

Using the Tools of Pollution Prevention to Reduce Greenhouse Gas Emissions

by Richard Reibstein

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Our public debate about policy to combat climate change sometimes seems limited to a choice between trading and taxes. Yet, there are other tools of governance that could be more actively examined. The problem of global warming is so big that we should be actively pursuing a “full-toolbox” approach of doing everything we can, and considering how each strategy can be synergistically implemented in concert with other strategies. This Article argues for greater attention to a suite of tools successfully used to promote pollution prevention: assistance, planning, and expanded right to know reporting. These tools employ a mode of governance that may be termed “relational,” where government complements traditional enforcement with efforts to encourage self-responsibility and enlist collaboration with willing members of the regulated community. That community is not a homogeneous group, but is composed of many different entities presenting a great variety of motivations and capacities. A full-toolbox, relational approach can more powerfully control risks and harness the potential for creative solutions, fostering not just environmental progress but also building the social and intellectual capital necessary for the technological and economic advancement that will most effectively solve our problems. The pollution prevention (P2) movement provides examples of how we might best use government to mobilize resources to address global warming.

I. P2's Quiet Success

P2 has been the declared policy of the United States since the passage of the Pollution Prevention Act of 1990,¹ and in the

early 1990s every state had a P2 program that typically provided education and assistance to companies in finding ways to reduce pollution at the source, instead of controlling pollution after it had been created. Despite what some might term “a general ennui” about P2, the data indicate substantial accomplishments have resulted from what has been relatively minimal investment. These programs have had quiet success by helping companies redesign processes, reformulate products, perform more careful measurement and use, and other efficiency and substitution efforts to reduce and prevent pollution. The U.S. National Pollution Prevention Roundtable, the organization of P2 professionals, issued a report in 2009 finding the following:

[S]tate and local programs documented overall reductions of approximately 7.7 billion pounds of pollution: 5 billion pounds from reducing materials and waste; 2 billion pounds from reducing air emissions; and 60 million pounds from reducing water pollution from 2004 to 2006. In addition, water consumption was reduced by over 4 billion gallons and energy usage was reduced by over 1 billion kilowatt-hours. . . . In almost every case, these efforts have not only led to environmental improvement, but have been cost-effective, saving a total of approximately \$6.4 billion.²

help protect the environment and reduce risks to worker health and safety. (3) The opportunities for source reduction are often not realized because existing regulations, and the industrial resources they require for compliance, focus upon treatment and disposal, rather than source reduction; existing regulations do not emphasize multi-media management of pollution; and businesses need information and technical assistance to overcome institutional barriers to the adoption of source reduction practices. (4) Source reduction is fundamentally different and more desirable than waste management and pollution control. The Environmental Protection Agency needs to address the historical lack of attention to source reduction.

42 U.S.C. §13101(a) (2007). In the P2 Act, Congress declared that it is “the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible,” describing what has been termed the “hierarchy” of management options—recycling when pollution cannot be avoided, then treatment, and then disposal or release as a last resort. *Id.* §13101(b).

2. NAT'L POLLUTION PREVENTION ROUNDTABLE, ROAD TO SUSTAINABILITY: POLLUTION PREVENTION PROGRESS FROM 2004 TO 2006, RESULTS FROM THE NATIONAL POLLUTION PREVENTION DATA MANAGEMENT SYSTEM 3 (2009), available at <http://www.p2.org/wp-content/road-to-sustainability-2004-20062.pdf>.

1. See Pollution Prevention Act of 1990, Pub. L. No. 101-508, §§6601-6610, 104 Stat. 1388, 1388-1321 to 1388-1327 (codified at 42 U.S.C. §§13101-13109). The preamble of the Act states, in part:

Congress finds that: (1) The United States of America annually produces millions of tons of pollution and spends tens of billions of dollars per year controlling this pollution. (2) There are significant opportunities for industry to reduce or prevent pollution at the source through cost-effective changes in production, operation, and raw materials use. Such changes offer industry substantial savings in reduced raw material, pollution control, and liability costs as well as

The services provided by these programs consisted of trainings, site visits, information distribution, awards and recognition, and help in conducting P2 planning. The report notes that in 2003, the organization was able to gather documentation from state programs for an estimated reduction of 172.8 billion pounds of pollution since 1990, and that the data do not capture all of the results of P2 activities.³

Only some programs have had the resources to document the results of the assistance they have provided. In a previous report on results from 12 state programs receiving total funding of less than \$15 million, reductions in energy use were estimated to be worth \$184 million in total cost savings.⁴ A good example from one program is found on page eight of the *2008 Pollution Prevention Report* of the Minnesota Pollution Control Agency,⁵ providing the results of P2 assistance in just one year: about 19 million pounds of waste reduced or reused, 20 million kilowatt-hours of energy saved, and 19 million gallons of water conserved, for cost savings of more than \$8 million. "MPCA's technical assistance partners saved their clients over four dollars for every dollar invested in these programs."⁶ Another example is the 39,947 tons diverted from landfills since January 2000 and the \$3.87 million in business savings since January 2000 cited by Waste Reduction Partners, a collaborative effort of the Tennessee Valley Authority, the Land-of-Sky Regional Council, and the North Carolina Division of Pollution Prevention and Environmental Assistance.⁷

A 1997 evaluation of the Toxics Use Reduction Program in Massachusetts found that companies covered by that pollution law (which requires reporting, planning, the payment of fees, and provides substantial assistance and education) cited savings of \$88.2 million, while the regulations cost the covered companies only \$49.4 million.⁸ In addition to this favorable cost-benefit ratio, from the 1990s to the early 2000s, companies covered by the law would have used about one-half a billion pounds of toxics less than they would have used had they continued using the toxics at the same rate as they did before the Act was passed.⁹ The cost-benefit esti-

mate noted above is exclusively for the regulated entity, and does not take into account the many benefits to society from reducing chemical use.

What is the value to the rest of us of removing 500 million pounds of toxic chemicals from commerce? These chemicals no longer required for production are no longer shipped, stored, leaked, discharged, allowed to contaminate land, or emitted in our communities. They are no longer a risk to workers. They are no longer a disposal or management problem at any of the many risk points in their life cycle. The savings cited above accrued to the companies themselves and so pass muster for the strictest cost-benefit analysis. But the figures do not take account of the value to society of reduced pollution, nor of the many other reductions (such as in water and energy use) that these programs achieve, without enforcement. While economists have argued over whether the Porter Hypothesis is true (that in the long run, strict environmental laws are good for the economy), these programs have been proving that prevention works and does so in the short run as well. We have often failed to note the role of government in launching and proving that the idea of win/win, where both the environmental and the economic bottom line are improved, is real.

Our inherited assumption that environmental progress is costly, that a trade off between jobs and the environment is inevitable, should be forever discarded. We now have evidence that environmental programs can provide substantial reductions in pollution and save money in multiples beyond what is spent on the programs. This evidence points to the need for attitude readjustment concerning environmental policy. Our thinking has been based on the original approach to environmental problems, when we added on controls and did nothing to change the input, or the process in which materials were used. But because rethinking product, process, and operations can lead to efficiencies and improvements that advance technology and economic values, it is desirable to recognize environmental issues as clues to how things can be improved. If wastes are resources in the wrong place, then focusing on wastes will result in better use of resources. This new thinking stands to reason. The old idea that environmental initiatives run counter to profitmaking ignores the reality of externalities: that economies operate within a social and biophysical context. The old idea ignores the finite nature of resources, and the one arguably infinite resource that has often been used to dispute the scenarios of "doom-sayers": human ingenuity.

Investment in pollution prevention is desirable. The conflicts and tensions P2 causes are generally short-term in nature, because it requires readjustment, or stem from a failure to recognize the common responsibilities that environmental emergencies create. (This is not to gainsay legitimate complaints about poorly designed programs when they occur.) Aggressive programs to promote P2 primarily adversely affect those who resist change because of investments or other entrenched interests, including habit.¹⁰ For

3. *Id.*; see *id.* app. II (providing statistics on pollution abated).

4. See NAT'L POLLUTION PREVENTION ROUNDTABLE, P2 PRODUCES RESULTS (2007).

5. Minnesota Pollution Control Agency, *2008 Pollution Prevention Report*, available at <http://www.pca.state.mn.us/publications/reports/lrp-p2s-2sy08.pdf>.

6. *Id.*

7. See Waste Reduction Partners, http://www.landofsky.org/wrp/About_WRP.htm (last visited June 24, 2009).

8. MASS. TOXICS USE REDUCTION PROGRAM, EVALUATING PROGRESS: A REPORT ON THE FINDINGS OF THE MASSACHUSETTS TOXICS USE REDUCTION PROGRAM EVALUATION 40 (1997), available at http://www.turi.org/index.php/home/about_turi/ma_tura_program/program_evaluation/1997_program_evaluation (presenting the costs and benefits). However, companies chose to make \$27 million in investments (MA TUR planning does not require that a company implement TUR, but that they can document they have identified and considered their options for TUR).

9. See Rick Reibstein, *Does Providing Technical Assistance for Toxics Use Reduction Really Work? A Program Evaluation Utilizing Toxics Use Reduction Act Data to Measure Pollution Prevention Performance*, 16 J. CLEANER PRODUCTION 1494 (2008); see also MASS. EXECUTIVE OFFICE OF ENVTL. AFFAIRS, THE EFFECT OF PROVIDING ON-SITE TECHNICAL ASSISTANCE FOR TOXICS USE REDUCTION: A PROGRAM EVALUATION UTILIZING TOXICS USE REDUCTION ACT DATA (2006), available at http://www.mass.gov/Eoeca/docs/eea/ota/programs/ota_effectiveness_study_final_2006.pdf.

10. See Joel Hirschhorn, *Why the Pollution Prevention Revolution Failed, and Why It Ultimately Will Succeed*, POLLUTION PREVENTION REV., Winter 1997, at 11.

example, exhorting homeowners to use fewer pesticides can reduce sales for pesticide producers and require education and effort to transition to organic lawn care, resources for which may not be immediately available in a locality. It is important, however, to recognize how different this kind of problem is from the inhibiting assumption with which we have been living for so long, that we cannot afford environmental investments. That environmental programs can promote desirable economic development should be at the heart of the policies we develop and motivate us to more assertively use the tools that can bring about modernization. This policy revolution should be incorporated into programs and law. We have lived with a political balance for so long in which our original command-and-control environmental statutes either accommodate to business-as-usual or are “technology-forcing.” Pollution prevention is “technology-fostering.”

Because it encompasses a “can-do,” forward-looking ethic, P2 accommodates to practical considerations, but not to stasis. It recognizes that not all companies can substitute safer chemicals for their problematic input materials, and points out that they can still ensure that the least amount necessary is used, and continue searching for, and work on developing substitutes, even if they do not yet exist. Therefore even when there are no good substitutes or when companies have already undertaken significant efficiency improvements, P2 remains relevant as a way of doing business, as a means and ethic of continuous improvement, of constant awareness of developing opportunities. Because it is flexible and allows companies to continue using what they must use, and because careful measurement and efficiency analysis is good for operations, many have adopted the approach on an ongoing basis, and incorporated it into Environmental Management Systems, Total Quality, Green Chemistry, Sustainability, and Lean Production programs.¹¹ “Lean Is Green” is now a common observation.

The tools that P2 programs have used—assistance (including free and confidential on-site visits, general education and guidance, recognition, technology demonstrations, workshops and clinics, collaborative research, recognition, free software, and subsidies), right-to-know reporting, and planning—have worked. Why not apply them to the global warming problem? The response to global warming requires changes in technology and the routines of living to which we have all become accustomed. Requiring that an entity complete a plan, and helping it accomplish the task can be an

efficient and gentle way to prompt the mass transition to a low greenhouse gas (GHG) economy we need, as it addresses each individual entity in terms of its own capacity, while establishing a universal goal. Providing each planning entity with assistance and education is appropriate in light of the difficulties many will have in making the needed changes. Planning and complementary assistance are useful tools for the task at hand and should receive much greater attention.

II. Planning and Assistance

Planning requirements have been instituted to address stormwater pollution, to minimize hazardous waste, to prevent and respond to emergencies, to ensure safety, and to reduce toxics use. Planning has the virtue of providing flexibility and prompting progress by the most economically efficient means. It is a limited tool that is usually used in such a way that nothing is actually mandated—the idea is that the planner will learn that it makes sense to reduce pollution and implement beneficial activities by choice. Planning requirements implemented in this way are consistent with traditions of limiting interference with business enterprise decisionmaking. Although it could be coupled with requirements to implement or achieve certain levels of progress, as generally used planning is by no means a complete answer to our problems. But considered within a full context that includes enforcement to ensure planning is implemented, and assistance and education so that planning is executed well, it should be an extremely useful complement to other approaches, such as taxes, cap-and-trade, reporting, or permits. These other approaches make entities reduce GHG emissions. Planning and assistance help them to see how they could do it. Planning helps them understand which actions will work best for them. Without a planning exercise, entities will more likely do the minimum to comply and remain stuck in assumptions that the whole venture is too costly to take seriously. With planning and assistance, we avoid the cookie-cutter approach that assumes one size fits all, when it might not, and we institute an ethic that is universal.

Because planning and assistance alone do not force change, all change that results is achieved voluntarily. This seems weak in comparison to command-and-control regulation, but it can be a useful transition and should not replace firmer requirements where they are necessary. If it works, harsher requirements may be avoidable. Planning shares the oft-cited virtue of pollution rights trading: it finds the most economically efficient changes. However, it does so within each polluting facility, keeping the focus on each source of pollution. This militates against the development of hot spots that trading can cause. Moreover, the economic motivation is not subject to the vicissitudes of a market in one variable (the price of a ton of carbon), but relates to an infinite variety of factors. Planning and assistance result in the perception of economic value when they illuminate viable options that reduce costs as well as the bad things they address (hazardous waste, stormwater pollution, emergencies, and GHGs). For example, a company that learns it can avoid dumping

Joel Hirschhorn, the co-author of the 1986 Office of Technology Assessment study *Serious Reduction of Hazardous Waste* (an exploration of the extraordinary potential of shifting from an after-the-fact control approach to prevention) writes:

As attractive as the P2 strategy was, however, even the visionaries soon realized that any kind of major shift from control to prevention entailed a profound change in thinking—and not merely changes in policy, regulations, and technology. It would require people in virtually every part of society to learn a new paradigm, to cooperate, and to embrace change.

Id.

11. See MASS. GEN. LAWS ch. 211 (2006) (The Massachusetts Toxics Use Reduction Act (TURA) now regards as compliant with TURA planning requirements an Environmental Management System that incorporates basic TUR planning, for companies that have conducted sufficient iterations of TURA planning.).

its etchant every Saturday night by carefully monitoring and maintaining its pH will also likely find that it has lowered its product reject rate, because its etchant will not perform poorly all day Saturday and more finished products will pass muster in quality control. Reducing etchant disposal and purchase is a benefit, but reducing product rejects can be a huge money saver.¹² Cost-saving opportunities appear in many different areas, as in reduced time spent on compliance, reduced insurance costs, reduced potential liability, and improved public relations and product marketing opportunities (increasingly important in light of the rise of the green consumer, concerned shareholder, and responsible corporate partner). In addition, indirect benefits often result, such as when cleaner workplace air leads to greater productivity, and the team effort often used to generate P2 (or GHG reduction) ideas leads to better management-staff relations.

Planning and assistance allow each covered entity to apply and develop its knowledge of its own situation, constraints, and opportunities to find the most economically attractive improvements. These tools enlist participation in problem solving, bringing entities to recognize and address what they might otherwise consider external to their operations. If done well, this can create a stronger recognition by the regulated entity of its place in the context of the affected society and environment. Planning is important for communicating the importance of responsibility to each source of pollution. Assistance is key to winning cooperation because it offers the collaboration of a friendly arm of government, which also shares information and case study examples of what other, similar entities have accomplished. Pollution prevention assistance programs have created a variety of initiatives designed to reach and help companies, such as confidential onsite visits, benchmarking tools, award programs, breakfast meetings, technology roundtables, technology demonstration events, and intern placement programs. The concepts of assistance and planning are flexible and can be tailored to identify and address needs and opportunities as they exist.

Voluntary assistance and planning that only require consideration and no actual implementation are not intended to replace but rather to complement enforcement, permitting, and caps that directly mandate reductions. Assistance and planning reinforce a commitment to freedom and self-determination but within the limits set by stronger rules, or as transitional steps to, or appropriate exit ramps or escape routes from, stricter regimes. They therefore provide a richer relational context than enforcement-based rules alone. They provide a pulling force because push alone is not enough. When society uses both the friendly helping hand and keeps the punishing forcing hand in reserve, it implements a two-handed approach to governance that is more effective than using either hand alone. If the two hands work synergisti-

cally, a stronger relationship between government and the governed should be the result. Government is transformed in the eyes of the regulated community from a one-dimensional actor representing only the prospect of punishment to a set of people with whom one can safely and beneficially interact.¹³ This can only help to bring about greater acceptance of the overall project of reducing the “bad” (pollution, GHGs), knowledge of how to accomplish the goal, and on the part of some, willingness to lead. Assistance programs, and the task of rethinking materials and process that planning embodies, can create a body of shared intellectual capital about how to solve problems as well as social capital: a network of relationships of trust, built around successful instances of helping companies to succeed in reducing pollution and saving costs.

III. The Hunt

There are those so entranced by abstract economic theories that they assume no such money-saving options exist because businesses would have already found them. Although the country’s P2 programs have supplied thousands of examples and case studies to illustrate how companies continuously improve their operations,¹⁴ it is assumed that the National Pollution Prevention Roundtable, the U.S. Environmental Protection Agency (EPA),¹⁵ and many others are wrongly reporting enormous savings. But it is not that the opportunities do not exist. It is that businesses do not normally focus on the opportunities. Picture the environmental chief and the production chief making recommendations to the chief executive officer (CEO) of a company about how to use \$100,000 in cash. The environmental chief says: “Boss, if we use the money to buy a new aqueous degreaser, we can save \$20,000 a year in unnecessary hazardous waste generation because we’ll be able to get rid of that poisonous solvent we use.” The production chief says: “If you use that \$100,000 to buy a new production line, I’ll make you a half-million more next year.” Businesses are busy making money. Cost-saving

12. This example is drawn from the experience of the MA Office of Technical Assistance, which in the early 1990s disseminated information about IBM’s practice of making etchants “immortal”, and worked with several companies on reducing acid waste generation by extending the life of etchants through careful monitoring (and “regeneration”). Improved etchant processes were a typical result, with benefits in productivity far outweighing the value of reducing purchases and hazardous waste generation.

13. The author has experienced this transformation dramatically. In the late 1980s, when introducing pollution prevention concepts to industry groups, it was not unusual to experience outbursts of anger on the part of company officials angry about “regulators” and the costs imposed on them for managing hazardous wastes, air emissions, water discharges, etc. This gradually changed as the program developed, though many companies still harbor distrust of government and others express surprise that an agency exists that is dedicated to providing free and confidential services.

14. See Pollution Prevention Resource Exchange, <http://www.p2rx.org/> (last visited June 24, 2009) (a national network of regional information centers: the North East Waste Management Officials Association (NEWMOA), the Waste Reduction Resource Center, the Great Lakes Regional Pollution Prevention Roundtable, the Southwest Network for Zero Waste, the Pollution Prevention Regional Information Center, the Peaks to Prairies Pollution Prevention Information Center, the Western Sustainability and Pollution Prevention Network, and the Pacific Northwest Pollution Prevention Resource Center).

15. See ENVTL. PROT. AGENCY, DRAFT POLLUTION PREVENTION STRATEGIC PLAN 9, available at <http://epa.gov/p2/pubs/docs/P2StrategicPlan012309.pdf>.

Between 2001 and 2003, the P2 efforts of 29 regional, state, and local governments resulted in the prevention of over 6 billion pounds of air, water, hazardous and solid waste pollution. The efforts saved businesses and governments at least 1.2 billion kilowatt hours and 44 billion gallons of potable water. The total savings returned to the economy for more productive use was more than \$500 million. This sum was 5 times the total budget for these P2 programs for the corresponding time period, and more than 25 times the federal investment.

environmental options are often not implemented because they compete with profitmaking opportunities that are far greater. Also, people may be expert in what they do, and not necessarily in alternatives to what they do. CEOs may be expert money hunters, but they hunt in familiar parts of the forest. Planning makes them hunt in parts they usually ignore, and assistance helps them learn how to find what they might not find on their own.

This author has worked in technical assistance since 1988, and has many stories that illustrate the value of a fresh pair of eyes.¹⁶ My first on-site visit was to a company that processed gases. There was oil all over the floor underneath the primary gas processing machine. When asked how that oil had come to be on the floor (necessitating costs and time on cleanup), it was determined that during routine maintenance of the machine the hoses were allowed to drip oil. The fix was simple (drain the hoses into a cup or plug them), but it had never been applied because no one had paid attention to the issue. The company was focused on production. Environmental issues are clues to how operations may be made more efficient, and an external motivation for stepping back and taking a broader view can be beneficial (if not arrogant, intrusive, or misleading; a true service mentality, and developing expertise and institutional memory, help to prevent this). People from the outside, who have practiced doing this at many facilities, are often invaluable resources, even when they start off knowing very little about a particular process. The act of asking questions can prompt useful critical thinking on the part of experts within the company, and support the generation of new ideas, or the resurrection of old ones whose value had not been fully appreciated.

A GHG reduction-planning requirement and accompanying assistance could get CEOs and other facility staff to use their superb skills to hunt for improvements in places where they are desperately needed, and engage and empower others in the facility as well. Many assistance programs have concentrated on stimulating culture change within visited facilities, promoting innovation and teamwork, prompting creative initiative on the part of management and staff. Very little work would be necessary to adjust existing P2 planning to focus on GHGs. For example, the 2006 Massachusetts Toxics Use Reduction Act Amendments allowed companies that had done three rounds of toxics use reduction planning to do Resource Conservation planning, which includes energy conservation and use of cleaner energy sources.¹⁷

IV. Modes of Assistance

The on-site, free, confidential one-on-one visit is one form of assistance, which can be very effective if the service providers address people where they are, within their constraints, and with their capacity, and do a good job of tailoring solutions to their situation. Those administering one-on-one on-site assistance programs can also learn a great deal about what it is like for the regulated community to attempt to comply, and thus can feed back to regulators information that can help them to redesign rules and programs, which makes them work better. The assistance program can also assist in the development of practices that encourage good faith, because by using the regulator's informed sense of what is possible in a practical sense, the on-site visit service can help enforcement personnel understand what constitutes a good-faith effort in a particular setting.

This also strengthens the relationship between government and the regulated community. For example, if there are no good alternatives to a volatile chemical in wide use, an effort to pressure companies to cease using it will be less effective than one that concentrates on how to use it with less waste and release, and which focuses on research to develop new alternatives. Conversely, if an on-site visit official observes new practices that could be duplicated by others, regulators can use enforcement (such as settlement policies) and rules to encourage others to make the switch to the new practices.

But one-on-one programs take a long time to reach everyone, and only a certain segment of the population wishes to work with government officials, even when they have a good track record and offer confidentiality. Assistance as broad general education can reach more who do not use on-site services. Assistance initiatives should encompass training, workshops, fact sheets, guidance, demonstration events, and other services. For example, the Massachusetts Toxics Use Reduction Institute (TURI) at the University of Massachusetts at Lowell has a laboratory that performs free evaluations of alternative cleaners. Hundreds of companies have used this service to check out safer chemicals before adopting them to replace more toxic substances. TURI also has a library, and it trains and qualifies private-sector professionals to provide toxics use reduction (TUR) services, creating a corps of private sector professionals who can certify that company TUR plans comply with requirements. Through continuing education requirements, the state ensures that this sector remains up to date and effective in transmitting information.

Assistance also encompasses subsidies. Delaware's Blue Collar Jobs Act of 1992 was one of the first to provide tax incentives to industry for reducing waste.¹⁸ Michigan's Department of Environmental Quality matches investments by Michigan universities for research and development of innovative P2 technologies "having the potential to reduce the quantity or toxicity of specific environmental wastes

16. See Massachusetts Office of Technical Assistance and Technology, [http://www.mass.gov/?pageID=eoeesubtopic&L=5&L0=Home&L1=Grants+%26+Technical+Assistance&L2=Guidance+%26+Technical+Assistance&L3=Agencies+and+Divisions&L4=Office+of+Technical+Assistance+and+Technology+\(OTA\)&sid=Eoea](http://www.mass.gov/?pageID=eoeesubtopic&L=5&L0=Home&L1=Grants+%26+Technical+Assistance&L2=Guidance+%26+Technical+Assistance&L3=Agencies+and+Divisions&L4=Office+of+Technical+Assistance+and+Technology+(OTA)&sid=Eoea) (last visited June 25, 2009) (providing free and confidential on-site assistance, to help companies and others comply with environmental rules, and reduce the use of toxics, energy, water, and other resources.) Similar programs exist in many states, sometimes within enforcement or small business assistance agencies, and sometimes within universities or other organizations. Some use interns or retired engineers, and some have permanent staff.

17. See Massachusetts Department of Environmental Protection, Resource Conservation (RC) Planning: A New Option for TURA Filers, <http://www.mass.gov/dep/toxics/tura/rcplan.htm> (last visited June 25, 2009) (information on Resource Conservation planning, including guidance).

18. Tax Credit for the Creation of Employment & Qualified Investments in Business Facilities (Blue Collar Job Act), DEL. CODE ANN. tit. 30, §§2011(a) et seq. (1992). http://revenue.delaware.gov/services/Business_Tax/FullBC.shtml.

currently generated by Michigan businesses.”¹⁹ New York State’s new Pollution Prevention Institute is providing a grant program because “research shows that grant programs have been extremely successful in other states in developing highly innovative, high-impact, pollution prevention (P2) initiatives that have led to measurable outcomes and increased awareness.”²⁰

Assistance is also provided through recognition, and many states have established Governor’s Awards, or other special events to promote examples of good faith and success in the implementation of sustainable practices such as pollution prevention, energy efficiency, solid waste reduction, or water conservation. One well-developed example is New Mexico’s Green Zia program, which characterizes companies implementing pollution prevention as having “a vision and desire to move towards environmental excellence and long-term environmental and economic sustainability,” and declares that it is the policy of the state to encourage and support them.²¹

V. Relationship to Private-Sector Service Providers

Assistance can seem like an extraneous function of government, and perhaps that is why in lean times these programs have suffered budget cuts. Free-market true believers can also question why government is interfering with the private sector’s provision of consulting and educational services. But many small businesses cannot afford consultants, and some consultants may be tempted by a profit motive that values return visits to a company with a pollution problem. Government-provided or -sponsored education, guidance, and other services must attempt to be fair and objective, and are often produced through transparent processes with accountability, and thus can be a source for authoritative information. When government or government-sponsored programs set a standard for assistance that focuses on eliminating pollution at the source, others are more strongly motivated to also provide true prevention assistance. In addition, the government programs provide many referrals to goods and services and thus generate business for the green private sector, including consultants who do the same things as the government service, but take it farther. Government-provided assistance personnel generally do not fill out permit applications or purchase or install equipment—they assist companies in understanding their options and determining a course of action. They generate business for the private sector that addresses cleaner operations.

19. Michigan Department of Environmental Quality, Matching Grants Available to Research Innovative Pollution Prevention Technologies, <http://www.michigan.gov/deq/0,1607,7-135-3585-85906--,00.html> (last visited June 25, 2009).

20. New York State Pollution Prevention Institute, Community Grants Program, http://www.nysp2i.rit.edu/community_grants.html (last visited June 25, 2009).

21. New Mexico Environmental Department, Green Zia: Environmental Excellence Recognition Program, http://www.nmenv.state.nm.us/Green_Zia_web-site/index.html (last visited Aug. 9, 2009).

VI. A Deeper Right to Know and Mass Balance Accounting

The Toxics Release Inventory (TRI) of the Emergency Planning and Community Right to Know Act has been hailed as a “surprising success” because it brought about dramatic reductions in toxic releases through inexpensive means.²² All across the country, people have the right to know about what is released from the facilities of “large quantity toxics users.”²³ But in Massachusetts, New Jersey, and the city of Eugene, Oregon, a deeper right to know has been created. This is the right to know what dangerous products are being used. In these jurisdictions, input must be reported, not just output.²⁴ This permits the assessment of an input/output mass balance. Mass balance accounting for materials is the only way to accurately measure resource efficiency.²⁵ If you consult the TRI and learn that a nearby company has reduced its releases, you may be glad about that, but it may be because the company has captured those releases in a filter, which is better than releasing them but is not as good as reducing its input of the toxic material that causes the release of concern. The contaminated filter must still be managed. Or, the company has simply reduced production, and when production increases again, the toxic material input will also increase, and releases will increase again. The company may even seek and receive public commendation for reducing releases, when it has done nothing to use its materials more efficiently. But when you have information on input and chemical usage, it is possible to see if a company has actually reduced its input and that is the reason that releases are down. Only through input/output mass balance reporting does the public have the ability to know that a company has truly become safer and cleaner. As more accurate measurement of dangerous chemical use is also directly relevant to risk assessment, investors and potential business partners can also benefit from better measurement of materials use efficiency.

This form of reporting recognizes the community’s right to know the true level of performance by its potentially risky neighbors. Applied to GHGs, it would provide a level of knowledge that would more effectively assure the correct application of social approval and disapproval than simply knowledge about levels of releases. Requiring reporting on the inputs that cause GHG releases would not just recognize the community’s right to know about a company’s performance and commitment, it would also ensure that companies

22. See Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 259 & n.1 (2001).

23. Emergency Planning and Community Right to Know Act, 42 U.S.C. §§11001-11050, ELR STAT. EPCRA §§301-330 (the entities required to submit reports on toxic releases under the Act).

24. Toxics Right to Know Amendment to Eugene City Charter, Section 54, Amendment IV was enacted in 1996. See http://www.eugene-or.gov/portal/server.pt/gateway/PTARGS_0_2_181662_0_0_18/Eugene%20Charter-2002%20update.pdf. The New Jersey Pollution Prevention Act was enacted in 1991. See New Jersey Technical Assistance Program, The New Jersey Pollution Prevention Act, <http://www.cees.njit.edu/njtap/njppa.htm>.

25. See Reibstein, What if Technical Assistance Really Works?, *Sustain*, Fall/Winter 2008, at 8, <https://www.bu.edu/cees/people/faculty/reibstein/SUSTAINReibstein.pdf>.

do accurately measure their own performance, a prerequisite to effective internal initiatives. As engineers say, what gets measured gets done.

Another way of recognizing the right of the public to know is to require reporting that companies have completed GHG reduction planning. Plans must encompass company secrets, so they must be kept on site and not revealed to the public. But plan summaries can be made public, as assurance that they are being seriously conducted. The plans themselves must be available to inspectors, and enforcement to ensure that the plans are made in good faith is essential. But provision for summary reporting to the public affirms the element of social responsibility that a planning requirement embodies: that the public has a right to know not just about releases, but that efforts are being made to transition from the practices of the past.

VII. Canceling Out the Right to Pollute

Unlike pollution rights trading, planning does not confer a right to pollute. Instead, it imposes an obligation. It asserts that there is a responsibility for each large emitter to try to reduce its emissions. A requirement that one must write a plan for bringing about reductions in one's own sphere of operations is a firm and strong statement of that responsibility. When a state provides assistance and education on how to reduce GHGs, it sends a message that this is a matter that is important to society. When a state requires reporting on the level of GHGs that are emitted, and makes that data accessible to everyone, it creates the possibility for social pressure to be exerted on individual entities. When a state requires the payment of a fee for releases of GHGs, it labels that activity as a social bad (and can fund the programs discussed herein). When a state requires reporting that planning has been accomplished, it is declaring that its citizens have a right to know that every large contributor to this common problem recognizes their responsibility to investigate what actions they can take.

Unlike trading, which adds a new expression of proprietary interest to an authorization to pollute, i.e., the permit, and thus is morally confusing, a planning requirement is well-grounded in terms of fundamental philosophy. A regime that only has cap and trade sends a strange message that pollution is a right that you bought with money (and so you should get to keep it; you paid for it). Including a planning requirement mitigates that message with the statement: you have a responsibility to reduce your emissions—there is no right to pollute. A planning responsibility should be considered as a necessary adjunct to a trading scheme because of the misleading message trading programs send to those who buy or sell an economic “right to pollute.” It is one way to reassert the common interest and ensure such markets are in accord with our sense of what is just and right. It is a way of putting trading in its proper place; preventing the trading system from distorting our sense of values.

It is arguable on philosophical grounds that a company should be required to conduct a plan before it be allowed to

purchase the right to pollute. (This might not be immediately practical if trading is in the process of being implemented and there is not already sufficiently wide understanding of how to implement a planning requirement, or ready resources for substantial assistance). The virtue of such an approach would be that everyone would have to look for results, and if they found them, they might be able to profit from them, which would add motivation to the planning effort. The fact that everyone would have to plan and no right to pollute would be reified would address some of the shortcomings of a trading scheme, and the fact that caps and trading opportunities would exist would strengthen the incentive to do planning well. One seeming drawback of this scheme would be if planning worked so well no one needed to buy credits. But this would be an excellent problem to have. Market enthusiasts may object that a requirement to do planning before buying emission credits would undermine the value of the credits and thus be unfair to sellers. But if the company forced to do planning takes it seriously and finds ways to reduce its need for credits, the reduction sought by the trading system will occur anyway—without transactional and verification costs—and it will become more feasible to implement the most important part of the trading system: the declining cap. A trading system that has a planning requirement is one that is efficient and morally comprehensible in the light of climate change, and thus is more robust than trading without a planning requirement.

It has been suggested that the activities that planning would require are the same activities that a company would conduct if they were to try to capture the benefits of a trading program. For any company aggressively seeking credits under a trading scheme, a planning requirement would be harmless; it would require virtually no extra effort except perhaps some additional documentation. But few companies will be such leaders. For many companies, a planning requirement would ensure that they do more than select already-favored options. It would cause them to become better educated about what is technically and economically feasible. The experience of P2 planning shows that many companies did not do a very good job on their own of understanding their choices before they had to plan. If planning involved full-cost accounting, unconventional options would receive a fair comparison with those already favored, countering internal biases, and employees and other sources of ideas would be consulted. It is perhaps fair to say that most companies do not do a great job of thinking outside of their proverbial box, because they usually make money by staying inside of their box. Planning would significantly increase the likelihood that easily overlooked options would receive serious consideration. A planning requirement would also reach every member of a designated sector, and not just the leaders. Finally, only a planning requirement would provide the public with any assurance that the managers of a company were examining options outside of business as usual.

Until such time as trading credits are worth an extraordinary amount of money, companies will likely examine options well within their comfort zone, and only some com-

panies will do anything at all. A well-designed planning requirement will reach those who wish not to be bothered by the outside world and will bring every covered entity some distance from what might otherwise be a very narrow focus. For example, with just a trading regime a company might replace its lighting and sell the credits they receive. This is easy to do and requires very little effort. But with a planning requirement, the company could be required to undertake a careful consideration of solar thermal applications for their industrial hot water use, ground-source heat pumps, insulation of their warehouse, day-lighting of their offices, steam recompression, compressed air system upgrading, new motors, variable speed drives, analysis of pump and fan operations, hybrids for their fleets, etc. A planning requirement has the potential to prompt vastly greater attention to the needed transition than any trading scheme but ones with very aggressive caps.

Planning employs a self-evident proposition, that this is a responsibility to the world at large, and to fail to think about it is avoiding a responsibility. Though this responsibility falls upon everyone, large GHG emitters should be under special focus. It should not be considered an acceptable substitute for large GHG emitters to spend advertising money or issue glossy corporate reports to convince us that they are making an effort. There should be a standard way that everyone can know GHG reductions are truly being done. The great benefit of planning to large GHG emitters is that they could save all the money they are now spending on public relations efforts that could better be spent on actual GHG-reduction initiatives. Proper planning and reporting will efficiently let the public know what reductions are being achieved in a much more reliable fashion.

VIII. Planning as a Transitional Tool

It is possible to start with a planning method that is not required and then to put in incentives for people to adopt it, before requiring it. Thus, planning can be a good transitional tool from our current hands-off regime to something that better addresses our common problem. Instituting planning first as a voluntary measure with concerted assistance and encouragement also allows for improvement of the planning tool before planning itself is required, e.g., for tailoring the requirement for different sectors, developing effective guidance and assistance, and better matching incentives to what motivates organizations to perform. One example of an incentive is to offer expedited permitting for those who submit proof of a good-faith planning effort, or actual achievements of the intent of the plan. (A good planning requirement will incentivize actual results rather than process.) Beginning in as voluntary a fashion as possible means that those who adopt it first are those who use the tool well, who figure out how to make it work. They deserve to take the lead.

Using standard, well-accepted methods of planning and a metric for evaluating if the planning is effective, e.g., through

audits and certifications, is a well-developed option.²⁶ Expectations can drive much progress before law need be enacted. Shareholders can demand plans by their managers, and responsible corporations can demand plans of their suppliers. The International Organization for Standardization 1400 standard for an environmental management system (EMS) is effective without the force of law, by qualifying professionals to certify that an EMS is in place and functioning. Because others want to know that an EMS is in place and functioning, contracts result, money flows, and no governmental oversight is necessary. After EMSs had been used for years, enforcement agencies began obtaining settlements that require their implementation and adopting policies that provide penalty reductions.²⁷ They have also established programs to provide recognition for when they are in place.²⁸ (EMSs as well as planning can focus on global warming). Rather than an ideological justification for having such a program be voluntary, it may be more efficient to start with the willing adopters first. A period of voluntary GHG planning could bring the process to wider understanding and successful use.

IX. Getting to the Root of the Problem

The most important benefit of a planning approach, however, goes far beyond its flexibility, the opportunity of using for more worthwhile purposes the millions of dollars spent on advertising about corporate responsibility, and the importance of a commonly accepted ethical principle that emissions should be reduced. The most important benefit is that we may design the GHG plan as something that focuses on the source of the problem. We can choose to design plans that are preventive, that address the root causes of this problem, steering entities toward avoiding creating GHGs in the first place. Avoiding emissions at the source is the best way to manage them. *Plans should be preventive.*²⁹ A plant with black smoke coming out of the stack can reduce emissions by channeling the smoke into a baghouse, but if the plant recognizes that the black smoke is being caused by inefficient

26. See Cary Coglianese & Jennifer Nash, *Management-Based Strategies for Improving Private Sector Environmental Performance* (Harvard Kennedy Sch. of Gov't, Working Paper No. RWP05-025, 2005). While Cary Coglianese and Jennifer Nash warn against overstating what can be accomplished through planning requirements, they describe the significant potential of the tool for prompting institutional change.

27. See STEVEN SISK, U.S. ENVTL. PROT. AGENCY, COMPLIANCE-FOCUSED ENVIRONMENTAL MANAGEMENT SYSTEM - ENFORCEMENT AGREEMENT GUIDANCE, EPA-330/9-97-002R (Aug. 1997, revised Dec. 2001), available at <http://www.epa.gov/compliance/resources/publications/incentives/ems/ems12elemr.pdf> (discussing EMSs in enforcement settlements).

28. See U.S. Environmental Protection Agency, National Environmental Performance Track, <http://www.epa.gov/perfrac/> (last visited July 7, 2009).

29. See Heather M. Tenney, *A Comparison of Voluntary and Mandatory State Pollution Prevention Program Achievements* (Apr. 20, 2006) (M.S. thesis, Tufts University), available at <http://www.ecos.org/content/general/detail/1975> (an evaluation of 15 state programs with varying requirements). See also Nicholas Ashford & Charles Caldart, *Policies to Promote Pollution Prevention and Inherent Safety*, in ENVIRONMENTAL LAW, POLICY AND ECONOMICS (2008) (describing Inherent Safety Opportunity Audits and Technology Options Analysis, the impact of the MA TURA program, and noting that "[b]eginning in 1979, a number of MIT studies found that regulation can stimulate significant fundamental changes in product and process technology that benefit the industrial innovator; provided the regulations are stringent and focused" (emphasis added)).

combustion, or uses a cleaner fuel, or concentrates its heat more effectively, it can also reduce the emission of smoke, and these are better approaches because they involve innovation and the upgrading of the facility. If the facility still needs a baghouse when these actions are taken, it will be a smaller one. Preventive strategies avoid the problem of shifting pollution—for example, from the air to the baghouse filters—making an air release problem into a waste disposal problem. Out of sight and out of mind has not served us well in the past.

The point of planning should be for a facility to ask, what are the causes of GHG release? What actions set in motion the operations that create the problem? If planning goes back to the origin of the problem, then it can be most efficiently addressed and we will most efficiently move forward with the adoption of better processes and technologies. Those required to do GHG planning could be led to see how they can improve operations, and avoid problems, by changing their practices.

X. A Collective Effort to Address a Common Problem

We could design bad planning requirements, but we could also design them so they lead plants toward upgrading, modernization, innovation, and investment. This is best done when planning is viewed as a collective effort to solve a common problem.

Even when horses are led to water, they cannot be made to drink. So even companies that learn, through planning, that they could cut the burning of high-pollution fuels with solar, wind, efficiency, and many other options, and eventually put themselves in a position of much lower operating cost, might still say, but I don't want to lay out all that capital this year, and wait six or seven years to get my payback. That might look okay to us, but they might not be able to do that.

But if planning is seen as part of a suite of governance tools, we can have companies doing plans and learning about their options for reducing GHG emissions and then using grants, loans, and tax incentives to make them more cost effective to implement. Subsidies that help them afford to try new options will increase the rate at which new technologies are developed and adopted. If companies have the right education, they may see and understand the big picture, and the right technical assistance, they may do better at identifying their options. And if they have the right financial assistance, they will be more likely to implement them.

A recent example illustrates the importance of such programs. A recycling company contacted Massachusetts Office of Technical Assistance and Technology (OTA) for assistance, having just learned that they were subject to Toxic Use Reduction Act (TURA) planning and reporting. The company official was very frustrated and complained that the law was hurting him for no reason, imposing a burden that made no sense. (This is a typical reaction for many first-time filers even with much less justification.) He said, understandably, that there was nothing he could do to reduce the use

of the toxic chemical that triggered requirements, as it was a result of receiving incoming material over which he had no control. There are many companies confronted with the expectation that they reduce impacts and they believe they have no way to do it. (If this is true, then nothing in the law requires the planning effort to be long and drawn out, but can be limited to a thorough checking that it is really true that no new opportunities have developed.) An OTA engineer suggested that he take samples from his various incoming shipments and determine which ones were the source of the contaminant. An incoming sampling program is not very expensive and could quickly discover which clients are causing the problem. At that point, it might be possible—there are no guarantees but experience has shown that it is often possible—to reduce the contamination of the entire load by the specific toxic chemical. This might be achievable by segregating the toxic load and processing it separately, or by communicating with the client and investigating options to reduce the toxin in the product. OTA's experience has been that there have only rarely been cases when supposedly there was nothing that could be done, and no options were found by OTA to reduce toxics use. The availability of an experienced and capable assistance effort is essential for a planning requirement to be effective in achieving reductions. In the past, OTA has sometimes been able to arrange for free lab sampling at government facilities. The provision of this occasional free service has increased the willingness of companies to pursue the suggestion of sampling incoming product.

Not all companies have the expertise in what they could be doing. Some are struggling, or have very busy schedules, or lack expertise. They need help to see the very big and complicated transition, and they need help to make it. The idea that because they are imposing a risk on the world by emitting large amounts of GHGs they should be required to look at their options does not mean that we, the public (acting through government agencies that provide assistance), should not also help them in every way that we can.

Planning can be a prerequisite for receiving a benefit. As the experience of the Massachusetts TUR program has shown, a planning requirement can speed the transition to safer technologies.³⁰ So why should it not be instituted as a condition of receiving a permit or other approval that risks harm to health, safety, or the environment? By embedding the planning effort within an array of other initiatives involving incentives, right to know reporting, assistance, encouragement, and disincentives for ignoring responsibility, we may emphasize and articulate the idea of common responsibility and common effort, to address a common problem. In this way, we can progress faster in protecting our common property, the biosphere.

30. *The Effect of Providing On-site Technical Assistance*, discussion of the "TURA Coverage Effect, 30, at: http://www.mass.gov/Eoeca/docs/eea/ota/programs/ota_effectiveness_study_final_2006.pdf.

XI. What Plans Might Look Like

Assistance, education, subsidies, recognition, and fee and reporting requirements are fairly easy to explain. We are familiar with examples. But if you have never had to comply with a planning requirement you may not be quite sure just what it entails. Here is one way to think about how planning can be done.

The plan should begin with a *declaration of intent*. The declaration of intent should make clear that the entity regards the reduction of GHG emissions as a matter of utmost importance and it is henceforth committed to its realization on a continuing basis. It should request assistance from every member of the organization and evince a willingness to reward contributions toward success. Accountability for tasks related to this mission should be established.

The next matter to be addressed is *measurement*. The facility should commit to effective measurement of GHG emissions from the site of its operations, first, and second, to the off-site emissions to which it is a contributory cause. These latter emissions could be caused by its purchases, or by its sales, or by partnerships, or even political activities. Internal and external emissions are quite different and should be measured separately, in order to ensure that entities do not fail to examine what they can do onsite by concentrating on easy-to-achieve offsets.

The matter of measurement is one that can involve a variety of units and methods. The entity should conduct measurements in the first instance so that it can understand its contribution to global warming, understand what processes and materials are causing that contribution, and understand whether its implemented actions result in changes. But the company should commit to gradually developing and adopting measures that are congruent with common practice by others, so as to be part of a universal system of measurement that is transparent and understandable by anyone. Planning requirements, or planning incentives as when it is a prerequisite for receiving subsidies or preferred treatment, is a way to develop standardized methods. Accompanying planning with education in the selected measurement methods and assistance in their application is a way to continuously improve them.

Necessary components of effective planning are *source identification* and *cause and cost allocation*. What is the source of the problem? What is it that causes the emissions? Measurement can be performed without these elements, as when the daily electrical bill for a large facility is examined, or the weekly quantities of fuel burned are monitored. But identifying that a facility is heating a large vat of water that requires the furnace to be turned on, and allocating a percentage of the weekly fuel (and its cost) to that water-heating task is critical. It is this level of measurement that will inform the entity of where it must focus its attention and where it is in its own self-interest to change practices.

Source identification and cause allocation should be coupled with *functional analysis*, in order to enable effective *options identification*. In other words, why is the big vat of

water being heated? It is being heated in order to reduce the viscosity of a substance so that it can flow. Understanding this allows the examination of options for accomplishing the same task in another way. Is it possible that the substance can be mixed with water and then flow without having to be heated, that gravity plus a small rinse will do the trick? Is it possible that the need for the substance to flow through a pipe can be eliminated by conducting the next operation within the same tank? Is it possible that the heating can be accomplished with a solar thermal device? Is it possible that the substance can be heated more effectively if the tank is insulated? Is it possible that the substance would flow better if the surface were coated with a smooth material? All of these questions flow from a questioning of the purpose and function of the action being taken. This is where the real benefits of planning can be found, because planning that causes an entity to step back from the operations it has been conducting, and ask if there might be another way to get what they want, can lead to operational improvements that have many benefits besides GHG reductions. Functional analysis is the doorway to both efficiency and innovation.

A good plan should *map important GHG sources and causes* because doing this makes sure they are found and shows their relationship to each other and to other activities. It should involve a *team of people with various perspectives brainstorming* because the best choice and implementation of options flows from a group that works in an integrated fashion. The group, working from the map to identify opportunities to make desirable changes, benefits from working together across organizational divides, and the wider perspective creates the possibility of generating practical ideas. If done well, the planning team can enhance the internal culture of the entity and constructively influence its orientation to be more cognizant of externalities, the future, and the intellectual resources within and accessible to the company. This is good for mitigating business risk as well as enhancing social responsibility and the inflow of useful information.

A good plan is not an extra, ancillary task. A good planning process is an opportunity for enlivening and enriching the core tasks of the entity. *The team should interact with all personnel who might have an idea or insight to offer*, thus leading to greater cohesion and a spirit of cooperation and innovation. The team should hold each member responsible for giving credit where credit is due. This way the leader of the team will not receive all the glory for ideas submitted by others, and the effort will remain collaborative or likely successful. While valuing the individual, the team should be the voice of the entire facility, and as such should seek to discover the best alternatives to explore.

The process of options identification should be incorporated into ordinary business so that it is not disruptive, and so that it is accepted and made part of continuous operations. If this happens, research will build and exploration of new opportunities will expand and improve over time. If the planning process is discrete and time-consuming, it will fall into disuse unless constantly promoted. If it becomes a way of doing business, it will promote constant modernization.

When the team has successfully fostered *the generation of a list of ideas* worth exploring, management should make choices to investigate, using a method of *comparing each idea to current activities*. The problem that must be overcome at this point is the bias for things as they are, and other biases that may result because of the comfort level that various influential people will have with certain alternatives. For example, if the use of methane gas from a local landfill is considered, and is judged feasible, but the operator of the furnace is an expert in oil burning, the operator may feel threatened by having to learn a new system. His supervisor may feel a need to protect the operator because of loyalty and sympathy. These are admirable sentiments and they should not be ignored. A good plan will take account of them and provide the furnace operator with training and bonuses and other encouragement and assistance to manage the transition. But a good plan will first make an accurate comparison of the advantages of using the local methane source to continuing to burn oil.

The common problem of planning is that an outcome is secretly desired and the planning process is subverted in quiet and undetectable ways. This makes a waste of everyone's effort. This problem can be avoided by careful and accurate comparison of alternatives to current practice, looking at the costs and benefits over the useful life of the systems, and considering costs that are hidden in overhead and other accounts, not usually allocated to the source—the activity in question. An accurate comparison will include potential liabilities and the opportunity cost of not pursuing an option. An accurate comparison should then be followed by a full and compassionate examination of the process of transition, considering the perspectives of the people involved, their capacities, and their proclivities. This may not be all documentable or even discussed. But if a plan is to be effective, the people involved need to be understood.

Once the options have been identified and compared to current practice, then the plan needs to *consider implementation*. Trials and more investigation will likely be useful. Here again, measurement is key, including accurate methods of measuring both costs and benefits. In addition to quantitative measurements, such as reductions in fuel use, it is necessary to carefully observe key matters, such as whether product quality or customer acceptance are maintained, are workers satisfied with the new methods of operation, how easy was it to implement the new action, and how long can it be kept going?

This all can sound very cumbersome and complex. But planning can be very easy. However the steps of a plan are delineated, it is important to remember that the plan exists for a purpose—to get the company to do X if it possibly can. If the company decides to just do X, no one should be kicking because they skipped some planning steps. The principle that the goal is a defined result, not process, can be used to simplify the plan for anyone who finds it daunting. It is also important to recognize that the elements of a plan are things an intelligent organization should be doing anyway; it

is about understanding what is happening in the facility and what could be happening to make it work better.

XII. The Full Toolbox

Law is infinitely flexible and is limited only by our will and imagination and the bounds of what is right in a system of mutual self-governance. A government of the people can devise what it needs, within constitutional limits, to serve its members in effective and equitable fashion. The world's governments can respond to the global problem of warming by fashioning systems that work, out of all the methodologies we have at our disposal.

GHG reduction planning is a tool that needs greater consideration. It should be coupled with reporting requirements that recognize the public's right to know that large contributors to global warming are doing what they can to reduce emissions. In order to make sure that significant contributors take the matter seriously, we should inspect and certify plans to make sure they are conducted in good faith, and also provide varied and substantial forms of assistance to help them achieve emission reductions. Planning is flexible. Companies are given the chance to look over all their operations and make their own choices. They know best how their own facilities operate. They should be expected to make an effort to make them cleaner. A good package of governance tools will ensure someone can come out to the covered facilities and help it along, that loans and grants and training and information resources will be available. A good program will promote the development of appropriate private-sector contracting services, and celebrate successes.

This approach has been tried before. It has been tried with toxic chemical use,³¹ hazardous waste, wastewater discharges, energy use, solid waste generation, acutely hazardous chemicals, stormwater discharge, and water use. It is not the be all and end all, but assistance, planning, and right to know can be used together to make a positive difference. Employing a flexible, user-friendly approach does not contradict or replace, but complements and supplements, the power of government to step in more resolutely if it must. Using such a two-handed approach will improve the relationship between government and the regulated community, appropriately encourage self-responsibility, and bring about substantial benefits by uncovering opportunities to mobilize efficient investments of public and private resources.

31. The author's experience with the 1989 MA TURA is the reason for this plea for greater attention to planning-tool, assistance and right to know. He has worked in TURA's Office of Technical Assistance (OTA) since its inception. TURA provides a good example of a law that combines planning, reporting, education and assistance, and a fee on toxics use as well (which effectively funds the program).