence and counter evidence marshalled and compromises reached on technical and non technical grounds alike. In all of this, government is one amongst other players involved in shaping what now seems to be the remarkably bendy stick of environmental regulation.

REFERENCES

Atkinson, G. 1993. A View of the Regulator's Perspective. In Duffy, F., A. Laing, and V. Crisp, *The Responsible Workplace*. London: Butterworth Architecture.

Bachrach, P., and M.S. Baratz. 1963. ''Decisions and Non Decisions: An Analytical Framework.'' *The American Political Science Review* 57: 633-642.

Beazer Engineering Services.1993. *Proposed Amendments to Part L of Building Regulations: a review and cost analysis.*

Boehmer-Christiansen, S. 1988. ''Black Mist and the Acid Rain: Science as a Fig-Leaf Of Policy.'' *The Political Quarterly* 59 (2): 145–160.

Boehmer-Christiansen, S., and J. Skea. 1991. *Acid Politics: Environmental and Energy Policies in Britain and Germany*. London and New York: Belhaven Press.

Callon, M. 1986. The Sociology of an Actor Network: the Case of the Electric Vehicle. In Callon, M., J. Law, and A. Rip, eds. *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World*. Basingstoke: Macmillan.

Department of the Environment, 1989 (revised July 1994). *Approved Document L: Conservation of Fuel and Power*. London: HMSO.

Department of the Environment. 1992. *Research Report, 1990–1991*. London: HMSO.

Department of the Environment. 1992. *Climate Change: Our National Programme for CO_2 Emissions*. London: HMSO.

Energy Efficiency Office of the Department of Environment and the Central Office of Information.1992. *Insulating Your Home.* London: HMSO.

Polan, B. 1990. ''Flaws and effects.'' *The Guardian*. January 26.

Guy, S., and E. Shove. 1993. Leaping the Barriers. Paper presented at the British Sociological Association Risk and Environment Study Group, York, December 1993.

HM Government. 1990. *This Common Inheritance: Britain's Environmental Strategy*. London: HMSO.

Haas, P. 1990. *Saving the Mediterranean*. New York: Columbia University Press.

Jasanoff, S. 1991. ''Cross National Differences in Policy Implementation.'' *Evaluation Review* 15 (1): 103–119.

Jasanoff, S. 1990. *The Fifth Branch: Science Advisors as Policymakers*. Cambridge, MA: Harvard University Press.

Knowles, C., and P. Pitt. 1972. *The History of Building Regulation in London 1189–1972*. London: Architectural Press.

Marsh, D., and R. Rhodes. eds. 1992. *Policy Networks in British Government*. Oxford: Clarendon Press.

Muthesius, S. 1982. *The English Terraced House*. New Haven and London: Yale University Press.

OECD/IEA. 1991. *Energy Efficiency and the Environment*. Paris: OECD.

Oreszczyn, T., and M. Gillott. 1995. ''Energy Efficiency beyond Part L.'' *The Architects' Journal*. 19 January: 39–41.

Pearce, D. 1994. The Precautionary Principle And Economic Analysis. In O'Riordan, T., and J. Cameron, eds. *Interpreting the Precautionary Principle*. London: Cameron May.

Schipper, L. 1991. ''Improved Energy Efficiency in the Industrialized Countries.'' *Energy Policy*. March: 127–137.

Shove, E. 1995. Constructing Regulation and Regulating Construction. In Gray, T., ed. *Environmental Policy in the 1990s.* London: Macmillan.

Shove, E. 1994. Energy Efficiency in the Making. Paper presented at the Global Academic Conference, Manchester, July 1994.

Shove, E., and S. Guy. 1994. *Putting Science into Practice: Saving Energy in Buildings*. ESRC End of Award Report. Swindon: Economic and Social Research Council.

Wallace, D. 1995. *Environmental Policy and Industrial Innovation: Strategies in Europe, the USA and Japan.* London: Royal Institute of International Affairs.

Vogel, D. 1986. *National Styles of Regulation*. Ithaca, NY: Cornell University Press.