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Author(s)	Kennedy, Rónán
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Rethinking Reflexive Law for the Information Age:
Hybrid and Flexible Regulation by Disclosure

Rónán Kennedy*

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I Introduction

Although it has its defenders,¹ command-and-control environmental regulation has been criticised for being economically inefficient and for relying on the effectiveness of the regulator and its staff.² Scholars have claimed that ‘traditional’ command-and-control methods of dealing with pollution, involving the use of uniform technology standards, operate in a fragmented manner with the inefficiency of a large central bureaucracy and without coordination. Unresponsive to new information, they do not always properly balance the costs and benefits of regulation and do not encourage continual reductions in pollution.³ These arguments have led to the development of a ‘second generation’ of regulatory instruments: market-based, further upstream, more flexible, built on public transparency, integrated into business planning, and focusing on incentives rather than punishment.⁴ These may operate in a flexible, modular way.⁵

Disclosure-based regulation is one of the responses to the perceived inefficiency and ineffectiveness of traditional command and control regulation. While it has a history that stretches back to US federal securities laws in the 1930s, it has become a significant feature of environmental regulation since the 1960s. Much of the promise of the application of ICT to environmental regulation relies on the power of information to change behaviour, whether individual or organizational. However, the impact of ‘regulation through disclosure’ is still not adequately studied or properly understood. Its results may be limited, it does not always achieve the desired results, and the response from practitioners is not always positive. This

* School of Law, National University of Ireland Galway.

¹ For example, Sidney A Shapiro and Thomas O McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 DUKE L.J. 729; Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and “Fine-Tuning” Regulatory Reforms*, 37 STAN. L. REV. 1267 (1985).

² Bruce A Ackerman and Richard B Stewart, *Reforming Environmental Law*, STAN. L. REV. 1333 (1985).

³ Richard B Stewart, *A New Generation of Environmental Regulation?* 29 CAP. U. L. REV. 21, 28–34 (2001).

⁴ Dennis D. Hirsch, *Symposium Introduction: Second Generation Policy and the New Economy*, 29 CAP. U. L. REV. 1, 6–15 (2001).

⁵ Jody Freeman and Daniel A. Farber, *Modular Environmental Regulation*, 54 DUKE L. J. 795 (2005).

Article explores these issues, highlighting practical difficulties and design issues that can prevent such programmes from achieving their full potential but also offering some solutions.

Disclosure-based schemes are examples of informational regulation and ‘reflexive law’ in action. Perhaps the best-known example in environmental regulation is the US Toxics Release Inventory, which achieved unexpected reductions in emissions. Pollution Release and Transfer Registers (PRTRs) are now used across the world. California’s Proposition 65, which requires manufacturers to place labels on products warning consumers of associated health risks, is more problematic.

Disclosure-based regulatory schemes are, of course, not perfect. The public availability of information does not guarantee that it is accurate, properly understood, or complete. Seeming reductions in emissions may actually be the result of underreporting rather than better environmental management. Polluters may respond strategically to the thresholds in a reporting program.

Unlike more traditional methods of regulation, informational regulation does not guarantee results. It is difficult to quantify the benefits of the disclosure of data on environmental harms and risk, and many may be more elusive than real, as the results may be public alarm, erosion of company value, and the diversion of funds from salaries to health and safety measures.

Although it is difficult to build comprehensive and reliable data, individuals are responsible for a great deal of pollution. While informational regulation has been somewhat successful in regulating corporate behaviour, its applications to individuals may be more difficult. Consumers may be unable to change because of limited options, ingrained habits and bounded rationality. Individualised environmental information carries with it privacy issues which must be carefully balanced with the environmental goals.

Finally, it is a fundamental principle of the rule of law that it should be clear. Reflexive regulation may breach this as, unlike formal law, is rarely explicit: much of it lies invisible or unexplained to the ordinary citizen or regulated firm.

Disclosure-based schemes require careful design. In order for information to be useful and usable for regulatory purposes, it must be comparable. There is therefore a need for standardisation in reporting methods and metrics. Institutional factors which frame the context for decision-making, such as the range of possible actions, the standards of proof and exclusionary rules that apply, and the oversight arrangements can influence the creation, collection, and consideration of information in regulatory processes. In order to be effective, informational regulation must be sustainable, gaining in use, accuracy, and scope over time.

This Article proceeds in four Parts. Part II provides initial background and context for a full understanding of informational regulation and disclosure in the context of information

and communications technology (ICT), reviewing relevant literature from law and sociology, and taking a Foucauldian perspective on the role of ICT in practices of power in the present day. Part III provides additional background on the development of reflexive and informational regulation in environmental law, giving a taxonomy of these types of instruments and critiquing so-called ‘third generation’ tools. Part IV explores the specific topic of disclosure as a regulatory tool in more detail, giving a brief history of its development, outlining the theoretical rationales put forward in support of it, and mentioning examples of its application in practice. It also critiques this particular type of regulatory instrument, highlighting the non-deterministic and contingent outcomes of the use of high technology for regulatory purposes, something which is well-known in disciplines such as science and technology studies but is perhaps less clearly understood in law. The Article concludes with Part V, which contributes practical suggestions and examples of how reflexive regulation schemes can be designed for the context of modern ICT.

II Environmental Law in the ‘Information Age’

The study of ICT and its relationship to legal and regulatory systems is a topic that is still in its infancy as the subject of academic attention, although its consequences are pervasive and the potential resulting improvement or dis-improvement in public services are obviously important to all citizens.⁶ What literature does exist is focused on intellectual property⁷ and the challenges for legal practitioners.⁸ The focus is on ‘code as law’⁹ (the ways in which software can constrain consumers more effectively than legal rules) or perhaps ‘code meets law’¹⁰ (the interaction between the two types of rules in property regulation) but not on ‘law through code’¹¹ (in the sense of software implementations of regulatory schemes). Issues arising from the use of expert systems in law were discussed in the 1990s,¹² but this technology has not developed to the extent expected at the time. The use of computers for

⁶ Jonny Holmström and Daniel Robey, *Inscribing Organizational Change With Information Technology*, in *ACTOR-NETWORK THEORY & ORGANIZING* 165, 165–6 (Barbara Czarniawska and Tor Hernes eds., 2005).

⁷ For example, ANDREW D. MURRAY, *THE REGULATION OF CYBERSPACE: CONTROL IN THE ONLINE ENVIRONMENT* (2006).

⁸ For example, RICHARD SUSSKIND, *THE FUTURE OF LAW: FACING THE CHALLENGES OF INFORMATION TECHNOLOGY* (1998); RICHARD SUSSKIND, *TRANSFORMING THE LAW: ESSAYS ON TECHNOLOGY, JUSTICE, & THE LEGAL MARKETPLACE* (2003); RICHARD SUSSKIND, *THE END OF LAWYERS?: RETHINKING THE NATURE OF LEGAL SERVICES* (2009).

⁹ LAWRENCE LESSIG, *CODE: & OTHER LAWS OF CYBERSPACE, VERSION 2.0* (2006).

¹⁰ R Polk Wagner, *On Software Regulation*, 78 *So. CAL. L. REV.* 457 (2005).

¹¹ For isolated examples, see Danielle Keats Citron, *Technological Due Process*, 85 *WASH. L. REV.* 1249 (2008); Danielle Keats Citron, *Open Code Governance*, *U. CHI. LEGAL F.* 355 (2008).

¹² Jacques Fremont, *Computerized Administrative Decision Making and Fundamental Rights*, 32 *OSGOODE HALL L.J.* 817 (1994).

legal decision making was studied in Scandinavia in the early 1990s,¹³ but very little has been published on this in English.¹⁴ There is only one published article directly on the topic of ICT and environmental regulation in law reviews,¹⁵ together with a small cluster of articles on closely related topics and some literature from other disciplines, but as yet no coherent perspectives, approaches, or frameworks have developed.

II.A An Environmental Revolution Driven by ICT?

The seminal article in the field is Professor Daniel Esty's 'Environmental Protection in the Information Age'.¹⁶ Esty claims that we either have entered or are entering into an 'Information Age', a transformation which is driven by ICT.¹⁷ This is situated within an economic analysis of environmental law,¹⁸ relying on the work of James Krier and others.¹⁹ In what is so far the only comprehensive article on the application of ICT for environmental regulation, Esty is very optimistic about the potential of these new tools to achieve better outcomes and argues that in the 'Information Age',

... we stand on the verge of an environmental revolution perhaps as important as that which launched the modern environmental movement four decades ago. The technological advances of the Information Age provide an opportunity to make environmental protection more data-driven, empirical, and analytically rigorous. ... [A]s information gaps become less pervasive, institutional design options for addressing environmental problems will expand and we will be able to rethink our regulatory choices.²⁰

Esty comprehensively outlines the advantages: ICT makes possible the large-scale and inexpensive tracking of pollution emissions. It can also be used for data management, analysis, and retrieval, making 'data mining' possible and making it easier to manage complexity. It also allows information to be disseminated widely and rapidly.²¹

These new possibilities reshape the environmental decision-making context. Hitherto invisible environmental problems, such as the depletion of fish stocks, can be brought to light

¹³ Jon Bing, *Code, Access and Control*, in HUMAN RIGHTS IN THE DIGITAL AGE, 204, 204–5 (Mathias Klang and Andrew Murray eds., 2005).

¹⁴ An example is Dag Wiese Schartum, *Dirt in the Machinery of Government—Legal Challenges Connected to Computerized Case Processing in Public Administration*, 2 INT'L J. L. & INFO. TECH. 327 (1994).

¹⁵ Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115 (2004).

¹⁶ *Id.*

¹⁷ *Id.* at 155–70.

¹⁸ *Id.* at 124–5.

¹⁹ James E Krier and W David Montgomery, *Resource Allocation, Information Cost and the Form of Government Intervention*, 13 NAT. RESOURCES J. 89 (1973).

²⁰ Esty, *supra* note 15, 119–20.

²¹ *Id.* at 156–61.

through analysis of data. The impact of emissions over time and at a distance can be better understood. The interconnection of environmental hazards, such as the composition and sources of polluted air, can be more easily tracked. Data visualization, such as representations of the hole in the ozone layer over Antarctica, can help to mobilise individuals to take action and better explain the scientific evidence for damage.²²

Computer modelling allows for better forecasting. With improved processing speeds, and genetic algorithms, models can be tested and adapted in very little time. This expands the scope and span of control available to policymakers. It can also improve the policy-making process by grounding it in real results, identifying failing programs and the best solutions. This may lead to greater transparency and a better functioning democracy and it is likely to transform administrative processes.²³

ICT can help to solve several of the problems that prevent comprehensive and fully effective environmental regulation. In the marketplace, it can help with the search costs involved in finding markets for what were formerly considered to be ‘waste’ by-products, such as diacids from nylon production, which can be sold to tanneries; increasing precision in defining environmental rights through GPS/GIS; better valuation of potential future harms; shifting decision-making to the market where appropriate; and lowering the cost of contracting for compensation for environmental harms to a level where many more can participate.²⁴

For regulators, more precise information can help create more specialised, decentralised, and sophisticated organizations. Quantification and visualization can better communicate environmental problems. Closer identification of problems allows policy-makers to match the scale of the problem with the appropriate scale of response.²⁵ Poor national performance on comparative measures of environmental performance can be a significant spur for action.²⁶

Esty’s theoretical perspective on information²⁷ is economic rather than scientific or social and he acknowledges that ‘[h]arnessing the power of information technology will require a nuanced understanding of the relationship between environmental information and institutional design.’²⁸ He highlights some issues, such as the need to transform data into information and then knowledge; the risks from ‘disinformation’; the possibility that cyber

²² *Id.* at 160–3.

²³ *Id.* at 164–70.

²⁴ *Id.* at 175–180.

²⁵ *Id.* at 182–87.

²⁶ *Id.* at 168.

²⁷ *Id.* at 130–55.

²⁸ *Id.* at 121.

democracy could become chaotic; too much information can lead to decision-making paralysis; and that information on environmental hazards can be used for malicious ends.²⁹

II.B Information Regulation

Although there has been little writing that bears directly on the use of ICT in the regulatory process, as Esty notes, “[c]onsiderable attention has been paid to the potential for “information regulation.”³⁰ Perhaps the most relevant example of this scholarship is the work of Professor Bradley Karkkainen, particularly his article ‘Information as Environmental Regulation’.³¹ While his approach is not so explicitly rooted in economic theory, his focus is nonetheless on filling in what he calls the ‘information gap’³² and how this might improve the attention which environmental issues get from management within the firm because of market pressures.

Another representative example is Professor Thomas McGarity’s article, ‘Hazardous Air Pollutants, Migrating Hot Spots, and the Prospect of Data-Driven Regulation of Complex Industrial Complexes’.³³ This provides a detailed consideration of efforts by the Texas Council for Environmental Quality (TCEQ) to use mobile air monitoring devices in order to better regulate industrial pollution. The TCEQ’s approach is focused on ‘residual risk’ as defined in the Clean Air Act (CAA), that is, risks that remain once the CAA’s technology-based standards have been complied with.³⁴ It made use of mobile monitoring vans to gather information on air pollution in the vicinity of petrochemical plants.³⁵ McGarity concludes that data-driven regulation has significantly more potential than model-driven efforts.³⁶

II.C Informational Governance

From sociology, a highly significant writer on the topic is Professor Arthur Mol. His approach is based on notions of an ‘information age’³⁷ and ‘ecological modernisation’³⁸ to develop a

²⁹ *Id.* at 171–4.

³⁰ *Id.* at 125.

³¹ Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257 (2001).

³² *Id.* at 315.

³³ Thomas O. McGarity, *Hazardous Air Pollutants, Migrating Hot Spots, and the Prospect of Data-Driven Regulation of Complex Industrial Complexes*, 86 TEX. L. REV. 1445 (2008).

³⁴ *Id.* at 1446.

³⁵ *Id.* at 1453–73.

³⁶ *Id.* at 1492.

³⁷ ARTHUR P. J. MOL, *ENVIRONMENTAL REFORM IN THE INFORMATION AGE: THE CONTOURS OF INFORMATIONAL GOVERNANCE*, 42–52 (2008).

³⁸ *Id.* at 60–68.

theory of ‘informational governance’,³⁹ in which ‘informational processes, resources and struggles move to the centre of environmental governance and politics, increasingly replacing authoritative resources, nation-state power and conventional bureaucratic processes.’⁴⁰ According to Mol, we are moving into Castells’ ‘network society’, with globalised communications, (paradoxically) increased uncertainty regarding knowledge, and governance replacing government.⁴¹ From this emerges *informational governance*: ‘the idea that information is fundamentally restructuring processes, institutions and practices of environmental governance’.⁴² This development is founded on the changes in power and impact in society which ICT facilitates, linked to globalization, the redefinition of the role of the nation-state, and a loss of trust in science.

Informational governance must be distinguished from informational regulation, discussed further below,⁴³ whose theoretical basis is more in law and economics than in political science or sociology.⁴⁴ Informational governance can be paralleled with the development of the ‘informational economy’: ‘a specific form of social organization in which information generation, processing, and transmission become fundamental sources of productivity and power.’⁴⁵ From a theoretical perspective, Mol argues that it can be understood as a process of ecological modernization, culminating in a developing ecological rationality. This abstraction of environmental realities into information spaces enables new transformative power. As we relate to our environment more and more through measurements which are then communicated and mediated by ICT, there is the potential for environmental issues to be re-constructed, re-interpreted, and re-understood by individuals and society in different ways depending on how that information is represented. We should not assume that this is an entirely positive development: inequalities of power persist in new media and information networks; information may not always be reliable; state regulation remains relevant; and the need for local infrastructure can limit its effectiveness in, for example, developing countries.⁴⁶

II.D Governmentality

These questions of power and control bring us to the work of Michel Foucault. He developed

³⁹ *Id.* at 82–91.

⁴⁰ *Id.* at 102.

⁴¹ *Id.* at 37–53.

⁴² *Id.* at 83.

⁴³ See Part III.B.

⁴⁴ MOL, *supra* note 37, 85–90.

⁴⁵ Arthur P. J. Mol, *Environmental Governance in the Information Age: The Emergence of Informational Governance*, 24 ENVIRON. & PLAN. C: GOVERN'T & POL'Y 497, 500 (2006).

⁴⁶ *Id.* at 501-07.

his thoughts on the transmission of power through mechanisms of surveillance and measurement in government in the concept of *governmentality*, which Dean defines as ‘how we think about governing, with the different mentalities of government’,⁴⁷ and elaborates as

... [a]n analytics of government [approach which] ... is a study of the organised practices through which we are governed and through which we govern ourselves, what we shall call here *regimes of practices* or *regimes of government*. These regimes, however, involve practices for the production of truth and knowledge, comprise multiple forms of practical, technical and calculative rationality, and are subject to programmes for their reform.⁴⁸

Scholars have extended these concepts into notions of ‘geo-power’,⁴⁹ ‘environmentality’,⁵⁰ ‘eco-governmentality’,⁵¹ or ‘ecological rationalities of government.’⁵² These see ‘the environment’ not as

... the naturally given sphere of ecological processes which human powers try to keep under control, nor ... as a mysterious domain of obscure terrestrial events which human knowledge works to explain ... [but as] a historical artifact that is openly constructed⁵³

The connection to ICT as a locus and tool in these discourses become obvious when one considers the importance of these new technologies for control of time, space, and place.

As a method of analysis, governmentality has a number of characteristic elements: identifying problematizations (controversies surrounding the process of processes of government); attention to the practices of government, which themselves govern how government is conducted; and viewing these practices as assembled from diverse, heterogenous, and contingent elements. As a result of this last element, there are four closely connected enquiries into how these assembled regimes function. First, what they seek to make visible and legible; second, what technologies and techniques are deployed in the application of power; third, what forms and systems of thought and knowledge are privileged within a particular regime; and finally, what forms of identity does the operation of the system presuppose or attempt to construct. Governmentality analysis also seeks to identify the ‘ultimate ends and ... utopian goals’ of a particular regime of government. However, while

⁴⁷ MITCHELL DEAN, *GOVERNMENTALITY: POWER & RULE IN MODERN SOCIETY*, 16 (1999).

⁴⁸ *Id.* at 18–9 (emphasis in original).

⁴⁹ Timothy W Luke, *On Environmentality: Geo-Power and Eco-Knowledge in the Discourses of Contemporary Environmentalism*, 1995 *CULTURAL CRITIQUE* 57, 57.

⁵⁰ ARUN AGRAWAL, *ENVIRONMENTALITY: TECHNOLOGIES OF GOVERNMENT & THE MAKING OF SUBJECTS* (2005).

⁵¹ Sebastien Malette, *Foucault for the Next Century: Eco-Governmentality*, in *A FOUCAULT FOR THE 21ST CENTURY: GOVERNMENTALITY, BIOPOLITICS & DISCIPLINE IN THE NEW MILLENNIUM*, 221, 221 (Sam Binkley and Jorge Capetillo eds., 2009).

⁵² *Id.* at 221.

⁵³ Luke, *supra* note 49, at 67.

values are very significant, they are analysed more as elements of a governance regime rather than the source or end goal of that regime. Finally, Dean argues that an ‘analytics of government’ approach (as he terms this method) is modest in the sense that it does not seek to be global or radical, but instead seeks to view in a detached fashion the operation of systems of government. Nothing is taken for granted.⁵⁴

Nonetheless, once these organised practices are in place and the ‘technologies of government’ (to use Dean’s phrase) are deployed as a means of control, the consequences are significant:

[T]he system is a condition of particular forms of life and social and political organization, patterns of consumption and communication, professional expertise and methods of training, and so on, and that once made durable and necessary it is able to to exercise certain determination on patterns of innovation.⁵⁵

The applicability of this perspective to the use of ICT in environmental regulation should be clear from a re-consideration of Esty’s article on the topic,⁵⁶ which is a prominent example of ‘resource managerialism’—reducing nature

... through the encirclement of space and matter ... to a cybernetic system of biophysical systems that can be dismantled, redesigned, and assembled anew to produce ‘resources’ efficiently and in adequate amounts when and where needed in the modern marketplace.⁵⁷

Viewing initiatives to expand the use of ICT as instances in the creation of a wider mesh of tools and techniques for controlling both human populations and the natural world highlights the political importance of these new technologies and the consequences for power relationships in society. These questions of power, politics, and surveillance will be considered in more detail later in the Article,⁵⁸ first, however, more detailed background on the phenomenon of reflexive regulation is required.

III Reflexive Regulation: The Third Generation of Environmental Law

What is sometimes called the third generation of environmental law is characterised by the use of ‘collaborative and participatory processes, outcomes-based instrument choice, reflexive law principles, distributive justice concerns, sustainable development principles, and adaptive ecosystem management.’⁵⁹ The adoption of these so-called ‘new environmental policy instruments’ (NEPIs) is driven largely by economic factors: the cost of ‘traditional’ regulation

⁵⁴ DEAN, *GOVERNMENTALITY*, *supra* note 47, 27–38.

⁵⁵ Mitchell Dean, *Putting the Technological Into Government*, 9 *HIST. HUM. SCI.* 47, 58 (1996).

⁵⁶ See Section II.A.

⁵⁷ Luke, *supra* note 49, 70–71.

⁵⁸ See Part IV.E.

⁵⁹ Craig Anthony Arnold, *Fourth-Generation Environmental Law: Integrationist and Multimodal*, 35 *WM. & MARY ENVTL. L. & POL’Y REV.* 771, 791(2011).

to regulators and regulated entities; a perception that NEPIs were more efficient; a shift from models of government to lighter-touch ‘governance’ approaches; proposals from the European Commission; the impact of global recession and the resulting focus on cost; and political support for adopting new schemes.⁶⁰ They do not involve the displacement of the state or the disappearance of ‘old’ policy instruments, but rather the parallel application of both in a hybrid system,⁶¹ an issue which will be discussed again in the concluding Part.

III.A ‘New Governance’ in Environmental Regulation

In the early years of this century, some new approaches to environmental law began to emerge and develop at a rapid rate.⁶² In Europe, the rise of the concept of ‘ecological modernization’ (that economic and technical progress can provide solutions to the problems of pollution and environmental degradation that it creates) helped to push policy-makers from rigid ideas of government to more flexible application of governance (a development already discussed above), to developing a broad ‘toolbox’ of regulatory approaches and towards deregulation.⁶³ Although ecological modernization did not take complete hold on policy-making,⁶⁴ it nonetheless gave rise to what is called ‘new governance’, which can be defined as

... a range of processes and practices that have a normative dimension but do not operate primarily or at all through the formal mechanism of traditional command-and-control-type legal institutions ... [T]he common features ... involve a shift in emphasis away from command-and-control in favour of ‘regulatory’ approaches which are less rigid, less prescriptive, less committed to uniform outcomes, and less hierarchical in nature.⁶⁵

In addition, researchers and policymakers had begun to understand the limitations of regulation as a policy tool, and the political tides moved in favour of market liberalization.⁶⁶ As a result, environmental law may be becoming more concerned with establishing principles rather than rules. Examples in European environmental law might include the evolution of the

⁶⁰ Andrew Jordan, Rüdiger K W Wurzel, and Anthony R Zito, *Comparative Conclusions—“New” Environmental Policy Instruments: An Evolution or a Revolution in Environmental Policy?*, 12 ENVTL. POL. 201, 202–5 (2003).

⁶¹ Neil Gunningham, *The New Collaborative Environmental Governance: The Localization of Regulation*, 36 J. L. & SOC. 145, 165 (2009).

⁶² Andrew Jordan, Rüdiger K W Wurzel, and Anthony R Zito, *“New” Instruments of Environmental Governance: Patterns and Pathways of Change*, 12 ENVTL. POL. 1, 3–4 (2003).

⁶³ JANE HOLDER AND MARIA LEE, ENVIRONMENTAL PROTECTION, LAW & POLICY: TEXT & MATERIALS, 164–5 (2007).

⁶⁴ Andrea Revell, *Ecological Modernization in the UK: Rhetoric or Reality?*, 15 EUR. ENV'T 344 (2005).

⁶⁵ Gráinne de Búrca and Joanne Scott, *Introduction: New Governance, Law and Constitutionalism*, in LAW & NEW GOVERNANCE IN THE EU & THE US, 1, 2 (Gráinne de Búrca and Joanne Scott eds., 2006).

⁶⁶ IAN BAILEY, NEW ENVIRONMENTAL POLICY INSTRUMENTS IN THE EUROPEAN UNION: POLITICS, ECONOMICS & THE IMPLEMENTATION OF THE PACKAGING WASTE DIRECTIVE 4 (2003).

Environmental Impact Assessment Directive⁶⁷ through a review and revision process based on implementation reports from member states; and the Common Implementation Strategy for the Water Framework Directive, which is not mentioned in the directive itself.⁶⁸

Examples of the impact of these shifts in policy include the integration of environmental protection with other policies; the use of tracking progress towards specific goals; a commitment to the good governance values of openness and participation; and the use of new instruments for environmental protection, including voluntary agreements.⁶⁹ At European level, there is a shift to self-regulation, such as the introduction of environmental management systems, with rewards for voluntary participation.⁷⁰ However, while some states were willing to experiment, such as the Netherlands in making use of voluntary agreements,⁷¹ most member states were slow to adopt new environmental policy instruments.⁷² Industry preferred the certainty of command and control; politicians were reluctant to dismantle the existing regulatory structure; and ‘new’ instruments (by their nature) require challenges to ‘old’ thinking, which is often deeply ingrained.⁷³

In the US during the early 1990s, the Republican majority in Congress sought, as part of its ‘Contract with America’, to roll back many of the environmental protections enacted in previous decades. The executive was able to portray this initiative to the public as a ‘sell-out’ to corporate interests and defeat it.⁷⁴ During the same period, industry groups mobilised to try to soften the broad, prescriptive, and detailed scheme of environmental regulation that had developed over the previous two decades. With a focus on tradeable permits and voluntary compliance with emission reduction goals, these efforts resonated with a general preference amongst the American public for moving control from the federal government to the state and local level. The Clinton administration sought to channel this appetite for change into a

⁶⁷ Directive 1985/337/EEC of the European Parliament & of the Council of 27 June 1985 on the assessment of the effects of certain public & private projects on the environment 1985.

⁶⁸ Joanne Scott and Jane Holder, *Law and New Environmental Governance in the European Union*, in *LAW & NEW GOVERNANCE IN THE EU & THE US*, 211 (Gráinne de Búrca and Joanne Scott eds., 2006).

⁶⁹ Joanne Scott and David M Trubek, *Mind the Gap: Law and New Approaches to Governance in the European Union*, 8 *EURO. L.J.* 1 (2002).

⁷⁰ Christoph Demmke, *Implementation of Environmental Policy and Law in the United States and the European Union*, in *GREEN GIANTS?: ENVIRONMENTAL POLICIES OF THE UNITED STATES & THE EUROPEAN UNION* (Norman J. Vig and Michael G. Faure, eds., 2004).

⁷¹ Anthony R Zito et al, *Instrument Innovation in an Environmental Lead State: “New” Environmental Policy Instruments in the Netherlands*, 12 *ENVTL. POL.* 157, 169–71 (2003).

⁷² Bailey, *supra* note 66, at 52–3.

⁷³ *Id.* at 3–4.

⁷⁴ Richard J Lazarus, *The Greening of America and the Graying of United States Environmental Law: Reflections on Environmental Law’s First Three Decades in the United States*, 20 *VA. ENVTL. L. J.* 75, 93–5 (2001).

‘reinvention’ of the federal government. In environmental regulation, this led to the ‘Common Sense Initiative’ (negotiated regulation for specific industries), the ‘Environmental Leadership Program’ (incentives to develop environmental management systems) and ‘Project XL’ (site-specific and industry-developed alternative compliance plans).⁷⁵

These were broadly ‘reflexive’, meaning that they hoped to make individuals and firms internalize environmental norms rather coercing them into making more environmentally positive choices, an approach which will be explained more fully in the next section. This change in focus was driven by the claim that the machinery of government is too information-poor, resource-limited, and slow-moving to deal with dynamic organizations and marketplaces and will often stymie innovation. Reflexive law is ‘a distinct and independent conception of law’, renouncing standards and targets in favour of communication and structural supports for contemplation.⁷⁶

In the US, the role of environmental protection agencies has also been re-evaluated in recent years, with a move from conflict between business and environmental goals being resolved through legal rules and enforcement⁷⁷ to a focus on results and innovation, continuous improvement, negotiable and collaborative relationships, and multiple centres of leadership (government, business, communities, and others).⁷⁸ Businesses are seeking to move ‘beyond compliance’ to voluntary performance targets and internal environmental management systems, leading to a decline in environmental litigation and a shift by NGOs to collaborative solutions.⁷⁹

This presents new challenges for lawyers, who have skills in advocacy, negotiation, and concluding agreements, but may not have experience with open, dynamic, and win-win solutions. Law may not always be the primary means of solving environmental problems (if it ever was),⁸⁰ and lawyers must work in a collaborative way with other professionals.⁸¹ However, it should not be thought that command-and-control measures are no longer used. They are still introduced in Europe⁸² and remain the foundation of US environmental law,

⁷⁵ Rena I Steinzor, *Reinventing Environmental Regulation: The Dangerous Journey From Command to Self-Control*, 22 HARV. ENVTL. L. REV. 103, 107 (1998).

⁷⁶ Stewart, *supra* note 3, at 127–30.

⁷⁷ George B. Wyeth, “Standard” and “Alternative” Environmental Protection: The Changing Role of Environmental Agencies, 31 WM. & MARY ENVTL. L. & POL’Y REV. 5, 9–10 (2006).

⁷⁸ *Id.* at 18–22.

⁷⁹ Bradley C. Karkkainen, *Environmental Lawyering in the Age of Collaboration*, 2002 WIS. L. REV. 555, 559–67.

⁸⁰ Wyeth, *supra* note 77.

⁸¹ Karkkainen, *supra* note 79, 571–4.

⁸² Suzanne Kingston, *Environment*, 59 INT’L & COMP. L. Q. 1129, 1134 (2010).

although more integrated approaches are being adopted there.⁸³

III.B Reflexive and Informational Regulation

‘Reflexive law’ instruments, also known as ‘process-based’, ‘systems-based’, or ‘management based’ regulation,⁸⁴ include product labelling, emissions reporting and internal environmental audits. While examples of reflexive law can be found elsewhere, such as in the regulation of financial markets,⁸⁵ Orts mentions some that are specific to environmental law, such as the National Environmental Policy Act (NEPA), environmental auditing and enforcement policies, and eco-management and audit schemes (EMAS).⁸⁶ These attempt to make polluters internalise the norm of environmental protection as society moves to a more cooperative and coordinated approach to achieving its goals.⁸⁷ They can be divided into two main categories: ‘reflexive regulation’ and ‘informational regulation’. These share certain common characteristics:

- mandated public disclosure
- by corporations or other private and public organizations
- of standardized, comparable, and disaggregated information
- regarding specific products or practices
- to further a defined public purpose.⁸⁸

They also share particular design features:

- a specific policy purpose
- specified disclosure targets
- a defined scope of information
- a defined information structure and vehicle

⁸³ Uwe M Erling, *Approaches to Integrated Pollution Control in the United States and the European Union*, 15 TUL. ENVTL. L.J. 1 (2001).

⁸⁴ Neil Gunningham, *Environment Law, Regulation and Governance: Shifting Architectures*, 21 J. ENVTL. L. 179, 189 (2009).

⁸⁵ Eric W. Orts, *Reflexive Environmental Law*, 89 NW. U. L. REV. 1227, 1232 (1995).

⁸⁶ Eric W. Orts, *A Reflexive Model of Environmental Regulation*, 5 BUS. ETHICS Q. 779, 785–6 (1995).

⁸⁷ Stewart, *supra* note 3, 127–51.

⁸⁸ ARCHON FUNG, MARY GRAHAM, AND DAVID WEIL, *FULL DISCLOSURE: THE PERILS & PROMISE OF TRANSPARENCY*, 6 (2007).

- an enforcement mechanism.⁸⁹

However they differ in certain details and will be considered separately below.

In the environmental context, ‘reflexive regulation’ can be defined as:

... a legal theory and a practical approach to regulation that seeks to encourage self-reflective and self-critical processes within social institutions concerning the effects they have on the natural environment. ... The idea is to employ law not directly in terms of giving specific orders or commands, but indirectly to establish incentives and procedures that encourage institutions to think critically, creatively, and continually about how their activities affect the environment and how they may improve their environmental performance.⁹⁰

Reflexive regulation tends to focus on working with industry in a cooperative and collaborative fashion, often through *voluntary approaches*. These involve regulators negotiating with industry in order to establish a voluntary agreement or codes of practice which could achieve the aims of the regulatory scheme. These can achieve greater and quicker ‘buy-in’ but can require significant resources if the number of firms involved is large. Ensuring compliance can also be difficult.

Another non-regulatory method of achieving better environmental outcomes is through EMAS. Under these schemes, businesses can adopt these types of systems as a means of managing environmental risks, better engaging with regulators and reducing costs. For example, the EU has introduced a regulation on EMAS,⁹¹ which aims to improve the environmental performance of participating firms over time, on a voluntary basis.⁹² However, they do not guarantee specific results, standards can vary, and they are not always appropriate for small firms.

Informational approaches, which require only that firms provide information on their products and services to the public, have also been receiving attention in recent years.⁹³ Informational regulation is a prominent example of the direct application of reflexive law principles through disclosure requirements. It can be defined as ‘rules requiring mandatory disclosure of information on environmental operations or performance of regulated entities to third parties, such as workers, consumers, shareholders, or the public in general.’⁹⁴ Examples of reflexive environmental informational regulation include ‘truth-in-environmental-

⁸⁹ *Id.* at 39.

⁹⁰ Orts, *supra* note 86, 780.

⁹¹ Regulation 761/2001 allowing voluntary participation by organisations in a community eco-management & audit scheme (EMAS).

⁹² Orts, *supra* note 85, 1287–1313.

⁹³ For a further discussion of these, see Section IV.

⁹⁴ David W. Case, *The Law and Economics of Environmental Information as Regulation*, 31 ENVTL. L. REP. 10773, 10775 (2001).

advertising and environmental labels'.⁹⁵ The application of informational regulation can be broadly categorised as 'descriptive' or 'persuasive', depending on whether information is simply disclosed or framed in such a way as to encourage individuals to change the behaviour.⁹⁶ It can take negative or positive forms, be aimed at consumers or businesses, and be simple or complex. Examples include warnings on cigarette packets, environmental impact statements, or eco-labels.⁹⁷

At the consumer level, these include *product labelling*, which involves placing environmental information labels on goods which are available for sale. Unlike design and product standards, these do not impose any obligation that standards are being met; instead, the hope is that consumers will use the product labels to guide their purchasing decisions and that market pressure will encourage producers to innovate and reduce environmental impact of their products. However, it is not clear that individuals or (more significantly) investors base very many of their decisions on the allocation of financial resources on environmental factors, even when this information is readily available.⁹⁸

At the enterprise level, there may be *reporting and disclosure* requirements, which will be discussed further below. Firms may be placed under an obligation to disclose information about the environmental impact of their goods and services. The hope is that negative publicity and consumer choice will push suppliers towards providing more benign offerings. These schemes are relatively cheap to operate, but firms may resist reporting what they claim to be sensitive information, data may be unreliable, and the impact on consumer preferences is not always clear.

There also exist *voluntary disclosure schemes*, such as FAIRTRADE, which aim to persuade more ethically- or environmentally-conscious consumers that a particular product is superior to its competitors in those terms.⁹⁹

III.C Theory and Procedure over Substance

While it is undeniable that the use of these 'new environmental policy instruments' has increased in recent years, it does not follow that 'old' instruments have disappeared, or that there is a wholesale move from command-and-control to a looser, governance-based

⁹⁵ Orts, *supra* note 86, 784.

⁹⁶ Michael Vandenbergh, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 VAND. L. REV. 515, 608–9 (2004).

⁹⁷ Stewart, *supra* note 3, 134.

⁹⁸ *Id.* at 97.

⁹⁹ Karen Yeung, *Government By Publicity Management: Sunlight or Spin?*, 2005 PUB. L. 360, 369.

approach. Both approaches co-exist to varying degrees in different jurisdictions.¹⁰⁰ In addition, academic study of NEPIs has tended to be more theoretical than practical, often omitting crucial ‘real-world’ issues, such as the influence of politics and institutions.¹⁰¹ Without careful attention to design issues, flaws in such schemes may lead to underperformance and a need for retrospective command-and-control regulation.¹⁰² They are not a panacea and are not appropriate for price-inelastic commodities or where an immediate abatement is required.¹⁰³

EMAS has been criticised for being procedural rather than substantive in nature, as it does not define targets for firms. Eco-labels can lead consumers to think that they are making good choices, rather than encouraging them not to consume in the first place. The label may be missing essential information about the environmental record of the producer. Even if these issues can be overcome, there is little evidence that consumers will actually base their purchasing decisions on such labels. Voluntary agreements are vulnerable to free riding.¹⁰⁴

III.D The Role of ICT in the Practices of Power

This increasing reliance on information as a source of power and a means of control must be placed in the context of Foucauldian governmentality theory, discussed above.¹⁰⁵ Information has political significance as a resource which enables or prevents action, as a symbol which helps to control interactions, and as an embodiment and expression of the biases within institutions.¹⁰⁶ Power is now more often tied to control of information than discourse.¹⁰⁷ ICT has a key role in this ongoing interplay between individuals and groups, by giving effect to values and norms through processes of measurement and calculation that make visible or legible particular social phenomena while ignoring others.¹⁰⁸

ICT makes Foucault’s ‘mechanised surveillance’ truly part of a machine. The role of ICT as an ‘inscription device’¹⁰⁹ gives these new tools great power over individuals, routines, and

¹⁰⁰ Andrew Jordan, K.W. Wurzel, and Anthony Zito, *The Rise of “New” Policy Instruments in Comparative Perspective: Has Governance Eclipsed Government?* 53 POL. STUD. 477 (2005).

¹⁰¹ BAILEY, *supra* note 66, 5.

¹⁰² *Id.* at 169–70.

¹⁰³ *Id.* at 188.

¹⁰⁴ CHRIS HILSON, REGULATING POLLUTION: A UK & EC PERSPECTIVE, 107–11 (2000).

¹⁰⁵ See Part II.D.

¹⁰⁶ CHRISTINE BELLAMY AND JOHN A TAYLOR, GOVERNING IN THE INFORMATION AGE, 162–5 (1998).

¹⁰⁷ SCOTT LASH, CRITIQUE OF INFORMATION, 3 (2002).

¹⁰⁸ Bill Doolin, *Information Technology as Disciplinary Technology: Being Critical in Interpretive Research on Information Systems*, 13 J. INFO. TECH. 301, 305–6 (1998).

¹⁰⁹ ‘... devices which produce, reproduce, and disseminate “inscriptions”, which are essentially sets of marks, symbols, drawings or other graphical representations’. Brian P Bloomfield, *The Role of Information Systems in the UK National*

public discourse.¹¹⁰ A focus on the circulatory routes of power allows us to see that technologies, including ICT, co-constitute the framework, context, and relationships of power between individuals and groups in society through a process of mutual shaping.¹¹¹

Therefore, taking into account the meta-nature of ICT, we should not see digital technology as having a predetermined impact, possessing absolute power or being the only important factor. Physical space, social space, and digital space are ‘partly embedded’ in each other, and changes in one can affect power relationships in another.¹¹² Knowledge is not always power; choices must still be made.¹¹³ ICT may in fact reinforce existing arrangements rather than change them,¹¹⁴ although this conclusion has been contested by other studies.¹¹⁵

IV Critiquing Disclosure as a Regulatory Tool

An important aspect of the perceived power of information in environmental regulation, and the particular focus of this article, is the use of disclosure-based regulation as one of the responses to the perceived inefficiency and ineffectiveness of traditional command and control regulation.¹¹⁶ Often called ‘informational regulation’, this can be defined as ‘government mandated public disclosure of information on the environmental performance of regulated entities.’¹¹⁷

IV.A Development of Disclosure

Informational regulation is not new.¹¹⁸ It has been used in railway regulation since the 1860s,¹¹⁹ in financial regulation since the 1930s, and was a significant part of the

Health Service: Action At a Distance and the Fetish of Calculation, 21 SOC. STUD. SCI. 701, 705 (1991).

¹¹⁰ *Id.* at 708.

¹¹¹ Bert-Jaap Koops, *Law, Technology, and Shifting Power Relations*, BERKELEY TECH. L.J. 973, 979 (2009); Richard E Sclove, *Making Technology Democratic*, in RESISTING THE VIRTUAL LIFE: THE CULTURE & POLITICS OF INFORMATION 85, 89 (James Brook and Iain A Brook eds., 1995).

¹¹² Saskia Sassen, *Digital Networks and the State: Some Governance Questions*, 17 THEORY, CULTURE & SOC. 19, 28 (2000).

¹¹³ Langdon Winner, *Mythinformation*, in THE WHALE & THE REACTOR, 98, 109–10 (1986).

¹¹⁴ Kenneth L. Kraemer and John Leslie King, *Information Technology and Administrative Reform: Will E-Government be Different?'*, 2 INT'L J. ELECTRONIC GOV'T RES. 1 (2006).

¹¹⁵ Arild Jansen and Einar Løvdal, *Can ICT Reform Public Agencies?'*, in ELECTRONIC GOVERNMENT 8TH INTERNATIONAL CONFERENCE (EGOV 2009) , 88 (Maria A Wimmer et al. eds., 2009).

¹¹⁶ David W. Case, *Corporate Environmental Reporting as Informational Regulation: A Law and Economics Perspective*, 76 U. COLO. L. REV. 379, 380–1 (2005).

¹¹⁷ *Id.* at 383.

¹¹⁸ MICHAEL E. KRAFT, MARK STEPHAN, AND TROY D. ABEL, *COMING CLEAN: INFORMATION DISCLOSURE & ENVIRONMENTAL PERFORMANCE*, 57 (2011).

¹¹⁹ Giandomenico Majone, *The New European Agencies: Regulation By Information*, 4 J. EURO. PUB. POL'Y 262, 265 (1997).

development of environmental and health and safety law in the 1960s and 1970s.¹²⁰ In the US, it developed as a ‘middle ground’ between the competing priorities of the Republican and Democratic Parties, who favoured less government and more risk-based regulation respectively.¹²¹ More recently, governments have used ‘league tables’ of, for example, school performance or business environmental performance as a means of ‘exclamation and excoriation’, or highlighting good and bad performers in health and safety (‘naming and faming’/‘naming and shaming’),¹²² while efforts to deal with political corruption, poor diet and energy efficiency in cars and household appliances have made use of information disclosure techniques.¹²³ Disclosure requirements have also been used in an effort to deal with the more recently developing problem of large-scale data breaches,¹²⁴ with some success.¹²⁵

The practical development of these styles of regulation have been driven by several critiques of conventional command-and-control regulation: many major pollution problems have been identified and dealt with to the extent that is economically feasible, and the significant problems that remain are generally non-point sources, such as water pollution, which are much less amenable to centralised solutions.¹²⁶ They are also connected to the increasing availability of ICT, which provide new capabilities to access, integrate, and select information.¹²⁷ From an academic perspective, the conceptual development of reflexive law can be traced back to Teubner’s work from the 1980s on, in which he argued that law goes through three phases of development, from ‘formal law’ (basic rules) to ‘substantive law’ (administrative procedures) to ‘reflexive law’ (indirect, abstract, rational).¹²⁸

Although disclosure-based instruments might seem on the surface to be examples of ‘soft law’, the reality is that they are used as both ‘soft’ and ‘hard’ tools (for example, to help with enforcement and prosecution) in a hybrid mix.¹²⁹ This flexibility is often achieved through ICT, which allows for greater transparency (by making available information on interactions between the regulator and the regulated), two-way interaction with the public, and

¹²⁰ Case, *supra* note 116, at 10074–5.

¹²¹ GRAHAM, DEMOCRACY BY DISCLOSURE: THE RISE OF TECHNOPOPULISM, 11–3 (2002).

¹²² Yeung, *supra* note 99, at 372–3.

¹²³ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 8.

¹²⁴ Paul M Schwartz and Edward J Janger, *Notification of Data Security Breaches*, 105 MICH. L. REV. 913 (2007).

¹²⁵ Sasha Romanosky, Rahul Telang, and Alessandro Acquisti, *Do Data Breach Disclosure Laws Reduce Identity Theft?*, 30 J. POL’Y ANALYSIS & MGMT. 256 (2011).

¹²⁶ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 4.

¹²⁷ Mary Graham, *Information as risk regulation: Lessons from experience* (2001), <http://www.transparencypolicy.net/assets/information.pdf>.

¹²⁸ Orts, ‘Reflexive Environmental Law’, *supra* note 85, 1255–63.

¹²⁹ Dorit Kerret, *Don’t Judge a Book By Its Cover: Use of an Analytic Framework and Empirical Data in Analyzing Environmental Policy Tools*, 42 ENVTL. L. REP. 10078 (2012).

dissemination of emissions data.¹³⁰ The widespread availability of networked digital telecommunication systems creates the possibility of new forms of informational regulation. These will increasingly empower individual citizens and will involve interactive, customisable, and more quickly updated interfaces. The systems are likely to be increasingly collaborative, with government still playing a key role but somewhat displaced to the position of convener and facilitator. The capacities of ordinary users, information disclosers, and regulators will be expanded by these new systems.¹³¹ However, as with any human system, they will be vulnerable to distortion, panic, and manipulation.¹³²

IV.B Rationales for Regulation by Disclosure

A reflexive model of behaviour control is ‘a social theoretical perspective rather than a strictly legal one’ and operates in quite a different way to traditional black letter, command-and-control mechanisms, simultaneously acknowledging and seeking to control individual autonomy.¹³³ The mechanisms of change are public pressure and communication, which seek to expand the usual scope of government activity.¹³⁴ Reflective law acknowledges its own limits, the limits of the system in which it operates, and the limits of individual humans. It seeks to continually learn and improve, while accepting that it can never provide a comprehensive solution to social problems.¹³⁵ It can also be applied in a way that takes advantage of the insights of the ‘tri-partism’ theory of regulation,¹³⁶ by using disclosure as a way of introducing third parties into the regulatory process.¹³⁷

Writing in the context of the regulation of toxic chemicals, but with an analysis that can clearly be extended to other domains, Lyndon states that information on toxicity is a public good and is therefore not readily produced by the market because of free rider issues¹³⁸ and concerns about tort liability create a disincentive for firms to build a full picture of the consequences of their products are placed on the market.¹³⁹ There is therefore a need for

¹³⁰ Dennis D Hirsch, *Globalization, Information Technology, and Environmental Regulation: An Initial Inquiry*, 20 VA. ENVTL. L.J. 57, 72 (2001).

¹³¹ FUNG, GRAHAM, AND WEIL, *supra* note 88, at 152–8.

¹³² *Id.* at 164–5.

¹³³ Orts, *supra* note 86, at 780.

¹³⁴ GRAHAM, *supra* note 121, at 10–11.

¹³⁵ Orts, *supra* note 85, at 1265–7.

¹³⁶ IAN AYRES AND JOHN BRAITHWAITE, *RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE* (1992).

¹³⁷ Orts, *supra* note 86, at 787.

¹³⁸ Mary L Lyndon, *Information Economics and Chemical Toxicity: Designing Laws to Produce and Use Data*, 87 MICH. L. REV. 1795, 1810 (1989).

¹³⁹ *Id.* at 1817.

regulatory intervention to create more transparency.¹⁴⁰

Regulation by disclosure has been labelled ‘ “populist maxi-min regulation,” which can be thought of simply as a kind of environmental blacklisting.’¹⁴¹ The requirement that information on environmental performance be disclosed may drive behaviour change in a number of ways. It can focus the minds of senior management on a problem that has hitherto been hidden,¹⁴² or unnoticed.¹⁴³ For commercial firms, the incentive may be the impact on financial performance: the stock market seems to read new information on pollution emissions as indicative of future performance and future costs, something which can directly impact on share prices.¹⁴⁴ Requiring firms to provide information to the public reduces the transaction costs incurred by individuals in gathering information on pollution, thus mitigating or eliminating the information asymmetry that would otherwise exist between the citizen and the corporation.¹⁴⁵ The social impact of being explicitly highlighted for bad performance in a ‘name and shame’ campaign may serve as a form of punishment.¹⁴⁶ It can also serve to alert consumers to a problem, thus motivating them to put pressure elsewhere in the regulatory structure in order to bring about change.¹⁴⁷ Finally, firms come under significant external pressure to act in line with an implicit ‘social contract’ which constrains their behaviour in ways that go beyond the strict legal requirement but may be a rational response to an expectation of further regulation in the future;¹⁴⁸ the use of disclosure requirements to highlight transgressions of these unspoken rules may incentivise higher levels of compliance.

On a more positive note, the possibility of benchmarking a firm’s performance against its peers gives managers a greater understanding of what is and is not possible and helps in driving a process of continuous improvement.¹⁴⁹ The use of more flexible regulatory tools

¹⁴⁰ *Id.* at 1825.

¹⁴¹ Archon Fung and Dara O’Rourke, *Reinventing Environmental Regulation From the Grassroots Up: Explaining and Expanding the Success of the Toxics Release Inventory*, 25 ENVTL. MGMT. 115, 120 (2000).

¹⁴² GRAHAM, *supra* note 121, at 21–3.

¹⁴³ Shakeb Afsah, Allen Blackman, and Damayanti Ratunanda, *How Do Public Disclosure Pollution Control Programs Work? Evidence From Indonesia* (2000), <http://core.kmi.open.ac.uk/download/pdf/9308153.pdf>.

¹⁴⁴ Shameek Konar and Mark A. Cohen, *Information as Regulation: The Effect of Community Right to Know Laws on Toxic Emissions*, 32 J. ENVTL. ECON. & MGMT. 109 (1997).

¹⁴⁵ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 38–40.

¹⁴⁶ Yeung, *supra* note 99, at 374.

¹⁴⁷ Katherine Renshaw, *Sounding Alarms: Does Informational Regulation Help or Hinder Environmentalism?*, 14 N.Y.U. ENVTL. L. J. 654 (2005).

¹⁴⁸ Neil Gunningham, Robert A Kagan, and Dorothy Thornton, *Social License and Environmental Protection: Why Businesses Go Beyond Compliance*, 29 L. & SOC. INQUIRY 307 (2004).

¹⁴⁹ Karkkainen, *supra* note 31, at 261.

allows regulators to avoid an ‘information bottleneck’ and respond quickly to a fast-moving and complex marketplace and changes in technology,¹⁵⁰ at a relatively low cost.¹⁵¹ It can bring new information on environmental impacts to the attention of decision-makers and provide a framework within which data is readily available for the purposes of ongoing monitoring.¹⁵² It can also enable those not involved in the day-to-day operations of an entity, such as the Board of Directors or external investors, to assess and compare its performance.¹⁵³ This type of pressure may also be effective in reducing greenhouse gas emissions,¹⁵⁴ leading to NGOs calling for greater disclosure of emissions and the United States EPA requiring large emitters to track these.¹⁵⁵ Similarly, poor national performance on comparative measures of environmental performance can be a significant spur for action.¹⁵⁶

IV.C Applications of Regulation by Disclosure

Perhaps the best-known example of the application of information disclosure in environmental regulation, developed as a response to a catastrophic leak of toxic chemicals at the Union Carbide plant in Bhopal India,¹⁵⁷ is the US Toxics Release Inventory (TRI), required under section 313 of the Emergency Planning and Community Right-To-Know Act. This requires regulated firms to submit annual data to the EPA on the volumes of certain toxic chemicals released into the air, water, land or transferred off-site. This information is made publicly accessible through an online database and otherwise. It is reported and commented upon by the media and environmental NGOs. It seems to have reduced the release of chemicals subject to reporting requirements by as much as 40%¹⁵⁸ or perhaps even 61%¹⁵⁹ and as much as 82% in some locations.¹⁶⁰ There may be other reasons for this reduction, such as other regulations, changes in production levels, and improvements in technology, but it seems clear that TRI was a success and brought about significant voluntary reductions in chemical releases.¹⁶¹ Similar programmes have been applied successfully at the state level in

¹⁵⁰ *Id.* at 263–4.

¹⁵¹ *Id.* at 291–2.

¹⁵² *Id.* at 297–8.

¹⁵³ *Id.* at 299–300.

¹⁵⁴ Andrew Schatz, *Regulating Greenhouse Gases By Mandatory Information Disclosure*, 26 VA. ENVTL. L.J. 335 (2008).

¹⁵⁵ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 9.

¹⁵⁶ Esty, *supra* note 15, at 168.

¹⁵⁷ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 11.

¹⁵⁸ Case, *supra* note 94, at 10775.

¹⁵⁹ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 15.

¹⁶⁰ JAMES T. HAMILTON, *REGULATION THROUGH REVELATION: THE ORIGIN, POLITICS, & IMPACTS OF THE TOXICS RELEASE INVENTORY PROGRAM*, 4 (2005).

¹⁶¹ Karkkainen, *supra* note 31, at 287–8.

the US.¹⁶²

The TRI seems to focus the attention of senior management to the issue in a way that brings about change.¹⁶³ It also helps to create (unfavourable) news stories and impacts on stock prices.¹⁶⁴ These news stories are a significant incentive for firms to reduce pollution.¹⁶⁵ The TRI may succeed because in addition to the reflexive impact, it allows for benchmarking and demands continuous improvement.¹⁶⁶ There seems to be a connection between the impact of emissions disclosure on the stock price of a particular firm and subsequent emissions reduction efforts by that firm.¹⁶⁷

A similarly successful exercise is California's Proposition 65,¹⁶⁸ which requires manufacturers to place labels on products warning consumers of associated health risks,¹⁶⁹ and which has met with some success¹⁷⁰ but also some criticism.¹⁷¹ In Massachusetts, mandatory reporting to customers on the quality of their water seems to have reduced health violations.¹⁷² The provision of information on the existence of lead paint in a house can have an impact on mitigation behaviour but this is not the same across all income levels.¹⁷³ In England and Wales, the release of information through the Environment Agency's Pollution Inventory has reduced emissions from the chemical industry.¹⁷⁴ Disclosure can also be used by international organizations and NGOs as a means of putting pressure on states that are not complying with multi-lateral environmental agreements.¹⁷⁵

¹⁶² Lori Snyder Benneer, *Are Management-Based Regulations Effective? Evidence From State Pollution Prevention Programs*, 26 J. POL'Y ANALYSIS & MGMT. 327 (2007).

¹⁶³ HAMILTON, REGULATION THROUGH REVELATION, *supra* note 160, at 54.

¹⁶⁴ *Id.* at 58–74.

¹⁶⁵ *Id.* at 190.

¹⁶⁶ Karkkainen, *supra* note 31, at 261.

¹⁶⁷ Konar and Cohen, *supra* note 144; Madhu Khanna, Wilma Rose H. Quimio, and Dora Bojilova, *Toxics Release Information: A Policy Tool for Environmental Protection*, 36 J. ENVTL. ECON. & MGMT. 243 (1998).

¹⁶⁸ The Safe Drinking Water & Toxic Enforcement Act of 1986.

¹⁶⁹ Karkkainen, *supra* note 31, at 345.

¹⁷⁰ Vandenbergh, *supra* note 96, at 610.

¹⁷¹ Bradley Karkkainen, Keynote: 'You manage what you measure': Information, Incentives, & the Architecture of Environmental Regulation (June 20, 2013), <http://ict4er.org/ict4er-2013/>.

¹⁷² Lori S. Benneer and Sheila M. Olmstead, *The Impacts of the "Right To Know": Information Disclosure and the Violation of Drinking Water Standards*, 56 J. ENVTL. ECON. & MGMT. 117 (2008).

¹⁷³ Hyunhoe Bae, Peter Wilcoxon, and David Popp, *Information Disclosure Policy: Do State Data Processing Efforts Help More Than the Information Disclosure Itself?* 29 J. POL'Y ANALYSIS & MGMT. 163 (2010).

¹⁷⁴ Andy Gouldson, *Risk, Regulation and the Right to Know: Exploring the Impacts of Access to Information on the Governance of Environmental Risk*, 12 SUSTAINABLE DEV. 136 (2004).

¹⁷⁵ Jennifer Shkabatur, *A Global Panopticon—the Changing Role of International Organizations in the Information Age*, 33 MICH. J. INT'L L. 159, 16–8 (2011).

IV.D Avoiding Technological Determinism

In light of the spread of disclosure-based schemes and the extent to which these rely on networked computer systems, it is important to examine closely and critically the new and subtle ways in which ICT allows the state to exercise power over its citizens and regulators to exercise power over the entities which it seeks to manage and control,¹⁷⁶ while creating the potential for resistance, individual or collective. As far back as the 1970s, scholars were discovering that the outcomes of computerization programs were politically rather than technologically determined,¹⁷⁷ and Mowshowitz highlighted that

[t]he key issue is the distribution of political power. Information technology may create opportunities for wider participation in decision-making, or it may serve as an instrument of manipulation and coercion.¹⁷⁸

On the positive aspects of ICT, Schmidt and Cohen of Google sketch a future with considerable appeal to those currently disempowered:

The advent and power of connection technologies—tools that connect people to vast amounts of information and to one another—will make the twenty-first century all about surprises. Governments will be caught off-guard when large numbers of their citizens, armed with virtually nothing but cell phones, take part in mini-rebellions that challenge their authority. For the media, reporting will increasingly become a collaborative enterprise between traditional news organizations and the quickly growing number of citizen journalists.¹⁷⁹

However, Webster and Robins query whether this so-called ‘Information Revolution’ is as radical as is claimed.¹⁸⁰ As Bloomfield and others remind us, ‘claims about IT tend to emphasise either discontinuity—it will revolutionise everything ... —or continuity—things will continue as before’,¹⁸¹ and Winner queries what he calls

... mythinformation: the almost religious conviction that a widespread adoption of computers and communications systems along with easy access to electronic information will automatically produce a better world for human living.¹⁸²

Nonetheless, ICT is and will continue to be an important element in social and political change,¹⁸³ albeit not in a deterministic or uni-directional fashion.¹⁸⁴ Therefore, the result of

¹⁷⁶ Koops, *supra* note 111, at 992.

¹⁷⁷ KENNETH C LAUDON, *COMPUTERS & BUREAUCRATIC REFORM: THE POLITICAL FUNCTIONS OF URBAN INFORMATION SYSTEMS* (1974).

¹⁷⁸ ABBE MOWSHOWITZ, *THE CONQUEST OF WILL: INFORMATION PROCESSING IN HUMAN AFFAIRS*, 188 (1976).

¹⁷⁹ Eric Schmidt and Jared Cohen, *The Digital Disruption: Connectivity and the Diffusion of Power*, 89 *FOR. AFF.* 75 (2010).

¹⁸⁰ Frank Webster and Kevin Robins, *Plan and Control*, 18 *THEORY & SOC.* 323 (1989).

¹⁸¹ Brian P Bloomfield et al, *Introduction: The Problematic of Information Technology and Organization*, in *INFORMATION TECHNOLOGY & ORGANIZATIONS: STRATEGIES, NETWORKS, & INTEGRATION*, 1, 2 (Brian P Bloomfield et al. eds., 1997).

¹⁸² Winner, *supra* note 113.

¹⁸³ Richard Heeks, *Reinventing Government in the Information Age*, in *REINVENTING GOVERNMENT IN THE INFORMATION AGE: INTERNATIONAL PRACTICE IN IT-ENABLED PUBLIC SECTOR REFORM*, 9, 15 (Richard Heeks ed., 1999).

increasing application of ICT is not the same across all fields of endeavour. In human rights activism, for example, ICT assists in creating capacity for distributed organizations, information gathering, and holding governments accountable, but also creates more opportunities for interception and surveillance.¹⁸⁵ Sassen points out how what she calls ‘the three properties of digital networks—decentralized access/distributed outcomes, simultaneity, and interconnectivity ... have produced strikingly different outcomes’ in electronic financial networks and electronic activist networks: the first were centralised and the second more locally and globally distributed. She highlights the need to consider what ‘social logics’ are driving changes within a particular network.¹⁸⁶ There is a need for similar research with regard to ICT and environmental regulation.

The reality is likely to be less predictable, more complex, and much more situationally specific than Schmidt and Cohen’s positive but deterministic prediction. We must remember that ‘[p]olitics will shape the information revolution as much as vice versa.’¹⁸⁷ However, there is a lack of useful research on these issues,¹⁸⁸ and the social sciences are still working to understand ICT.¹⁸⁹

Despite these uncertainties, the application of ICT in ER can create opportunities for changing power relationships, including new opportunities for resistance. Hamilton discusses how TRI data was analysed using Geographic Information Systems to highlight how pollution impacts more highly on communities of colour and poorer communities in the United States of America, providing information which was used by those advocating for environmental justice.¹⁹⁰ In a later work, he highlights how the Environmental Working Group (EWG), an NGO, was able to take the raw data provided by the United States Department of Agriculture (USDA), process it and place it online with detailed commentary that highlighted how a farm subsidy scheme intended to enhance land conservation was benefiting large producers to a disproportionate extent. These lessons were contained in the USDA data, but were not sufficiently analysed by the government; its release to the public enabled EWG to have a

¹⁸⁴ Doolin, *supra* note 108, at 307; JANNIS KALLINIKOS, *GOVERNING THROUGH TECHNOLOGY: INFORMATION ARTEFACTS & SOCIAL PRACTICE*, 17–8 (2011).

¹⁸⁵ Stephanie Hankey and Daniel Ó Clunaigh, *Rethinking Risk and Security of Human Rights Defenders in the Digital Age*, 5 *J. HUM. RTS. PRAC.* 535 (2013).

¹⁸⁶ Saskia Sassen, *Interactions of the Technical and the Social*, 15 *INFO., COMM. & SOC.* 455, 3–4 (2012).

¹⁸⁷ Robert O Keohane and Joseph S Nye Jr, *Power and Interdependence in the Information Age*, 1998 *FOR. AFF.* 81, 85 (1998).

¹⁸⁸ Philipp Zimmermann and Matthias Finger, *Information- and Communication Technology (ICT) and Local Power Relationships: An Impact Assessment*, 3 *ELECTRONIC J. E-GOVERNMENT* 231 (2005).

¹⁸⁹ SASKIA SASSEN, *TERRITORY, AUTHORITY, RIGHTS: FROM MEDIEVAL TO GLOBAL ASSEMBLAGES*, 329 (2006).

¹⁹⁰ HAMILTON, *REGULATION THROUGH REVELATION*, *supra* note 160, at 234–9.

significant impact on public discourse.¹⁹¹

In this regard, it is important to bear in mind that disciplinary power (such as physical punishment or imprisonment) has not been replaced by network power (such as surveillance), but that the latter ‘is currently transforming social relations and allowing other forms of power to be brought to bear’¹⁹² by controlling the flow of information within the network. ICT is nonetheless significant. Michael, writing about urban planning in the early years of computerization but with an analysis that can be extended to other forms of governmental and regulatory activity, points out that

... control ... [and] power, will increasingly be based on access to and control of information and the means for generating new knowledge out of it. ... [This] takes on significant new aspects when the computer provides an improved basis for choosing among options.¹⁹³

IV.E Difficulties with Disclosure

In light of this discussion, it should come as no surprise that disclosure-based regulatory schemes are not perfect:

Most information is not meaningful in itself, but requires interpretation and analysis. Because not all information is relevant to making an informed decision, more information is not always better. It is often claimed that people are smart enough to sort through the information they are given, but this argument can be taken too far, especially when the information is highly technical. Indeed, information-gathering or labeling that is excessive or too detailed can easily confuse, mislead, or be used to manipulate consumers; it may make people misperceive risks, misallocate resources, and frustrate health, safety, and environmental objectives.¹⁹⁴

Overall, the impact of ‘regulation through disclosure’ is still not adequately studied or properly understood. Its results may be limited,¹⁹⁵ it does not always achieve the desired results,¹⁹⁶ and the response from practitioners is not always positive.¹⁹⁷

More information is not necessarily better but may instead cause overload and poorer decision-making.¹⁹⁸ Simply disclosing ‘raw’ data may not have a significant impact on

¹⁹¹ JAMES T. HAMILTON, CONSERVING DATA IN THE CONSERVATION RESERVE: HOW A REGULATORY PROGRAM RUNS ON IMPERFECT INFORMATION, 78–90 (2010).

¹⁹² Lain Munro, *Non-Disciplinary Power and the Network Society*, 7 ORGANIZATION 679, 693 (2000).

¹⁹³ Donald N Michael, *On Coping With Complexity: Planning and Politics*, 1968 DAEDALUS 1179, 1182.

¹⁹⁴ Alexander Volokh, *The Pitfalls of Environmental Right-to-Know*, 2 UTAH L. REV. 805, 807 (2002).

¹⁹⁵ Geraint Howells, *The Potential and Limits of Consumer Empowerment By Information*, 32 J. L. & SOC. 349 (2005).

¹⁹⁶ Klaus Dingwerth and Margot Eichinger, *Tamed Transparency: How Information Disclosure Under the Global Reporting Initiative Fails to Empower*, 10 GLOBAL ENVTL POL. 74 (2010).

¹⁹⁷ Yeung, *supra* note 99, at 375.

¹⁹⁸ Douadia Bougherara, Gilles Grolleau, and Naoufel Mzoughi, *Is More Information Always Better? An Analysis Applied to Information-Based Policies for Environmental Protection*, 10 INT’L J. SUSTAINABLE DEV. 197 (2007).

emissions reduction; further processing to make the information useful and relevant to end users increases the possibility that the overall policy goal of reducing health risks will be achieved.¹⁹⁹ There are also social and environmental justice issues, as not all individual and groups have the same capability to analyse and use the information. Seeming reductions in emissions may actually be the result of underreporting rather than better environmental management.²⁰⁰ Reclassification of activities can remove reporting requirements and there may be little reduction in use of toxic chemicals at source.²⁰¹ In addition, polluters may respond strategically to the thresholds in a reporting program. A study of the Massachusetts Toxics Use Reduction Act reveals that there was a ‘a significant behavioral response to regulatory thresholds ...[and] up to 40 percent of the observed decrease in releases in Massachusetts may be artificial declines created by strategic behavior around the reporting thresholds.’²⁰² Finally, implementation (and success) is very context-specific—if the political, legal, and markets conditions are not suitable, it may achieve limited results.²⁰³

IV.E.1 Replicating the Problems of Command-and-Control

The provision of information, by itself, is not a form of risk assessment.²⁰⁴ We should not assume that simply because information is publicly available, it is accurate,²⁰⁵ properly understood,²⁰⁶ or complete. Analysis of the TRI data has revealed that it has contained significant errors in recording the quantity and location of toxic releases.²⁰⁷ If it is not carefully designed, a disclosure program will contain many of the weaknesses ascribed to command and control environment regulation: an unwarranted focus on major sources, a lack of discrimination between pollution types, or little incentive for further research.²⁰⁸

¹⁹⁹ Bae, Wilcoxon, and Popp, *supra* note 173.

²⁰⁰ Dinah A. Koehler and John D. Spengler, *The Toxic Release Inventory: Fact or Fiction? A Case Study of the Primary Aluminum Industry*, 85 J. ENVTL. MGMT. 296 (2007).

²⁰¹ Thomas E Natan and Catherine G Miller, *Are Toxics Release Inventory Reductions Real?* 32 ENVTL. SCI. & TECH., 368A, 373A (1998).

²⁰² Lori Snyder Benneer, *Strategic Response to Regulatory Thresholds: Evidence from the Massachusetts Toxics Use Reduction Act*, 2 (2005), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=776504.

²⁰³ Eungkyoon Lee, *Information Disclosure and Environmental Regulation: Green Lights and Gray Areas*, 4 REG. & GOVERNANCE 303 (2010).

²⁰⁴ Susan E Dudley, *It is Time to Reevaluate the Toxic Release Inventory*, 12 MO. ENVTL. L & POL’Y REV. 1, 6 (2004).

²⁰⁵ Mark A Cohen, *Information as a Policy Instrument in Protecting the Environment: What Have We Learned?*, 31 ENVTL. L. REP. 10425, 10427 (2001).

²⁰⁶ GRAHAM, *DEMOCRACY BY DISCLOSURE*, *supra* note 121, at 141–2.

²⁰⁷ Dudley, *supra* note 204, at 16.

²⁰⁸ William F Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*, 25 HARV. ENVTL. L. REV. 151, 176 (2001).

IV.E.2 Gaming the System

Although the application of ICT as a tool for reflexive environmental governance has great potential, practical implementations require careful design due to Goodhart's Law: 'any observed statistical regularity will tend to collapse once pressure is placed on it for control purposes'.²⁰⁹ Seeming reductions in emissions may actually be the result of underreporting rather than better environmental management.²¹⁰ In addition, polluters may respond strategically to the thresholds in a reporting program.²¹¹ This type of behaviour is observed in other contexts, such as health care management.²¹² The data provided may also be underestimated through a simple lack of awareness on the part of the reporting entities rather than deliberate attempts at deception or reluctant compliance.²¹³

IV.E.3 Unpredictable Results

Unlike more traditional methods of regulation, such as command and control, informational regulation brings with it no guarantee of results. The data that is presented and used is about the past and is not necessarily a reliable guide to future performance. In addition, informational regulation cannot guarantee any particular level of reduction, or any reduction at all.²¹⁴ Indeed, it can be difficult to directly link emission reductions to a disclosure scheme.²¹⁵ The potential impact of negative information on corporate reputation may lead to changes in management behaviour, and these can be significant, but they can drop off with time.²¹⁶

IV.E.4 Excessive Costs

It is difficult to quantify the benefits of the disclosure of data on environmental harms and risk, and many may be more elusive than real, as the results may be public alarm, erosion of company value and the diversion of funds from salaries to pay for health and safety measures.²¹⁷ The costs of a disclosure regime can be high,²¹⁸ but also very difficult to

²⁰⁹ C.A.E. GOODHART, *MONETARY THEORY & PRACTICE: THE UK EXPERIENCE*, 96 (1984).

²¹⁰ Koehler and Spengler, *supra* note 200; GRAHAM, *DEMOCRACY BY DISCLOSURE*, *supra* note 121, at 48.

²¹¹ Bennear, *supra* note 202, at 2.

²¹² Gwyn Bevan and Christopher Hood, *What's Measured is What Matters: Targets and Gaming in the English Public Health Care System*, 84 *PUB. ADMIN.* 517 (2006).

²¹³ GRAHAM, *supra* note 121, at 47.

²¹⁴ Cohen, *supra* note 205, at 10427.

²¹⁵ Dudley, *supra* note 204, at 14.

²¹⁶ GRAHAM, *supra* note 121, at 144–6.

²¹⁷ Dudley, *supra* note 204, at 10.

²¹⁸ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 10.

measure,²¹⁹ making it hard to assess whether or not it is yielding adequate results.

IV.E.5 Limited Understanding of Sustainability

Many attempts to use measurement and disclosure as tools for behaviour change are rooted in a limited perspective of sustainability as energy efficiency, take a ‘modernist’ perspective on human behaviour and regulation, and are conducted over short timeframes. This narrow focus misses broader social issues about power differences, control, and values, assumes that individuals have a great deal of control over their resource use choices, and that those individuals are rational in their choices.²²⁰ Many such schemes focus on minor, easy changes with limited impact, omitting major, difficult changes which could make a significant difference to overall sustainability.²²¹

IV.E.6 Intractable Habits

Although it is difficult to build comprehensive and reliable data, individuals are responsible for a great deal of pollution.²²² However, regulation is more complicated at this level, as individuals find it difficult to change or even resist externally-imposed behaviours.²²³ Information disclosure can help, by overcoming the limited cognitive capacity of individuals and also creating a market incentive for polluters to change their behaviour.²²⁴ However, changing individual habits is not as easy as we might wish,²²⁵ and many of the behaviours which are important for environmental protection are ongoing and routine (such as managing heating), rather than rare and significant (such as purchasing a motor vehicle), and thus difficult to change.²²⁶

While informational regulation has been somewhat successful in regulating corporate behaviour, its applications to individuals may be more difficult. There is an underlying assumption that consumers are rational and will properly assimilate, understand, and act on

²¹⁹ Yeung, *supra* note 99, at 368.

²²⁰ Hronn Brynjarsdottir et al, *Sustainably Unpersuaded: How Persuasion Narrows Our Vision of Sustainability*, in PROCEEDINGS OF THE 2012 ACM ANNUAL CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS, 947 (Joseph A. Konstan, Ed H. Chi, and Kristina Höök eds., 2012).

²²¹ Susie Moloney and Yolande Strengers, “Going Green”?: *The Limitations of Behaviour Change Programmes as a Policy Response to Escalating Resource Consumption*, 24 ENVTL. POL’Y & GOVERNANCE 94 (2014).

²²² Vandenbergh, *supra* note 96, at 537–84.

²²³ Michael Vandenbergh, *Order Without Social Norms: How Personal Norm Activation Can Protect the Environment*, 99 Nw. U. L. REV. 1101, 1103 (2004).

²²⁴ Christopher H Schroeder, *Third Way Environmentalism*, 48 KANSAS LAW REVIEW 1, 18–23 (1999).

²²⁵ Vandenbergh, *supra* note 223, at 593–4.

²²⁶ Michael Vandenbergh and Anne C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1696–7 (2007).

information provided. However, studies indicate that this is not necessarily true.²²⁷ Individuals may not easily understand the information that is released, and therefore not put it to the best possible use.²²⁸ The most successful uses of information regulation are ‘user-centred’, focusing ‘first on the needs and interests of information users, as well as their abilities to comprehend the information provided by the system.’²²⁹ Therefore, ‘information programs must convey information in a form that can be easily processed, and in an accurate and meaningful way that will enable individuals to make informed decisions.’²³⁰

Any regulatory scheme aimed at changing individual behaviour will need to include public education as a significant component,²³¹ particularly if it relies on informational regulation.²³² In addition, even if the necessary willingness and ability to change exists, an individual consumer may be unable to follow through on that motivation because of practical barriers.²³³

IV.E.7 Privacy and Confidentiality

The success of the TRI has led one academic to call for an ‘individual toxic release inventory’ or ‘individual carbon release inventory’ (ICRI), arguing that this would activate personal norms in favour of environmental protection.²³⁴ However, individualised environmental information carries with it privacy issues which must be carefully balanced with the environmental goals.²³⁵ In opposing mandatory disclosure regimes, individuals may appeal to a right to privacy and companies to a need for confidentiality. Nonetheless, these may not be properly-founded and rely on these widely-values as an excuse to avoid scrutiny.²³⁶

Commercial entities have argued that disclosure-based schemes require them to reveal commercially sensitive information about their operations,²³⁷ and national security concerns can make government reluctant to make too much available information on catastrophic risks in easy-to-access form.²³⁸ This can have a distorting effect on the institutional design of these

²²⁷ Yeung, *supra* note 99, at 368–9.

²²⁸ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 10.

²²⁹ FUNG, GRAHAM, AND WEIL, *supra* note 88, at 11.

²³⁰ WESLEY A MAGAT AND W KIP VISCUSI, *INFORMATIONAL APPROACHES TO REGULATION*, 17 (1992).

²³¹ Hope M Babcock, *Assuming Personal Responsibility for Improving the Environment: Moving Toward a New Environmental Norm*, 33 *HARV. ENVTL. L. REV.* 117 (2009).

²³² Peter S Menell, *Structuring a Market-Oriented Federal Eco-Information Policy*, 54 *MD. L. REV.* 1435 (1995).

²³³ Vandenberg and Steinemann, *supra* note 226, at 1697–8.

²³⁴ Vandenberg, *supra* note 223; Vandenberg and Steinemann, *supra* note 226, at 1712.

²³⁵ Katrina Fischer Kuh, *Personal Environmental Information: The Promise and Perils of the Emerging Capacity to Identify Individual Environmental Harms*, 65 *VAND. L. REV.* 1565 (2012)

²³⁶ Yeung, *supra* note 99, at 368.

²³⁷ GRAHAM, *supra* note 121, at 56.

²³⁸ *Id.* at 57–8.

schemes.²³⁹

IV.E.8 Muddying the Rule of Law

It is a fundamental principle of the rule of law that there should be clear boundaries between acceptable and unacceptable behaviour.²⁴⁰ Reflexive regulation may breach this as, unlike formal law, is rarely explicit: much of it lies invisible or unexplained to the ordinary citizen or regulated firm. This makes it difficult to challenge, as it will often rely on informal mechanisms of control. This presents difficulties in respecting individual autonomy and human rights, as there is often no clear administrative decision or redistribution of resources to challenge before a court.

V Improving Disclosure-Based Schemes

V.A Information in Environmental Regulation

Information may be a key aspect of the environmental regulation process, particularly schemes of regulation by disclosure, but it is often flawed or incomplete.²⁴¹ Although regulators rely on a wide and changing range of information in order to quantify and reduce pollution, information-gathering requirements are usually an afterthought in regulatory schemes and lead to large volumes of *data* but little *information*.²⁴² In addition, technological constraints often limit the capacity, scope, and effectiveness of environmental regulation.²⁴³ However, information-forcing regulation can provide more flexible regulatory systems that preserve accountability.²⁴⁴

The environment is often understood through information; indeed, it can be conceptualised as a web of information.²⁴⁵ The availability of a wide range and depth of ‘information’, particularly numerical data, regarding the environment, together with ready access to digital computer technology to process this, opens up the appealing vista identified by Professor Esty,²⁴⁶ of computers extending the span of human decision-making and control beyond what

²³⁹ *Id.* at 147.

²⁴⁰ Paul Craig, Formal and Substantive Conceptions of the Rule of Law: An Analytical Framework, 1997 PUB. L. 467, 467.

²⁴¹ Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 TEX. L. REV. 1600 (2008).

²⁴² Karkkainen, *supra* note 31, at 283–85.

²⁴³ DANIEL H. COLE, POLLUTION & PROPERTY: COMPARING OWNERSHIP INSTITUTIONS FOR ENVIRONMENTAL PROTECTION, 67–84 (2002).

²⁴⁴ Bradley C. Karkkainen, *Information-Forcing Environmental Regulation*, 33 FLA. ST. U. L. REV. 861 (2005).

²⁴⁵ Jim Chen, *Webs of Life: Biodiversity Conservation as a Species of Information Policy*, 89 IOWA L. REV. 495 (2004).

²⁴⁶ Esty, *supra* note 15.

was already achieved during the Industrial Revolution.²⁴⁷

However, although measurement is fundamental to many environmental regimes, it is often imprecise.²⁴⁸ The process of standardising measurement on a national or global basis is anything but straightforward.²⁴⁹ It is very difficult to estimate the resulting costs with a great degree of precision, and difficulties of method make it difficult to produce useful numerical figures.²⁵⁰

Environmental regulatory regimes must therefore be designed around limitations in information. This can take three different forms: uncertain information ('scientific and technical questions that are unlikely to have immediate or even short-term answers'²⁵¹), imperfect information ('available, or nearly so, only it lies with certain parties who are disinclined to share it'²⁵²) and emergent information (where 'scientific research or information ... has not been fully vetted or accepted by the scientific community'²⁵³). Failing to take these information gaps into account can lead to regulatory failure.²⁵⁴

Regulators can attempt to strengthen their response to inadequate information in a number of different ways: acknowledging the uncertainty (through, for example, the precautionary principle); shifting the burden of proving that an activity is unsafe to a particular party (usually the applicant for permission); establishing legal standards that require 'sound science' (such as the Data Quality Act); a focus on the consequences of a worst-case scenario; working towards a consensus between regulators and the regulated; developing simple standards-based approaches to estimate and avoid harm; and adaptive eco-system management.²⁵⁵

It is clear, therefore, that we need to gather more information on the operation of informational regulation.²⁵⁶ We also need to bear in mind that 'reflexive legal rationality requires institutional legal structures, cognitive models of reality, and normative

²⁴⁷ See Section II.A.

²⁴⁸ Judith Jones, *Regulatory Design for Scientific Uncertainty: Acknowledging the Diversity of Approaches in Environmental Regulation and Public Administration*, 19 JOURNAL OF ENVIRONMENTAL LAW 347, 348–9 (2007).

²⁴⁹ THEODORE M PORTER, TRUST IN NUMBERS: THE PURSUIT OF OBJECTIVITY IN SCIENCE & PUBLIC LIFE, 21–32 (1995).

²⁵⁰ Richard Macrory, *Regulating in a Risky Environment*, in REGULATION, ENFORCEMENT & GOVERNANCE IN ENVIRONMENTAL LAW, 155, 158 (2010).

²⁵¹ Wendy E Wagner, *Stormy Regulation: The Problems That Result When Stormwater (and Other) Regulatory Programs Neglect to Account for Limitations in Scientific and Technical Information*, 9 CHAPMAN L. REV. 191, 194–5 (2006).

²⁵² *Id.* at 195.

²⁵³ *Id.* at 196.

²⁵⁴ *Id.* at 197.

²⁵⁵ Jones, *supra* note 248, at 352–63.

²⁵⁶ Cohen, *supra* note 205, at 10425; Vandenberg, *supra* note 96, at 622.

characteristics quite different from its substantive counterpart'.²⁵⁷ This Article therefore concludes with some recommendations for constructing schemes of environmental regulation that depend on disclosure in the context of ICT.

V.B Use as Part of Overall Strategy

It has been suggested that informational regulation is best used as a complement to market-based and command-and-control approaches to regulation.²⁵⁸ There is therefore significant promise in 'hybrid policies' which use a variety of strategies rather than focusing solely on regulation,²⁵⁹ particularly when combined with the power of ICT.

V.C Institutional Design

It is necessary to gather large quantities of information, but without forgetting that it is possible to drown in data and for decision-makers to be overwhelmed by the range of facts and figures that they must assimilate in order to come to a conclusion.²⁶⁰ Institutional factors which frame the context for decision-making, such as the range of possible actions, the standards of proof and exclusionary rules that apply, and the oversight arrangements can influence the creation, collection, and consideration of information in regulatory processes. A well-designed institutional scheme can do much to overcome the reluctance of individual regulatory staff or agencies to expend too much resources (as seen from their perspective) in information-gathering efforts.²⁶¹ Graham suggests four principles: match disclosure to risk, design for accurate metrics and reporting, recognize disclosure as a continuum, (with tiers), and construct dynamic systems that can incorporate feedback and changes to the external policy environment.²⁶² In order to be effective, informational regulation must be sustainable, gaining in use, accuracy, and scope over time.²⁶³ An important determinant of the success of a disclosure base regulation scheme is that the 'information that is mandated in a disclosure system is integrated into the decision-making processes of a policy's intended users.'²⁶⁴

A significant aspect of the effectiveness of informational regulation, particularly at the individual level, depends on a perception that 'everyone else is doing it'.²⁶⁵ It is therefore

²⁵⁷ Gunther Teubner, *Substantive and Reflexive Elements in Modern Law*, 17 L. & SOC. REV. 239, 256 (1983).

²⁵⁸ Stewart, *supra* note 3, at 143.

²⁵⁹ KRAFT, STEPHAN, AND ABEL, *supra* note 118, at 197.

²⁶⁰ Wendy E Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L. J. 1321 (2010).

²⁶¹ Matthew C Stephenson, *Information Acquisition and Institutional Design*, 124 HARV. L. REV. 1422 (2011).

²⁶² GRAHAM, *supra* note 121, at 153–5.

²⁶³ FUNG, GRAHAM, AND WEIL, *supra* note 88, at 109.

²⁶⁴ David Weil et al, *The Effectiveness of Regulatory Disclosure Policies*, 25 J. POL'Y ANALYSIS & MGMT. 155, 160 (2006).

²⁶⁵ Vandenberg and Steinemann, *supra* note 226, at 1705.

important that in the design and implementation of information regulation, explicit recognition is given to the need to spread the word about the general acceptance and internalization of behaviour change, as well as particular successes, as ‘increases in perceptions of social-norm enforcement can then lead to norm cascades, causing norms to affect large portions of the population.’²⁶⁶

V.D Standardization of Results

In order for information to be useful and usable for regulatory purposes, it must be comparable. There is therefore a need for standardization in reporting methods and metrics,²⁶⁷ which was one of the reasons for the success of the TRI,²⁶⁸ as it allowed for comparison across time and location.²⁶⁹ Adding additional information to corporate disclosures, such as the number of employees or operating hours, may permit more accurate cross-firm comparisons and enable stakeholders to engage more effectively in oversight.²⁷⁰

²⁶⁶ *Id.* at 1708.

²⁶⁷ Cohen, *supra* note 205, at 10428.

²⁶⁸ Karkkainen, *supra* note 31, at 261.

²⁶⁹ *Id.* at 290.

²⁷⁰ Javier Delgado-Ceballos, George I Kassinis, and Juan Alberto Aragón-Correa, *Alternatives From Policies of Disclosure of Companies' Environmental Performance & Connections With the Reduction of Information Asymmetry & Signaling* (2009), <http://www.umdcipe.org/conferences/epckdi/3.pdf>.