FRAMING RULES: BREAKING THE INFORMATION BOTTLENECK

BRADLEY C. KARKKAINEN*

The first generation of environmental law in the United States largely reflected a model of direct regulatory proscription of unwanted individual and corporate behaviors through a series of regulatory commands of the "*thou shalt not*" variety,[1] which this Article will call the "Ten Thousand Commandments."[2] So, for example:

> "Thou shalt not discharge specified pollutants into the nation's waterways beyond specific volumetric tolerances established for your industry and incorporated in your permit."[3]

* Professor and Henry J. Fletcher Chair, University of Minnesota Law School; Founding Fellow, University of Minnesota Institute on the Environment.

[1] There are important exceptions. For example, the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4321–4347 (2000), simply requires federal agencies to produce assessments of the expected environmental impacts of major federal actions, a requirement that has been deemed "procedural only" by the Supreme Court. *See* Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 756–57 (2004) ("NEPA imposes only procedural requirements on federal agencies . . ."). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601–9675 (2000), the so-called "Superfund" hazardous waste clean-up statute, works primarily through a strict liability mechanism and is not directly prohibitory in character. *See* ROBERT V. PERCIVAL, ET AL. ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 366–68 (5th ed., 2006).

[2] I do not know how many environmental regulations are extant, but the number is surely large. The number ten thousand is used here only in a poetic sense, redolent both of the Biblical Ten Commandments and of Minnesota's "10,000 Lakes" which, depending on how one defines a "lake," number somewhere in the range of 11,800 to 15,200. *Compare* MINN. DEP'T. OF NATURAL RES., MINNESOTA FACTS & FIGURES: LAKES, RIVERS, AND WETLANDS FACTS, http://www.dnr.state.mn.us/faq/mnfacts/water.html (last visited Sept. 22, 2008) (stating that Minnesota has 11,842 lakes of 10 or more acres) *with* Univ. of MINN. DEP'T OF ENTOMOLOGY, 10,000 LAKES IN MINNESOTA?, http://www.entomology.umn.edu/chironomidae/MNlakes.htm (last visited Sept. 22, 2008) (stating that depending on definitions, estimates range as high as 15,281 lakes in Minnesota).

[3] More precisely, "the discharge of any pollutant by any person shall be unlawful" except by permit. Federal Water Pollution Control Act, § 301(a), 33 U.S.C. § 1311(a) (2000). "Discharge of a pollutant" is defined to include "any addition of any pollutant to navigable waters from any point source." 33 U.S.C.

> "Thou shalt not cause harm to any fish or wildlife species listed as endangered or threatened."[4]

And so on.

These regulatory proscriptions, in turn, are backed by stiff administrative, civil, and criminal sanctions for non-compliance, enforceable by administrative agencies, federal and state prosecutors, and sometimes ordinary aggrieved citizens through the mechanism of the citizen suit.

By most accounts, these highly prescriptive rules have been reasonably effective at grabbing the "low-hanging fruit" in environmental policy, forcing dramatic reductions in outputs of the most ubiquitous, high-volume pollutants from large stationary sources like industrial facilities and municipal wastewater treatment plants.[5] Critics argue, however, that this progress has come at the price of high compliance costs and disincentives to technological innovation.[6]

The prescriptive approach has generally been less effective at reaching more complex problems, such as the individually small but cumulatively damaging pollution outputs coming from numerous diffuse or mobile sources like automobiles[7] or non-point

§ 1362(12) and "the term 'navigable waters' means the waters of the United States." 33 U.S.C. § 1362(7). Permits are to reflect, inter alia, "effluent limitations for categories and classes of point sources . . . which shall require application of the best available technology economically achievable for such category or class." 33 U.S.C. § 1311(b)(2)(A).

[4] More precisely, "with respect to any endangered species of fish or wildlife listed pursuant to [section 4 of the Endangered Species Act,] it is unlawful for any person subject to the jurisdiction of the United States to . . . take any such species within the United States or the territorial sea of the United States [or to] take any such species upon the high seas." Endangered Species Act § 9(a)(1), 16 U.S.C. § 1538(a)(1) (2000). For purposes of this statute, "[t]he term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 U.S.C. § 1532(19). By regulation, the prohibition on "take" also applies to species of fish or wildlife listed as threatened, except as otherwise provided by rule. *See* 50 C.F.R. § 17.31 (extending prohibition on "take" to threatened wildlife species except as otherwise provided).

[5] *See* Jonathan H. Adler, *Free & Green: A New Approach to Environmental Protection*, 24 HARV. J. L. & PUB. POL'Y 653, 658–59 (2001) ("The initial generation of environmental policy was effective principally because it was plucking low-hanging fruit; removing lead from gasoline and preventing the disposal of raw sewage in rivers were relatively easy issues to address.")

[6] *See, e.g.*, Bruce Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1335–40 (1985).

[7] While strict emissions controls on new cars have reduced the average

source run-off from farms and urbanized areas.[8] Nor has it been very effective at controlling small-volume but potentially high-impact toxic pollutants, except perhaps in those rare cases where the regulatory solution was a technology-based standard or an outright ban on the manufacture, use, or environmental release of a specified substance.[9] Nor, finally, has this approach been very effective in the more complex and integrative tasks of protecting ecosystems.[10]

Almost from the outset of the era of prescriptive environmental regulation, the policy arena has been awash in proposals for regulatory reform, reinvention, and reorientation. These reform proposals vary in their specifics, but they tend to share some common features. Generally, the reformers call for more flexible, less *dirigiste* approaches to environmental regulation through such varied mechanisms as market-based cap-and-trade programs,[11] pigovian "green taxes,"[12] negotiated

pollution output per vehicle-mile traveled, especially in newer cars, this approach has done nothing to curb the growth in the number of automobiles and the average miles traveled, factors which have largely offset technology-induced gains in pollution efficiency. *See* Christopher Schroeder, *Regulating Automobile Pollution: An Environmental Success Story for Democracy?*. 20 ST. LOUIS U. PUB. L. REV. 21, 42 (2001) (stating that the "federal government's overall policy toward frequency of automobile use has actually undermined air quality improvement goals" by "making reliance on the automobile even more attractive compared to the alternatives," increasing vehicle miles traveled (VMT) both directly and indirectly); Craig N. Oren, *Getting Commuters Out of Their Cars: What Went Wrong?* 17 STAN. ENVTL. L.J. 141, 160 (1998) (stating that vehicle miles traveled doubled between 1969 and 1990, with the result that total auto emissions remained at about half their 1970 levels, twice the level they would have been had VMT remained constant).

[8] EPA believes most of the remaining pollution in the nation's rivers and streams comes from non-point sources, largely unregulated under the Clean Water Act. *See* Reed D. Benson, *Pollution Without Solution: Flow Impairment Problems Under Clean Water Act Section 303*, 24 STAN. ENVTL. L.J. 199, 224–25 (2005) (stating that the Clean Water Act "does not effectively regulate nonpoint source pollution" and that polluted run-off from agriculture "constitutes the biggest remaining source of water pollution problems in the nation").

[9] *See* Adam Babich, *Too Much Science in Environmental Law*, 28 COLUM. J. ENVTL. L. 119, 133–34 (2003) (stating that "[t]he most common criticism of risk-based standards is that they do not work"); Howard Latin, *Good Science, Bad Regulation, and Toxic Risk Assessment*, 5 YALE J. ON REG. 89, 89–90 (1988) (arguing that EPA generally regulates toxic pollutants through scientific risk assessment strategies that involve high regulation decision-making costs, ample opportunities for obstructive behavior by parties hostile to regulation, and systematic underprotection against potential toxic hazards).

[10] *See* EDGEWATER CONSENSUS, *infra* note 19.

[11] *See, e.g.*, Ackerman & Stewart, *supra* note 6, at 1341–48.

rulemaking and other forms of contractual or collaborative decision-making,[13] quasi-voluntary "challenge regulation,"[14] and programs that reward self-policing,[15] environmental self-management,[16] and voluntary commitments to superior environmental performance.[17] Despite these many calls for change, however, the statutory and regulatory landscape in the United States has remained remarkably static over the last several decades.

Many of the reform proposals are predicated upon the assumption that the central problem in environmental regulation is the economic and technological inefficiencies and resulting high

[12] *See, e.g.*, Christina K. Harper, *Climate Change and Tax Policy*, 30 B.C. INT'L & COMP. L. REV. 411, 427–29 (2007) (summarizing arguments for taxes on environmental "bads").

[13] *See generally* David A. Dana, *The New "Contractarian" Paradigm in Environmental Regulation*, 2000 U. ILL. L. REV. 35 (2000) (describing the emergence of various forms of contractually based environmental regulation); Daniel A. Farber, *Triangulating the Future of Reinvention: Three Emerging Models of Environmental Protection*, 2000 U. ILL. L. REV. 61, 76–79 (2000) (describing the bilateral "bargaining model" of environmental regulation).

[14] In "challenge regulation," the regulatory agency typically sets up a program with defined environmental protection objectives and publicly issues a "challenge" to industry to voluntarily meet program objectives, while holding out formal public recognition as a positive incentive to participate. *See* E. Donald Elliott, *Environmental TQM: Anatomy of a Pollution Control Program That Works!*, 92 MICH. L. REV. 1840, 1850–52 (1994) (describing the features of such programs and citing as examples EPA's Green Lights, Energy Star, and 33/50 toxic emissions reduction programs).

[15] *See* Sarah Stafford, *Does Self-Policing Help the Environment? EPA's Audit Policy and Hazardous Waste Compliance*, 6 VT. J. ENVTL. L. 1, 1 (2005) (describing and analyzing EPA's "self-policing" policy which reduces or eliminates penalties for self-identified, self-reported, and self-corrected violations).

[16] *See generally* LEVERAGING THE PRIVATE SECTOR: MANAGEMENT-BASED STRATEGIES FOR IMPROVING ENVIRONMENTAL PERFORMANCE (Cary Coglianese & Jennifer Nash eds., 2006) (describing and evaluating environmental protection strategies based on environmental management systems (EMS) and similar approaches); David W. Case, *Changing Corporate Behavior Through Environmental Management Systems*, 31 WM. & MARY ENVTL. L. & POL'Y REV. 75, 108–09 (2006) (arguing that policies to promote or require adoption of corporate environmental management systems could increase compliance with existing environmental laws and reduce currently unregulated environmental impacts and risks).

[17] *See* Dennis D. Hirsch, *Project XL and the Special Case: The EPA's Untold Success Story*, 26 COLUM. J. ENVTL. L. 219, 223–24 (2001) (describing and offering a positive evaluation of EPA's Project XL which offered regulatory relief to firms and facilities making specific commitments to achieve "superior environmental performance').

compliance costs imposed by prescriptive regulation itself.[18] But a public policy failure of at least equal magnitude is to be found in the long list of serious environmental problems that continue to go unaddressed by our current regulatory regime.[19]

These are, of course, not incompatible diagnoses. It could very well be the case *both* that the costs of existing environmental regulations are too high, *and* that our failure to address the remaining environmental problems stems at least in part from our recognition that simply extending familiar forms of regulation into new problem areas would impose unacceptably high costs. That fear appears to be central to the rationale offered by the present Administration for its reluctance to act decisively to curb greenhouse gas emissions, for example.[20]

In my view, however, there is another, equally important barrier to progress in addressing complex environmental problems. Establishing and enforcing detailed, prescriptive regulatory standards is an extremely information-intensive enterprise. Regulators must isolate the problem they are trying to address and come to understand the causal factors contributing to it in sufficiently fine-grained detail to support the development of specific regulatory commands directed toward all or most of the parties who may be in a position to do something about it. This is typically a painfully slow, step-wise, highly technical process, and it places extreme information demands on regulatory agencies.

To set technology-based effluent standards for water pollution, for example, the U.S. Environmental Protection Agency (EPA) must proceed pollutant-by-pollutant and industry-by-industry, setting industry-specific effluent limitations for each pollutant based on the agency's best engineering judgments as to

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[18] *See* Ackerman & Stewart, *supra* note 6, at 1335–40.

[19] *See* OFFICE OF SUSTAINABLE ECOSYSTEMS AND COMMUNITIES, U.S. ENVTL. PROT. AGENCY, TOWARD A PLACE-DRIVEN APPROACH: THE EDGEWATER CONSENSUS ON AN EPA STRATEGY FOR ECOSYSTEM PROTECTION (1997) [hereinafter EDGEWATER CONSENSUS]; SCIENCE ADVISORY BOARD, RELATIVE RISK REDUCTION STRATEGIES COMMITTEE, U.S. ENVTL. PROT. AGENCY, REDUCING RISK: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION (1990).

[20] *See* Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENVTL. L. REV. 1, 35 (2007) (stating that the Bush Administration declined to seek ratification of the Kyoto Protocol because it perceived compliance costs would be unacceptably high and the benefits relatively small because developing countries would not be subject to mandatory curbs on greenhouse gas emissions).

the level of control that might be achieved through the use of the most effective technology presently available in that industry. These highly technical judgments require detailed knowledge of the industry's production methods and processes, material inputs, the process chemistry that results in production of the unwanted pollutant as by-product, and the range of technologies available to reduce, recapture, control, or eliminate the unwanted by-product.[21] This process must be repeated for each industry producing that particular pollutant, and for each pollutant of concern. Small wonder, then, that for more than thirty years EPA has concentrated its efforts on the highest-volume ubiquitous pollutants, while only slowly coming around to establishing standards for hundreds of lower-volume but potentially quite harmful toxic pollutants.[22]

Nor have the regulatory agencies done more than scratch the surface of the gargantuan task of identifying possible toxic pollutants in the first place. Of the 82,000 synthetic chemicals in the EPA's inventory of chemicals in commerce, only a small fraction have ever been subjected to even the most rudimentary toxicity screening, much less to the full battery of tests that would be necessary to establish health-based regulatory standards.[23]

I call this problem the "information bottleneck" in environmental regulation. In my judgment, it is pervasive and severe, but it is not intractable. We may characterize the general problem through the following propositions:

1) *In our free market economy, the general presumption—the default rule—is that an activity is allowed unless it is specifically prohibited or restricted.*
2) *Activities may be prohibited or restricted only for good cause.*
3) *The burden generally falls on the proponent of a prohibition or restriction—generally, a regulatory agency—to justify it.*

[21] *See* Ackerman & Stewart, *supra* note 6, at 1336–37 (describing the high costs and "massive information-gathering burdens" associated with "centralized determination of complex scientific, engineering, and economic issues regarding the feasibility of control on hundreds of thousands of pollution sources").

[22] *See* David Roe, *Ready or Not: The Coming Wave of Toxic Chemicals*, 29 ECOL. L.Q. 623, 625–26 tbl.1 (2002) (stating that in assessing regulation of toxic pollutants, "what stands out is how few standards have been put in place").

[23] *See* Christine H. Kim, Student Essay, *Piercing the Veil of Toxic Ignorance: Judicial Creation of Scientific Research*, 15 NYU ENVTL L.J. 540, 541 (2007).

4) *In the context of environmental (and many other forms of) regulation, the regulatory agency must produce a reasoned explanation, backed by scientific and technical data and information, not only as to why a prohibition or restriction is necessary in general, but as to why the particular restriction chosen is better than the alternatives*.
5) *Judicial review of agency action through the Administrative Procedure Act or comparable statutory judicial review provisions further compounds the difficulty for agencies. Because their justifications and the underlying data and information may be challenged in court, risk-averse agencies seeking to avoid reversal have an incentive to produce ever more detailed analyses incorporating or rebutting all the data and information provided by interested parties during the notice-and-comment period.*
6) *Under this approach, potentially regulated entities have little or no positive incentive—and possibly a disincentive—to cooperate with regulators in identifying potentially harmful pollutants or other environmental risks, or to provide information that might advance the regulator's analytical process and lead to regulation. These parties often do have incentives later in the regulatory process to produce information that would tend to rebut or undermine the agency's own information, data, or analyses, because this may force the agency to modify the proposed rule, to withdraw it, to delay its onset while further analysis is undertaken, or to risk judicial reversal of the regulation.*
7) *Thus, instead of promoting cooperation in information production and disclosure, the regulatory process devolves into an adversarial game in which strategic non-production, non-disclosure, or selective disclosure of asymmetrically held information can be used to thwart, retard, or complicate agency action.*

Understood in this way, the regulatory process certainly appears to be suboptimal. It is important to bear in mind, however, that this is mainly an unintended result. The first generation of environmental law is simply an artifact of an age that firmly (and, we now think, naively) believed in "comprehensive bureaucratic rationality."[24] That is, it assumed that complex societal problems

[24] *Cf.* Colin S. Diver, *Policymaking Paradigms in Administrative Law*, 95

could be solved by assigning the task to smart, dedicated government experts who would objectively, efficiently, and more-or-less costlessly assemble all the relevant scientific and technical data and information, derive from it scientifically and technically informed, efficient, and effective solutions, and reduce the solutions to a series of concise regulatory commands directing the relevant non-governmental parties to take the necessary steps to ensure that the solutions were implemented.

But that project often becomes bogged down at the very first stage. Agency information-gathering, it turns out, is neither efficient nor costless. Because agencies can work on only so many problems at once, the opportunity cost of working on any particular rule is high, virtually guaranteeing that other important problems will go unaddressed. Once the decision is made to work on a rule, the costs of producing that rule, measured in the expenditure of agency personnel time and the costs of the information-gathering and analytical work that must precede it, can be staggering. Even then, the agency is typically working with incomplete information. There may be important gaps in the underlying science. Baseline environmental and public health data may be non-existent, spotty, ambiguous, inconsistent, or simply measured and recorded in incompatible formats. Potentially regulated parties often asymmetrically hold better or additional information, or may be better situated to produce the necessary information, but they may decline to produce or disclose information that might advance the regulatory process. Alternatively, potentially regulated parties may selectively produce and disclose only the data and information they think likely to influence the rulemaking in a direction they perceive to be favorable to their interests. Or yet again, they may seek to bury regulators in a blizzard of data and information, with the aim to

HARV. L. REV. 393, 409–13 (1981) (describing the "comprehensive rationality" model of administrative decision-making in vogue in the 1960s and early 1970s). This view began to emerge in the New Deal of the 1930s and greatly accelerated in the Great Society era of the 1960s which saw an unprecedented expansion of the federal bureaucracy. Our present architecture of federal environmental law is largely the product of a bipartisan consensus in the 1970s that a similar top-down bureaucratic approach was needed to address the problem of environmental protection which had burst onto the national scene with publication of Rachel Carson's inflammatory best-seller *Silent Spring*, some widely publicized fights over natural resource and public lands protection in the American West, and the Santa Barbara oil spill.

retard the regulatory process. Once a rule is in place, neither the agency nor the regulated industry has much in the way of positive, dynamic incentives to improve the information base on that particular problem. Industry tends to treat compliance costs as sunk costs; producing new information might cause the matter to be reopened, possibly leading to new compliance costs. For the agency, the problem is considered solved once the rule is in place; it is time then to move on to the next in a bottomless list of other problems.

What, then, is to be done?

Here I will outline, in very broad terms, some basic principles that in my judgment should inform a reorientation of environmental regulation for the next century, before proceeding to discuss some concrete applications. These principles are as follows:

1) Environmental programs should be structured to create incentives, both positive and negative, for private parties to continuously produce and disclose data and information that is relevant to the identification, understanding, and resolution of environmental problems.
2) Environmental programs should promote decentralized experimentation that can lead to the development of new, more efficient, and more environmentally benign technologies and production processes.
3) We should provide centralized mechanisms for the collection, distillation, analysis, and evaluation of this locally produced data and information, and create mechanisms for its efficient dissemination and diffusion.
4) In addition to centralized data and information collection, we should identify categories of information that are best *produced* centrally due to economies of scale associated with concentrated expertise, and assign responsibility to centralized agencies to conduct or oversee that research.
5) We should structure incentives to maximize the participation of the not-for-profit sector, especially universities and other not-for-profit research organizations, in environmental problem-solving.
6) We should structure all of this in a way that provides maximum incentives, both positive and negative, for the parties best situated to produce the relevant information to

do so.

I call rules aimed at achieving these six desirable outcomes *framing rules*. Unlike the first-generation environmental law of the "Ten Thousand Commandments," framing rules are not designed to operate as prohibitions or mandates to control individual or corporate behaviors directly. Instead, they aim to change the frame for environmental problem-identification and problem-solving by inducing the production and disclosure of knowledge and information that otherwise would be unavailable or difficult to obtain, or by altering the parties' incentives to act cooperatively in environmental problem-solving, rather than strategically attempting to thwart it.

I. SOME EXAMPLES AND APPLICATIONS

A. *NEPA*

The most obvious way to get parties to produce and disclose policy-relevant information is simply to require it, subject to penalties for non-compliance. Although this approach takes the form of a command-style rule, it can be distinguished from the "Ten Thousand Commandments" model insofar as it has a more limited and narrowly tailored objective, seeking not to control behavior directly but rather to influence behavior indirectly by changing the information environment in which decisions are made.

This approach dates back to the first major federal environmental statute of the modern era, the National Environmental Policy Act of 1969 (NEPA).[25] NEPA famously requires federal agencies to provide a comprehensive environmental impact statement (EIS) detailing the expected environmental impacts of, and alternatives to, any proposed action that would "significantly affect[] the quality of the human environment."[26] Proponents of NEPA argue that it has forced federal agencies to be more attentive to the environmental consequences of their actions and opened up agency decision-making to an unprecedented degree of public scrutiny. NEPA's

[25] National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321–4347 (2000)).

[26] 42 U.S.C. 4332(2)(C) (2000).

critics are skeptical of both of these claims, pointing out that production of the required impact assessment is usually farmed out to specialized agency personnel or to outside consultants far from the agency's actual chain of command, and that the required public input and environmental analyses typically come late in the day, after the agency has already de facto, although not legally, committed itself to the proposed course of action.

I have argued elsewhere that both NEPA's advocates and its critics miss the mark.[27] The open-ended information production and disclosure requirements of a formal EIS have turned out to be extremely costly and burdensome, creating a strong incentive for agencies to seek to avoid producing an EIS if at all possible. If the agency is deeply committed to a proposed action that carries high and unavoidable environmental costs, however, production of a formal EIS is generally unavoidable. At present, federal agencies produce approximately 500 full EISs per year,[28] but because that figure includes both draft and final EISs (as well as a few supplementals), we can safely conclude that only about 250 or so federal actions per year are subjected to the rigors of an EIS. This is a significant reduction from the early 1970s, when federal agencies drew up some 2000 EISs per year, even though the scale and scope of federal activities has expanded quite dramatically over that period. This, I submit, is good prima facie evidence that agencies have learned to avoid EISs.

It turns out that in the vast majority of cases, agencies have other options. They usually can, and in 50,000 cases a year do, escape the formal EIS requirement by preparing a slimmed-down document called an Environmental Assessment (EA) supporting a "Finding of No Significant Impact" (FONSI), determining that the environmental impacts of the proposed action will not rise to the EIS-triggering threshold of "significant."[29] To go this route and have it stand up against legal challenge might require the agency to design the project from the outset in a way that minimizes adverse environmental impacts, but from the agency's perspective, that

[27] *See* Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performanc*e, 102 COLUM. L. REV. 903, 906 (2002).

[28] *See* COUNCIL ON ENVTL. QUALITY, THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER TWENTY-FIVE YEARS 19 (1997).

[29] *See id.*

may be a small price to pay to avoid the costs and delays of an EIS, which typically takes several million dollars and from eighteen months to three years to prepare, much more in some cases.

Many agencies take this court-sanctioned escape hatch a step further by pursuing so-called "mitigated FONSIs." In a mitigated FONSI, the agency predicates the EA and FONSI upon mitigation measures specifically designed to keep the overall environmental impacts below the critical EIS-triggering "significant" threshold. Although detailed data on mitigated FONSIs are unavailable, their use appears to be widespread.[30] This device, too, has generally been upheld by the courts.

The widespread use of EAs, FONSIs, and mitigated FONSIs suggests that NEPA has indeed changed the terms of decision-making in federal agency actions, generally elevating the role of environmental considerations, albeit through a circuitous and unexpected backdoor route. By imposing heavy administrative and procedural costs (those associated with EIS production) on agency projects or programs that will cause severe adverse environmental impacts, NEPA backhandedly creates an incentive for agencies either to design projects *ab initio* to reduce their expected environmental impacts below the EIS-triggering threshold, or to add mitigation measures to keep the environmental costs down, obviating the need to produce a costly EIS. In most cases it is unlikely that agencies would have investigated, much less implemented, these environmentally benign design alternatives or mitigation measures absent the incentives created by NEPA. Thus, when all is said and done, it appears that NEPA does in fact change the information environment in which agency decisions are made, leading to environmentally salutary results.[31]

Thus understood, NEPA is a clear example of what I call a *framing rule*. It does not directly mandate that agencies choose environmentally benign alternatives. But by forcing them to consider the matter, and creating a strong indirect incentive to reduce adverse environmental impacts, it changes the terms of

[30] Elisabeth A. Blaug, *Use of the Environmental Assessment by Federal Agencies in NEPA Implementation*, 15 ENVTL. PROF. 57, 57 (1993) (concluding based upon a survey of 52 federal agencies that "agencies appear to rely heavily on mitigation measures to justify EAs and . . . findings of no significant impact").

[31] *See* Karkkainen, *supra* note 27, at 924–25.

agency decision-making and produces substantively better outcomes from an environmental protection standpoint. And it does so while preserving a large sphere for agency discretion to choose the most cost-effective design alternatives and mitigation measures, and to experiment with such measures over time.

The NEPA described here is something of an accidental policy success: no one quite intended it to work this way. Indeed, NEPA was conceived and enacted at the height of the age of comprehensive bureaucratic rationality, its authors apparently believing that comprehensive information production and analysis would lead to environmentally beneficial outcomes.[32] They certainly did not intend to make the EIS information and analytical requirement so burdensome that agencies' chief incentive would be to avoid it. To that extent, NEPA in action—revolving as it does around an onerous procedural penalty—is an awkward and somewhat ham-handed device.

Nonetheless, an examination of the core incentive structure on which this scheme rests reveals an interesting and potentially quite powerful approach to environmental problem-solving. NEPA does create incentives for agencies to produce and disclose data and information relevant to environmental problem-identification and problem-solving that otherwise likely would be unavailable. It does preserve a sphere for decentralized experimentation that could lead to efficiency gains in environmental problem-solving over time. And it does place the burden of producing information on the parties best able to do so, namely the proponents of proposed federal projects and programs.

B. *TRI*

An alternative to NEPA's heavy-handed procedural penalty and backdoor avoidance structure is to set more modest and targeted information production requirements from the outset. Perhaps the most familiar example of this approach is the EPA's Toxics Release Inventory (TRI), part of the Emergency Planning and Community Right-to-Know Act.[33] TRI requires any business with ten or more employees in specified Standard Industrial

[32] *See* Diver, *supra* note 24, at 409–11; Jonathan Poisner, *A Civic Republican Perspective on the National Environmental Policy Act's Process for Citizen Participation*, 26 ENVTL. L. 53, 76–79 (1996).

[33] Emergency Planning and Community Right-to-Know Act, 42 U.S.C. § 11023 (2000).

Classification codes to report annually, on standardized forms, all releases into any medium of some 650 toxic pollutants. The data are collected in a central, publicly accessible, searchable EPA database. Because the data are reported on standard forms using standard definitions, standard nomenclature, standard units of measurement, unique facility identifiers, and precise GIS-mappable geographical coordinates, the data can be aggregated or disaggregated geographically, by firm, by industry, and longitudinally over time to produce a rich, multidimensional picture of the status of, and trends in, industrially sourced toxic pollution.[34]

Although not directly linked to any further regulatory requirements, TRI data have multiple uses. The first TRI reports reportedly came as a shock to environmental regulators and corporate officers alike. Many stated that before TRI they simply had no idea how much toxic pollution was being released into the environment, because until then, no one had ever bothered to ask.[35] Information generated through TRI has been used by regulatory agencies to help set regulatory and enforcement priorities;[36] by industry groups and individual firms to guide and monitor voluntary facility-specific, firm-wide, and industry-wide pollution reduction programs;[37] and by non-governmental organizations (NGOs) and community groups to inform themselves about the extent and severity of toxic pollution in their local communities, and to pressure firms to raise environmental standards.[38] Because TRI data provide a transparent yardstick of one important dimension of facility- and firm-level environmental performance, TRI releases have also been used by corporate management, shareholder groups, insurers, and lenders as a proxy for firm-, facility-, and industry-level environmental performance

[34] Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 261 (2001).

[35] *See* R. Darryl Banks & George R. Heaton, Jr., *An Information-Driven Environmental Policy*, 11 ISSUES IN SCI. & TECH. 43, 46 (1995) (stating that because firms often have vague or erroneous information about their environmental externalities, many were surprised at the size of their TRI-reported releases and took action to curb them).

[36] Karkkainen, *supra* note 34, at 310.

[37] *Id.* at 305–09.

[38] *Id.* at 318–19.

generally.[39]

Unleashing a host of regulatory, social, and market pressures, TRI prompted many firms to undertake ambitious programs of voluntary pollution reduction. As a result, the overall volume of reported TRI emissions has fallen by roughly half since the program was inaugurated, despite substantial economic growth over that period.[40]

Like NEPA, TRI is not without its faults. Perhaps most critically, TRI data are so crude as to be potentially misleading. TRI-reported releases are not indexed to the toxicity of the substance released; all releases are reported straightforwardly in pounds, even though one TRI substance may be pound-for-pound a thousand-fold more toxic than another.[41] In addition, environmental and public health risks are a function not only of a substance's toxicity but also of the number of persons or other organisms exposed, the degree of exposure, and the substance's rates of dispersal and persistence in the environment, but none of this information is reflected in the TRI data.[42] Third, because TRI reporting is limited to pollution from industrial sources, it may present a misleading picture of overall patterns and concentrations of toxic pollution. In some areas, automobile-generated hazardous air pollutants may equal or exceed those from industrial emissions, but only the pollutants from the industrial sources appear on TRI.[43] Finally, TRI provides a comprehensive national data set, but only on a single dimension of environmental performance. Yet because the TRI data are so easy to acquire and use, they are often used as a proxy for overall environmental performance, again possibly creating a misleading picture as to who are the better environmental performers.[44]

Notwithstanding these criticisms, TRI has been an invaluable aid to governmental policymakers, corporate officers and directors, academic researchers, environmental non-governmental

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[39] *Id.* at 323–27.

[40] *See* EPA, 2006 TOXICS RELEASE INVENTORY (TRI) PUBLIC DATA RELEASE BROCHURE 3 (2008), *available at* www.epa.gov/tri/tridata/tri06/brochure/brochure.htm (stating that since 1988, manufacturing facilities have reduced their reported TRI releases by 59 percent for chemicals for which reporting has been required for that entire period).

[41] Karkkainen, *supra* note 34, at 332.

[42] *Id.* at 332–33.

[43] *Id.* at 334.

[44] *See id.* at 333.

organizations, community organizations, and ordinary citizens, improving our understanding of the nature and extent of toxic pollution and contributing, however indirectly, to pressures and incentives generally tending in the direction of improved environmental performance. Most of the criticisms directed at TRI go to the question of what additional information would be needed to provide a clearer and more complete picture. The problem, then, is not so much with the information TRI provides as with what it does *not* provide, much of which could be added at a relatively modest cost.

Like NEPA, TRI generally fits the profile of a *framing rule*. It has clearly induced private parties to produce, on a regular and recurring basis, an important class of information relevant to environmental problem-solving that otherwise would have been unavailable or difficult to obtain. It has placed the burden of producing that information on the parties best positioned to produce it, the industrial sources themselves, and unlike NEPA it has done so at a relatively modest cost. By enabling closer scrutiny of corporate environmental performance by regulators, environmental groups, community organizations, shareholders, and corporate managers themselves, it appears to have played a salutary role in creating or strengthening incentives for private parties to act in more environmentally benign ways, while allowing them the flexibility to experiment in finding the most cost-effective means to do so, and avoiding the straight-jacketing effects of more coercive forms of regulation. Finally, unlike NEPA, TRI has provided for the centralized collection and efficient dissemination of data on facility- and firm-level environmental performance. Indeed, centralized data collection and ease of distribution is TRI's signature feature.

C. *Proposition 65*

A third approach to creating incentives for information production and disclosure is embodied in California's Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986.[45] Enacted by voter initiative in 1986, Proposition 65 requires California businesses to give a "clear and reasonable warning" to any person—whether a worker, customer, or neighbor—whom the

[45] Safe Drinking Water and Toxic Enforcement Act of 1986, CAL. HEALTH & SAFETY CODE § 25249.5–.13 (West 2008).

business causes to be exposed to any substance identified by the state of California as carcinogenic or a reproductive toxin.[46] Most discussion of Proposition 65 has focused on the ubiquitous warning labels it has generated, whether these have any effect in altering behavior, and whether the information they provide is useful, misleading, or simply ignored.[47]

In the case of environmental releases, however, Proposition 65's effect is more indirect. Although implementing regulations authorize mass mailings, newspaper advertisements, and the posting of signs as acceptable methods of warning,[48] there is always some uncertainty in the case of environmental exposures as to who may be exposed, and whether the specific warnings given would be deemed by a jury to be "reasonable and adequate" under the circumstances. Failure to warn, or failure to warn adequately, exposes the violator to civil penalties of up to $2500 per violation for each day of violation, enforceable by a civil action by the attorney general or by citizen suit.[49] Thus environmental polluters face an open-ended risk of liability, even if they make good faith efforts to warn of exposures.

At this point, however, the statute creates the possibility of a safe harbor. An exposure to a listed substance is exempt from the warning requirement if "the person responsible can show that the exposure poses no significant risk assuming lifetime exposure at the level in question."[50] Making such a showing on a case-by-case basis would be technically difficult and prohibitively costly for most industrial polluters, but the California Environmental Protection Agency (CalEPA) is authorized to promulgate

[46] CAL. HEALTH & SAFETY CODE § 25249.6.

[47] *See, e.g.*, Clifford Rechtschaffen & Patrick Williams, *The Continued Success of Proposition 65 in Reducing Toxic Exposures*, 35 ENVTL. L. REP. 10,850 (2005) (listing changes to consumer products made as a result of Proposition 65 enforcement actions); Clifford Rechtschaffen, *The Warning Game: Evaluating Warnings Under California Proposition 65*, 23 ECOL. L.Q. 303 (1996) (evaluating effectiveness of warnings and recommending improvements); Michael Barsa, Note, *California's Proposition 65 and the Limits of Information Economics*, 49 STAN. L. REV. 1223 (1997) (criticizing the clarity and utility of Proposition 65 warnings).

[48] *See* CAL. CODE REGS. tit. 27, § 25605.1(a)(1)–(4) (authorizing warnings of environmental exposures by posting signs in the affected area, mailing or delivering notices at least once every three months, or public media announcements targeted to the affected area at least once every three months).

[49] *See* CAL. HEALTH & SAFETY CODE § 25249.7.

[50] CAL. HEALTH & SAFETY CODE § 25249.10.

regulatory "safe harbor" thresholds, known as "no significant risk levels" (NSRLs), below which toxic exposures will be deemed not to pose a significant risk and therefore not require warnings.[51]

This approach, coupling an open-ended risk of liability with the possibility of a regulatory "safe harbor," reverses the usual incentives for industrial polluters. Instead of opposing or seeking to delay regulation, California businesses welcome the issuance of regulatory thresholds which promise to shelter them against liability. But first, the regulatory agency must establish the safe harbor thresholds. That is where the inverted incentive structure has its greatest effect. Instead of strategically declining to produce or disclose information as in the standard "Ten Thousand Commandments" regulatory model, California businesses now have an affirmative incentive to cooperate with the regulatory agency by producing and disclosing any credible information that might assist in establishing NSLR regulatory thresholds.

That is precisely what happened in California. Within a few months after Proposition 65 was enacted, California regulators were able to establish NSRLs for nearly 300 carcinogens and reproductive toxins—a far faster rate of regulatory output than that of the federal EPA or the Occupational Health and Safety Administration, which must struggle against the usual industry incentives to withhold or strategically manipulate information to impair the regulatory process.[52] Trade associations and individual firms came forth with voluminous information on chemical toxicity, epidemiological studies, exposure pathways, and other relevant information in support of the regulatory effort.[53] Nor did industry have an incentive to delay the onset of regulation; the promulgated rules went unchallenged.[54]

The safe harbor NSLR regulatory thresholds that emerge from the Proposition 65 process bear a striking likeness to conventional

[51] *See* REPRODUCTIVE AND CANCER HAZARD ASSESSMENT BRANCH, CALIFORNIA EPA, PROPOSITION 65 SAFE HARBOR LEVELS: NO SIGNIFICANT RISK LEVELS FOR CARCINOGENS AND MAXIMUM ALLOWABLE DOSE LEVELS FOR CHEMICALS CAUSING REPRODUCTIVE TOXICITY 1 (2008); *see also* CAL. CODE REGS. tit. 27, §§ 25,705, 25,805 (listing NSRL and MADL levels for specific pollutants).

[52] *See* David Roe, *Toxic Chemical Control Policy: Three Unabsorbed Facts*, 32 ENVTL. L. REP. 10,232, 10,235 (2002).

[53] *Id.* at 10,235–36.

[54] Barsa, *supra* note 47, at 1240 (stating that by 1997, three hundred standards had been set without a single legal challenge).

"Ten Thousand Commandments" regulations in certain respects: they are fixed regulatory standards, established by a centralized regulatory agency on a substance-by-substance basis. Notwithstanding this facial similarity, however, there are also some important differences. The decision to reduce emissions below the "safe harbor" thresholds is voluntary. Businesses are not legally obligated to achieve these targets, and if it is too costly to do so they may elect to continue with higher levels of pollution and assume the risk of liability for failure to warn. Second, unlike most "Ten Thousand Commandments" regulations, the Proposition 65 "safe harbor" thresholds are purely health-based performance standards. CalEPA neither specifies the means to achieve them, nor does it predicate the standard upon the use of any particular technology. Businesses consequently remain free to experiment with whatever combination of process changes and pollution control measures they deem most cost-effective and most suitable to their particular circumstances.

The Proposition 65 scheme bears many of the hallmarks of a *framing rule* approach. Clearly, Proposition 65 creates powerful incentives for private parties to produce and disclose information relevant to environmental decision-making that would otherwise be unavailable or difficult for regulators to obtain, and it creates unprecedented incentives for those same private parties to cooperate in the regulatory process. It shifts the burden to produce information from the regulatory agency to the potentially regulated private parties, presumably better situated to produce it, but it preserves a role for the regulatory agency as the centralized repository of that information. It preserves a zone of decentralized experimentation in pollution-reducing technologies and production processes, and creates strong incentives for such experimentation to occur as businesses seek to achieve the "safe harbor" thresholds.

Proposition 65 has its own limitations. Like NEPA, it relies upon a blunt, heavy-handed, and onerous penalty default feature—in this case, the open-ended threat of liability under a nebulous "clear and reasonable warning" standard. For this reason, Proposition 65 is widely unpopular among California businesses, and efforts by environmental NGOs to enact similar measures in other states have been derailed by vigorous business opposition, raising serious questions about the replicability of the Proposition

65 model.[55]

The underlying incentive structure created by Proposition 65, however, is remarkably similar to that of NEPA. Each features a kind of penalty default provision: the costly and time-consuming EIS procedure in the NEPA case and the uncertain and open-ended threat of civil liability in the Proposition 65 case. In each case, this penalty can be avoided through channeled cooperation on the part of the regulatory target. Federal agencies can avoid NEPA's procedural EIS penalty by identifying and adopting design alternatives or mitigation measures that keep adverse environmental impacts below the EIS-triggering threshold of "significant." Similarly, businesses can avoid the Proposition 65 civil liability penalty by cooperating in providing the information necessary to allow the regulatory agency to set safe harbor thresholds, and subsequently by identifying and undertaking strategies to reduce their own emissions below these thresholds. In each case, the regulatory target is induced to produce and reveal valuable information and to undertake affirmative environmental protection measures that otherwise would probably not occur. Yet the regulatory regime does not prescribe in detail the behavior that must be undertaken, thus avoiding the pitfalls of the "Ten Thousand Commandments" approach. Instead, the regime creates incentives that induce and channel a self-designed and self-executed program of voluntary environmental performance improvements.

Proposition 65's effectiveness is limited by its narrow reach: it addresses only those substances determined by the State of California to be carcinogens or reproductive toxins. Many toxic substances produce acute or chronic adverse health effects other than cancer, birth defects, or other reproductive harms. And even within the categories of pollutants covered by Proposition 65, the list of covered substances is limited by CalEPA's current state of knowledge concerning carcinogenic or reproductive effects. As was noted earlier, thousands of chemicals in common use have

[55] *See* Paulette L. Stenzel, *The Right-to-Know Provisions of California's Proposition 65: The Naivete of the Delaney Clause Revisited*, 15 HARV. ENVTL. L. REV. 493, 494 n.8 (1991) (indicating early hopes of Proposition 65's backers that the measure would be replicated elsewhere); Richard A. Lovett, *Prop 65's Non-Toxic Legacy*, SACRAMENTO BEE, Nov. 30, 1997, at A15 (reporting criticisms of Proposition 65 as too harsh and rigid, and noting failures to enact similar measures in other states).

never been subjected to even the most basic toxicity screening.

At first blush, it might appear that this arrangement reflects an appropriate assignment of responsibility to investigate possible toxic effects. I suggested earlier that for some classes of problems, economies of scale might make it more efficient to assign responsibility for information production—here, basic medical, epidemiological, and toxicological research—to a centralized government agency—here, CalEPA's Office of Environmental Health. Indeed, this has been our standard approach to research in this area.

Yet critics have argued, with some reason, that this arrangement is inefficient. Business firms, especially those in the chemical industry, often begin with far greater expertise with respect to the chemicals they are producing than do distant regulators, and arguably are better positioned to study such substances at close range and at an earlier stage than disinterested academic researchers or government scientists and other agency personnel. It is precisely in this situation that the strategic non-production of information by the parties best able to produce it operates as an important barrier to effective regulation of toxic substances. For the private party producing the substance, it is an easy call to decide *not* to screen a chemical substance for toxicity, since such screening is not routinely required and, if undertaken voluntarily, might lead to results that must be disclosed[56] and could lead to more stringent regulatory scrutiny.[57]

D. *REACH*

The European Union recently adopted an ambitious new program to reverse these perverse incentives. Dubbed REACH (for *R*egistration, *E*valuation, *A*uthorization, and Restriction of *Ch*emical Substances),[58] the new EU regulation requires chemical manufacturers and importers to collect information on the toxic and hazardous properties of chemical substances and on their safe handling. This information will be registered with a central, publicly accessible database managed by the European Chemicals Agency in Helsinki, which will monitor and evaluate industry

[56] *See* Toxic Substances Control Act, 15 U.S.C. §§ 2601–2692 (2000).

[57] *See id.*

[58] Council Regulation 1907/2006, 2006 O.J. (L 396/1) (EC). REACH entered into force June 1, 2007.

submissions, require further testing and evaluation of chemicals that appear potentially hazardous, and initiate regulatory proceedings leading to the authorization or restriction of substances "of very high concern," including carcinogens, mutagens, reproductive toxins, and persistent, bioaccumulative, and toxic substances.

For substances requiring authorization, the burden is on the manufacturer or importer to show that the risks of the substance are adequately controlled, and that the socio-economic benefits of its continued use outweigh the remaining risks. If the risks are deemed unacceptable, any or all uses may be subject to regulatory restrictions, up to an outright ban. This regime applies to both old and new chemicals, but it will be phased in, with pre-registration by 2008 for high-volume chemicals (those produced or imported in quantities over 1,000 metric tons per year) as well as certain highly toxic substances, and eventually extending to all substances produced or imported in quantities over one metric ton per year by 2018.

The principal effect of REACH is to shift the burden of producing data and information on chemical toxicity and safe use from the regulatory agency to the manufacturers and importers of chemical substances, who are presumably better situated to conduct such evaluations. However, a public agency retains a central oversight, data management, supervisory, and regulatory role, essentially managing a triage system in which industry-supplied data are evaluated for quality control and for substantive content. When a "suspicious" substance is singled out for further inquiry, the burden shifts back to the manufacturer or importer to supply additional data and information on its risks and safe uses, measures that may be taken to minimize or mitigate risk, a risk-benefit analysis, and a justification for its continued use in light of the residual risks. If the regulatory agency is satisfied, it may authorize the continued use of the substance; if not, it may restrict any or all uses.

Under this quasi-licensing scheme, chemical manufacturers and importers operate under a very different set of incentives than under the conventional U.S.-style regulatory approach. Not only are they under a legal mandate to produce the required information, but they no longer have an incentive to engage in "willful blindness" or strategic non-production or non-disclosure of relevant information. Failure to produce or disclose such

information, or a regulatory determination that the submitted information is inadequate, could trigger a process leading to suspension or termination of the right to produce or sell the substance. Moreover, chemical manufacturers and importers have a positive incentive to identify and disclose the safest methods of handling and use of their products in order to avoid or limit the scope of any regulatory restrictions. Although such regulatory restrictions as finally emerge will look much like conventional "Ten Thousand Commandments"-type rules, the process of developing such rules is intended to be a constructive, collaborative dialog between the regulatory agency and the regulated entity, with the latter invited to make its best case for the continued use of its product by identifying and promoting the safest uses and methods of use. Given this set of incentives, and with the regulatory body acting as a central repository and dissemination point for information produced by the parties best positioned to produce it, REACH bears many of the hallmarks of a framing rule approach.

While it is too early to say how REACH will work out in practice, we can anticipate two areas of possible concern. The first is the sheer volume of information the European Chemicals Agency will be required to process. This could lead to regulatory backlogs, or to cursory review of the information submitted, or both. The second is the static, once-off nature of the review process. The assumption seems to be that once a substance is initially screened and all the available information is considered, regulators can conclusively determine whether that substance poses enough of a risk to merit further inquiry. Once that further, second-stage review is completed, regulators are expected to conclusively determine whether the substance still poses unacceptable risks and should be restricted. This approach does not create dynamic incentives for ongoing investigation and incorporation of new information from scientific advances. Nor does it push the boundaries of our understanding of chemical properties and their interactions with human biochemistry and microbiology.

REACH almost certainly will add to the stock of knowledge concerning chemical toxicity and safe use. Just as importantly, it will provide broad access to the assembled data and information, facilitating self-help actions to identify and implement safe uses, and to avoid risky uses, of chemical products. While the central

focus is on chemical product safety, many of the substances in the REACH database are also environmental and workplace pollutants. To that extent, REACH will aid informed decision-making in the environmental and occupation health-and-safety arenas as well, both in Europe and elsewhere, including the United States.

II. FORWARD APPLICATIONS: CLIMATE CHANGE

This Article has described several examples of environmental "framing rules": rules that do not attempt in the first instance to directly control the behavior of regulated parties, but instead seek to shape the information environment in which public or private environmental decisions are made by mandating or creating incentives for the production and disclosure of defined categories of information. By and large, these approaches have been quite successful, though they are widely underappreciated.

The question arises, then, how might we extend what we have learned about framing rules to other areas of environmental law and policy? This Article will briefly sketch out some possible applications of framing rule approaches in the context of climate change, perhaps the most urgent and thorniest unresolved environmental problem we face, dwarfing all others. Given the global scale and the pervasive, multi-causal nature of the problem, a far-reaching suite of policies will almost certainly be necessary to address it. But framing rule approaches are good candidates for inclusion in the mix.

A. *Using NEPA to Curb "Significant" Carbon Footprint Impacts*

The greenhouse gas or "carbon footprint" impacts of major federal programs and projects should be addressed through legally mandated environmental impact assessments.[59]

To date, most of the public debate over climate change policy has focused on the actions of private actors: motorists and auto manufacturers, electric utilities, industrial sources, and the like. But the federal government is also a huge actor in our economy, and numerous categories of federal action—highway construction,

[59] For a thoughtful and insightful parallel analysis of how greenhouse gas emissions might be considered under California's environmental impact assessment law, see Dave Owen, *Climate Change and Environmental Assessment Law*, 33 COLUM. J. ENVTL. L. 57 (2008).

management of the national forests, federal vehicle fleet purchases, weapons systems, oil, gas, and coal leasing policies on federal lands, agricultural policy, and many more—have the potential to affect the federal government's, and the nation's, carbon footprint.

Arguably, assessment of the carbon footprint impacts of federal agency actions is already required under NEPA—and at least one federal court has so held.[60] Anytime the environmental impacts of a proposed action are expected to reach the level of "significant," an EIS detailing *all* the environmental impacts of the proposed action is required.[61] In principle, then, it should not matter whether the carbon impacts of that action arise to the level of "significant" in their own right; any carbon footprint impacts, including the cumulative impacts of the proposed action in conjunction with "other past, present, and reasonably foreseeable future actions" by federal agencies and non-federal parties, should be included whenever an EIS is required.[62]

The matter is a bit more complicated for proposed actions that are currently addressed through Environmental Assessments and FONSIs, however. Ordinarily, an Environmental Assessment can be more narrowly tailored than a full-scale EIS, since its only ostensible purpose is to determine whether the environmental impacts reach the level of "significant."[63] But what counts as a

[60] *See* Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172 (9th Cir. 2008) (remanding to NHTSA to promulgate new fuel economy standards on light trucks and to prepare a revised Environmental Assessment or Environmental Impact Statement considering greenhouse gas impacts of the new standards); *see also* Judge Patricia Wald's prescient 1990 dissenting opinion in which she declared global climate change impacts "a new and potentially catastrophic environmental phenomenon that fits squarely within the broad NEPA framework." City of Los Angeles v. National Highway Traffic Safety Admin., 912 F.2d 478, 492 (D.C. Cir. 1990) (Wald, J., dissenting in part) (overruled on other grounds by Florida Audubon Soc. v. Bentsen, 94 F.3d 658 (D.C. Cir. 1996)).

[61] CEQ regulations require Environmental Impact Statements to address the full range of direct, indirect, and cumulative environmental impacts of the proposed action, including ecological, aesthetic, historic, cultural, economic, social, and health impacts. 40 C.F.R. § 1508.8 (2008).

[62] *See* 40 C.F.R. § 1508.7 (defining "cumulative impact" as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) undertakes such other actions"). *See also* Ctr. for Biological Diversity v. NHTSA, *supra* note 60, at 34 ("The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct.").

[63] *See* 40 C.F.R. § 1508.9 (defining "[e]nvironmental assessment" as "a

"significant" impact in the area of climate change? Surely the changes now occurring in the earth's climate are "significant." Consequently, it is tempting to conclude that *any* incremental contribution to those significant environmental changes should itself be treated as a "significant" impact. Conversely, one might argue that because so many sources contribute to the climate change problem, almost any action considered purely on its own merits would result in an essentially imperceptible change and makes virtually no difference in light of larger global trends, and therefore should not be deemed to produce "significant" impacts.

How to resolve whether a proposed federal action is "significant," then, is not an easy question. Current NEPA regulations and CEQ guidance do not provide clear answers. The regulations define the term "significantly" in vague and for the most part unhelpful terms. "Significantly," we are told, "requires considerations of both context and intensity."[64] The regulations go on to say that one consideration in evaluating "intensity" is "[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts," and that "[s]ignificance exists if it is reasonable to anticipate a cumulatively significant impact on the environment."[65] That would seem to militate in favor of requiring a finding of "significance" and therefore an EIS for any federal action that produced greenhouse gases or otherwise contributed to climate change, however trivial the individual contribution of that action might be, on grounds that the cumulative impact of that action in combination with other actions elsewhere in the world is "significant."[66]

A narrower reading is available and probably warranted, however. The key term here is "related action": it is only if the proposed action is "related to other actions" that cumulative impacts need be considered in determining "significance." What is an "action," and which actions are "related"?

Again, the statute is silent and the regulations somewhat

concise public document . . . that serves to . . . [b]riefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact").

[64] 40 C.F.R. § 1508.27.

[65] 40 C.F.R. § 1508.27(7).

[66] *See* Lauren Giles Wishnie, *NEPA for a New Century: Climate Change & the Reform of the National Environmental Policy Act*, 16 N.Y.U. ENVTL. L.J. 628 (2008) (discussing need for NEPA reform to adapt it to climate change).

unclear, but a fair argument can be made that because NEPA is addressed to "major federal actions," these are the only "actions" contemplated by the language on cumulative effects of "related actions."[67]

And which of these actions are related? Again, silence, but language in the regulatory definition of "scoping" of EISs might provide a clue. CEQ contrasts "unconnected single actions" with three categories of arguably "related" actions that should be considered in a single EIS. The first category is "connected actions" that are "closely related" because they automatically trigger other actions, depend upon other actions occurring previously or simultaneously, or are "interdependent parts of a larger action."[68] The second category is "[c]umulative actions, which when viewed with other proposed actions have cumulatively significant impacts."[69] The third is "[s]imilar actions, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for considering their environmental consequences together, such as common timing or geography."[70]

The first and third of these categories—"connected" and "similar" actions—are discrete categories that probably apply only to a limited number of cases involving project interdependencies and parallel actions of like. However, the second category, "cumulative" actions, is potentially much broader. Arguably, all federal actions (or at any rate, all involving greenhouse gas emissions) have cumulatively significant effects on climate change when viewed in conjunction "with other proposed [federal] actions." So, arguably, all proposed federal actions could be considered "related" actions that cumulatively have a "significant" impact on climate change, and all should therefore be subject to EIS requirements.

For federal agencies, however, this would be a draconian

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[67] Indeed, the regulations define "major federal actions" as "actions with effects that may be major and which are potentially subject to Federal control and responsibility," including "projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies," as well as "agency rules, regulations, plans, policies, or procedures; and legislative proposals." 40 C.F.R. § 1508.18.

[68] 40 C.F.R. § 1508.25(a)(1).

[69] 40 C.F.R. § 1508.25(a)(2).

[70] 40 C.F.R. § 1508.25(a)(3).

consequence, imposing costly and dilatory procedural burdens on seemingly minor federal agency actions. One solution would be for agencies to seek to address the problem through expanded use of programmatic EISs—a sort of preemptive, program-wide environmental assessment that as a legal matter can obviate the need for additional project-level EISs so long as the environmental impacts of individual projects have been adequately addressed at the programmatic level. However, not all agency actions fit so neatly into predictable programmatic categories.

At a minimum, then, it is incumbent upon CEQ to provide additional regulations or guidance to clarify which federal actions should be considered "related" and therefore subject to cumulative impacts analysis for purposes of determining whether the cumulative greenhouse gas effects are "significant." More broadly, CEQ needs to clarify what counts as a "significant" impact of a proposed federal agency action in the climate change arena.

The need for such clarifying regulatory guidance also presents an opportunity for the incoming President to use CEQ as a vehicle to craft and implement a climate change policy applicable to federal agencies. By setting regulatory or guidance thresholds for when a federal agency action should be deemed to have "significant" climate change impacts, CEQ could establish a de facto substantive greenhouse gas emissions (or carbon footprint equivalent) standard applicable to federal agencies within the NEPA framework. Wishing to avoid the costs and delays associated with EIS production, agencies would then have a strong incentive to design their projects and programs to keep greenhouse gas emissions below those EIS-triggering CEQ-specified thresholds—or, alternatively, to add mitigation measures designed to bring emissions (or carbon equivalents) down and thereby to achieve equivalent results.

Drafting such substantive carbon footprint standards across the entire range of federal agency activities would be a massive informational and regulatory undertaking; arguably, CEQ is not up to the task. At this point, however, another alternative—also consistent with a framing rule approach—suggests itself.

Pursuant to presidential authority,[71] CEQ could instruct

[71] The NEPA statute created CEQ as an advisory body to the President. CEQ's authority to issue non-binding NEPA guidance and binding NEPA

individual federal agencies to devise their own climate footprint "significance" thresholds, consistent with general guidelines issued by CEQ, and subject to CEQ oversight and approval. Thus the burden of thinking through the appropriate substantive thresholds would fall to federal agencies themselves, arguably the parties best positioned to evaluate and characterize their own activities, assess their current carbon footprints, identify where their carbon footprints are likely to grow in light of future projects and programs, and identify and evaluate opportunities to reduce, mitigate, or offset such growth. Once these carbon footprint "significance" thresholds were established, they would provide a soft ceiling on agencies' carbon footprints, because the agencies would wherever feasible take measures to reduce, mitigate, or offset growth in their carbon footprints to remain below the regulatory thresholds and thereby to avoid the burdens of EIS production.

In short, an opportunity exists within existing statutory authorities under NEPA to use a framing rule approach to force federal agencies to undertake broad, agency-wide critical assessments of their carbon footprints; to use those assessments as the basis for setting "soft" substantive carbon footprint targets (i.e., carbon footprint "significance" thresholds); and to use avoidance of the burdens of EIS production as an incentive to induce federal agencies to evaluate and mitigate the carbon footprint impacts of proposed actions and programs. As with other environmental impacts evaluated under NEPA, federal agencies would be under no legal obligation actually to reduce their carbon footprint impacts below the EIS-triggering thresholds, but they would have an incentive to do so anytime the expected costs of the measures necessary to remain below the threshold were less than the expected costs to the agency of EIS production. At a minimum, then, this approach would bring greenhouse gas and other carbon footprint impacts into a prominent place in agency decision-making, and invite a careful weighing of the costs and benefits of prevention, mitigation, and offset measures.

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regulations stems from executive orders issued by Presidents Nixon and Carter, pursuant to the President's executive authority over federal agencies. *See* EXEC. ORDER NO. 11,514, 3 C.F.R. (1970) (instructing CEQ to issue NEPA guidance); EXEC. ORDER NO. 11,991, 3 C.F.R. 124 (1977) (amending Exec. Order No. 11,514 to instruct CEQ to issue NEPA regulations, and directing federal agencies to comply with CEQ regulations).

Such an approach is, of course, far from a complete solution to the climate change problem. But it could be a very significant element in the broader package of policies and measures that will be needed.

B. *Greenhouse Gas Emissions Registry*

A second type of framing rule approach that could be brought to bear on the climate change problem is a TRI-type self-monitoring and reporting requirement on greenhouse gas emissions.

In brief, the federal government could require specified parties—electric generating facilities and industrial facilities, for example—to report annually, using standardized metrics, estimation measures, and reporting requirements, all their greenhouse gas emissions.[72] Like TRI, this information could be assembled in a single, publicly accessible, computerized data base, facilitating aggregation, disaggregation, and manipulation of the data to provide inter-facility, inter-firm, inter-industry, and geography-specific benchmarks, comparisons, and trend analyses.

Like TRI, the greenhouse gas emissions registry would serve multiple purposes. It would provide regulators and government policy-makers with much more detailed, fine-resolution, and up-to-date data on actual greenhouse gas emissions than is presently available, allowing them to design better-informed climate change policies in the future, and to evaluate the effectiveness of current and future policies. It would force regulated entities to examine and track their own greenhouse gas emissions, elevating their awareness, even as it provided benchmarks for comparison with their peers and competitors. It would allow corporate managers, directors, and shareholders to gain a quick, comprehensive view of how all the firm's facilities were doing in comparison with each other, and with their peers. It would allow local officials and

[72] *Cf.* Andrew Schatz, *Regulating Greenhouse Gases by Mandatory Information Disclosure*, 26 VA. ENVTL. L.J. 335, 383–92 (2008) (proposing a Greenhouse Gas Release Inventory (GGRI) requiring mandatory reporting, centralized data collection, and public disclosure on greenhouse gas emissions from "major sources"); Michael P. Vanderbergh & Anne C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1729–31 (2007) (proposing the creation of a unified database on greenhouse gas emissions from individuals and households modeled on TRI and dubbed by the authors the Individual Carbon Release Inventory).

community groups to identify the largest source of greenhouse gas emissions in their communities, information that could be useful in all manner of local policy decisions, especially in the numerous communities that have committed themselves to community-wide greenhouse gas reduction targets. It would allow market analysts and investors to gauge which firms faced the greatest potential regulatory compliance costs in pending rounds of regulatory action to curb greenhouse gas emissions, and to issue investment advice or make investment decisions accordingly. It would allow prospective employees to use standardized greenhouse gas emissions data to evaluate which companies are the "greenest" on this crucial dimension of environmental performance—for some, an important consideration in the employment decision. In these and myriad other direct and indirect ways, standardized, publicly accessible reporting of greenhouse gas emissions would change the information environment in which corporate managers and directors run their businesses, elevating the prominence of greenhouse gas emissions as a factor in corporate decision-making.

This is not to suggest that a greenhouse gas emissions registry is by itself a panacea. Additional, tough, mandatory measures—a cap-and-trade scheme or a carbon tax being presently the most promising alternatives—will almost certainly be required. But properly designed, a greenhouse gas emissions registry can be an important first step leading to a better-informed climate change policy. It can be an ongoing complement to mandatory programs, providing additional incentives for improved greenhouse gas emissions performance beyond those available directly through the price mechanism. The information it provides can provide the basis for monitoring compliance with mandatory measures. And it can serve as the basis for assessing the overall effectiveness of future climate change policies and measures, and for revising those measures to address gaps or weaknesses in the regulatory scheme.

CONCLUSION

Despite their many differences, NEPA, TRI, Proposition 65, and REACH are all, to varying degrees of consanguinity, part of a broad family of approaches to environmental regulation that this Article dubs *framing rules*. All these measures change the terms of environmental decision-making by inducing parties to investigate and to disclose relevant information that otherwise

likely would have remained undiscovered or undisclosed. All place the burden of producing such information on the parties best positioned to do so. All create incentives (of varying kinds and degrees of strength) for parties to engage in voluntary improvements in environmental self-management and environmental performance. All leave their regulatory targets with a broad zone of discretion in which to experiment with efficient solutions to environmental problems.

The mechanisms described here are imperfect, and they are no panacea. Many fail to create fully dynamic incentives for continuous improvements in the information base upon which environmental decision-making is predicated. While there is much to be learned from studying the incentive structures created by these framing rule regimes, and extending them to address other environmental problems currently left unaddressed, there is also further conceptual work to be done to devise a second-generation of framing rule approaches that more fully capture the potential of the model sketched out here.