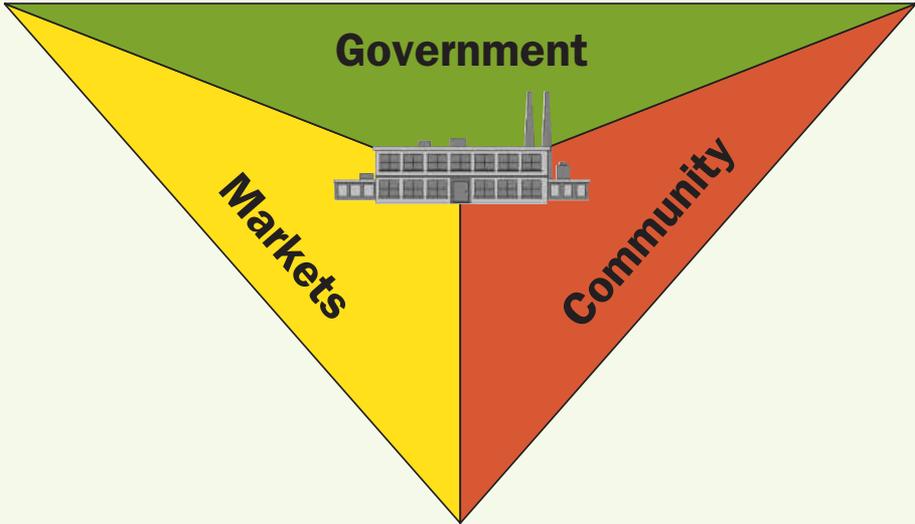


The New Model



Greening Industry: The New Model

Looking ahead with moderate optimism, we can imagine that the Earth's population has stabilized at 10 billion by the year 2050. About half the people live in today's developing countries, and a half century of 5 percent annual growth has given them incomes of \$4,000 per capita—twice the level in middle-income countries at the turn of the century. People still aspire to higher incomes, but desperate poverty has been vanquished.

Who wouldn't welcome such a prospect? It could materialize, since many countries have achieved 5 percent growth since 1950. But a shadow looms when we realize that this scenario would entail a 25-fold growth in output and potentially huge increases in pollution. Reacting to such numbers, some people argue that the world's poor will never enjoy material prosperity because industrial civilization will run headlong into an environmental catastrophe.

The full story of environment and development has yet to be told, and we cannot guarantee a happy ending. Global warming, deforestation, loss of biodiversity, and other problems remain daunting. Our own work has focused on only one chapter of the story, and one basic question: Can societies hold local, not global, industrial pollution within acceptable bounds while industry continues to grow? For this question, at least, the answer appears to be yes—if we are clever and careful.

We are optimistic because greening industry is not a futurist fantasy. In every country, no matter how poor, some factories already

operate at world-class environmental standards, and many profitable enterprises comply with national pollution regulations. Furthermore, extensive research has shown that sound, focused economic and environmental policies can greatly increase the number of good performers. Some of these measures entail reform of national economic policies, some require innovative and cost-effective approaches to formal regulation, and some harness the power of communities and markets to influence polluters through informal channels.

In this report, we have highlighted several innovative programs that demonstrate the potential for pollution reduction. Pilot projects are spreading as more countries decide to experiment with the new approaches, and broader experience will improve our understanding of their strengths and limitations. For the present, we can report that the results to date look promising. They suggest that coordinated action on all three fronts—economic reform, formal regulation, and informal regulation—can reduce industrial pollution significantly, even in very poor countries.

7.1 The Keys to Progress

Sustained progress on pollution control in developing countries depends on clear evidence that its benefits and costs compare favorably with those of other social investments. From Beijing to São Paulo, recent studies have verified that abatement of critical pollutants is a sound investment in many urban areas. However, regulating all pollutants under all conditions is neither economically defensible nor politically sustainable. Regulators have limited skills and resources, and they will rapidly lose political support if the public regards them as sloppy, unfair or ill informed. In Indonesia, the PROPER public disclosure program has demonstrated the impact of strategies that focus on accurately tracking and reporting a few critical pollutants from large emitters.

To maintain political support, environmental agencies need to marshal reliable information, educate the public about environmental tradeoffs, and encourage broad participation in setting goals. Such participation plays an important role in maintaining the credibility of Colombia's pollution charge system, EcoWatch in Philippines, and Indonesia's PROPER program. In PROPER, for example, stakeholders have an opportunity to vet the program's plant-level ratings before they are disclosed, forcing the agency to discipline its system for gathering, analyzing, and reporting data. And as the case

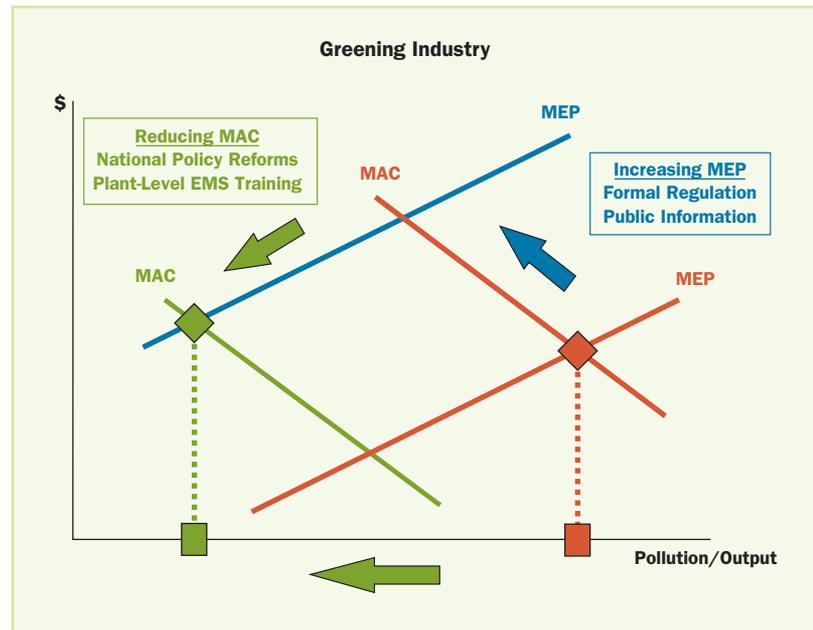
of Ciudad Juárez in Mexico shows, communities that participate in regulation will support its objectives, provide information about local polluters, and defend the environmental agency against political attack.

FEEMA's sustained outreach efforts in Rio de Janeiro reveal that good relations with business leaders are crucial as well, since industry associations often have the political clout to veto pollution-control programs. Regulators will find natural allies among CEOs of firms whose market position depends on good environmental performance. Having already paid for cleaner production, these leaders will support measures that require similar efforts from their competitors.

Leveraging Polluters' Incentives

Finally and most critically, progress requires understanding that managers do not sanction pollution because they enjoy fouling the air and water, but because they are trying to minimize costs. At the factory level, the marginal expected penalty for polluting (MEP) tends to rise with emissions intensity. But when managers reduce emissions, they also increase the plant's marginal abatement cost (MAC)—the price of abating the next unit of pollution. So managers try to minimize their overall costs by adjusting emissions until MAC approximately equals MEP.

Governments have many opportunities to influence this plant-level balancing act by reducing MAC or raising MEP (Figure 7.1). Governments can reduce MAC through national reforms such as liberalizing trade, privatizing national industries, and promoting new stock markets. Research in China, India, Mexico, Indonesia, and other developing countries has demonstrated the power of such measures. But economic reform is no panacea, because some policies can produce perverse environmental impacts. In Ciudad Juárez, for example, Mexico's decision to end propane subsidies dealt a devastating blow to the local campaign for cleaner brick production. National economic reformers can contribute to the fight against pollution by anticipating such impacts and working with environmental agencies to counter them. Appropriate measures may include strengthening formal regulation in critically affected areas, supporting more public dissemination of environmental information, and slowing implementation of environmentally risky reforms while local environmental institutions adapt to the new demands. Coordinating economic reforms and environmental policies will require close contact between the relevant national ministries. A formally

Figure 7.1 Policy Options for Pollution Control

constituted environmental advisory unit for the key economics ministers may provide the best guarantee that economic reform programs will incorporate such concerns.

At the sectoral level, governments can lower MAC by supporting environmental management training for small and medium-size enterprises. The example of Guadalajara, Mexico, suggests that such programs can provide a cost-effective complement to conventional regulation. Documented experience remains limited, however. More studies of pilot programs are needed to assess the strengths and limitations of environmental management training under different developing-country conditions.

At the plant level, regulators can raise MEP through both formal and informal channels. Among formal instruments, market-based instruments such as pollution charges reduce emissions at the lowest cost because they leave abatement decisions in the hands of factory managers. Successful experiences in China, Colombia, and Philippines have shown that pollution charges are feasible and effective in developing countries. Tradable pollution permits may also work well, but successful developing-country experiences have not yet been documented. Although interest in market-based instruments is spread-

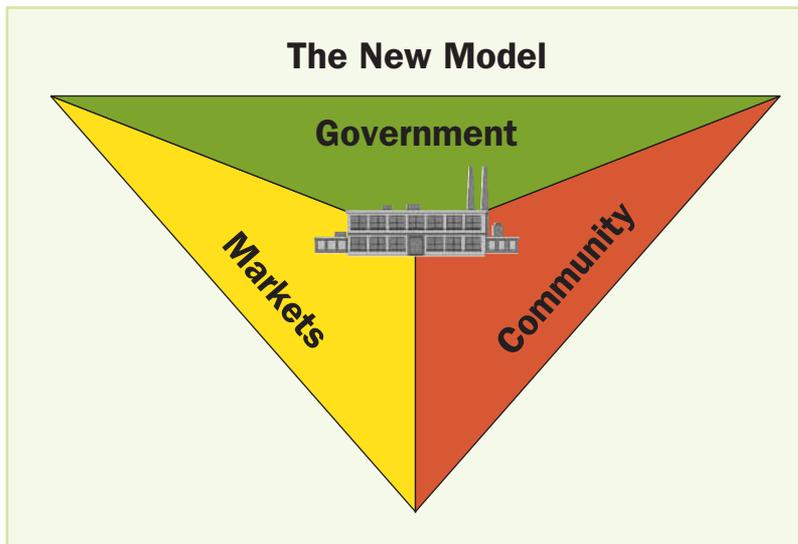
ing, many regulators will continue to rely on standards-based regulation for some time. Even so, targeted programs like São Paulo's ABC approach have demonstrated that traditional regulation can be reasonably cost-effective if monitoring and enforcement are focused on large pollution sources with low abatement costs.

Regulators can encourage informal regulation by publishing reliable, easily understood information on pollution sources and their impacts. Both EcoWatch in Philippines and PROPER in Indonesia have shown that public disclosure can have a strong impact even where formal regulation is weak, because it enlists social norms and market forces in pressuring polluters to clean up. Public information programs carry the extra benefit of generating political support for pollution control, by educating communities and raising the credibility of environmental agencies.

7.2 The New Model for Controlling Pollution

The proliferation of these new formal and informal channels is effectively creating a new model for pollution control (Figure 7.2). In this model, regulation is much more information intensive and transparent. As an environmental agency exerts influence through numerous channels, it becomes more like a mediator and less like a

Figure 7.2 New Dimensions for Policy



dictator. Community representatives take their place at the negotiating table along with regulators and factory managers. Market agents make their presence felt as well, through decisions by consumers, bankers, and stockholders.

The new model empowers policymakers because it gives them many options for improving industry's environmental performance. But the model also imposes new responsibilities—for strategic thinking about the benefits and costs of pollution control; a strong commitment to public education and participation; intelligent, focused use of information technology; and a willingness to adopt new approaches such as pollution charges and public disclosure. Of course, regulators will always have important responsibilities for traditional monitoring and enforcement. But in the future they will use more of their resources to raise MEP through informal regulation, to lower MAC through support for improved environmental management by small firms, and to promote sustainable economic reforms by working more closely with national policymakers.

The new approach pays particular attention to the problems of the poor. Recent research has shown that pollution intensity declines steadily as per capita income rises, both within and across countries. But economic development takes a long time, and the poor suffer heavily from pollution now. Evidence from Mexico, China, and elsewhere has shown that education provides a powerful lever for near-term improvement: Even if people are poor, they will not passively accept pollution if they are well informed about its sources and impacts. Through public education and maintenance of appropriate environmental standards, governments can help assure basic amenities and human dignity for the poor during the transition to greener industry.

7.3 The Role of the World Bank

The World Bank makes significant contributions to controlling industrial pollution on several fronts. By encouraging nations to adopt needed economic reforms, it influences pollution's "hidden half." In the long run, support for growth-oriented policies will encourage stricter pollution control by more prosperous societies. But the Bank has learned that not all economic reforms have clean impacts in the near term. It has recently revised its operational guidelines to ensure that Bank-supported reform programs incorporate environmental concerns. Successfully implementing these guidelines will require sustained effort, coordination between the Bank's econ-

omists and environmental specialists, and active collaboration between economic ministries and environmental agencies in partner countries.

The Bank has also financed decentralized environmental information systems that support the new regulatory model. Here the emphasis should be on appropriate scale, since experience cautions against using the most sophisticated modeling and data-processing technology to address all possible environmental problems. This comprehensive approach, which could be encouraged by the Bank's preference for big loans, can easily distract regulators from confronting their communities' most critical pollution problems. And once regulators have lost focus and clarity of purpose, their performance and credibility soon dwindle as well.

For several years, the Bank has catalyzed new thinking on pollution regulation by supporting pilot projects and disseminating their lessons to the international community. Partner environmental agencies have taken the lead, but the Bank has provided technical assistance, financial backing, and public support for innovative ideas. Recent initiatives of this kind include the Guadalajara small business assistance project in Mexico, the pollution charge programs in Philippines and Colombia, state-level environmental management reforms in Brazil, and public disclosure programs in Indonesia, Philippines, Mexico, and Colombia.

How can the World Bank promote the new model in the coming decade? Critical tasks include continued sponsorship of innovative pilot projects, widespread dissemination of their results, development of environmental loans that expand successful pilots to large-scale programs, and serious incorporation of environmental concerns into loans that support national economic reforms.

The Bank can use several instruments to support pilot projects, including the new Learning and Innovation Loans, Bank-administered environmental trust funds, and support of technical assistance as a "nonlending service" by the Bank's country operations units. The World Bank Institute should play the lead role in disseminating new ideas, through its international policy seminars and training programs for environmental professionals.

The Bank can expand pilot projects to large-scale programs through loans for development of pollution management systems that embody key principles of the new approach: focus, transparency, community participation, and regulatory instruments that leverage the economic incentives faced by polluters. To be successful, these

operations should promote a clear view of environmental objectives, cost-effective instruments for achieving those objectives, efficient gathering and analysis of appropriate environmental information, and, certainly not least, a strong capacity to enforce regulations when necessary.

Although the Bank also provides direct financing for pollution control, it has learned that subsidizing abatement investments by large, individual polluters is seldom the best way to control air and water emissions. Such polluters will generally mobilize their own resources to abate pollution if regulators properly leverage MAC and MEP. The major exception is construction of sewerage facilities: Household sewage remains a prime source of health damage in most poor countries, and the Bank provides support when communities cannot issue their own bonds to finance municipal sewerage and wastewater treatment systems. Further research will be needed to determine whether, and under what conditions, the Bank and other lending institutions should also finance common treatment facilities for industrial development parks and other areas where factories cluster.

The Bank can also promote the new approach through its lending operations that support national economic reforms. These operations provide an excellent opportunity for strengthening environmental agencies' ability to measure changes in environmental quality, identify serious pollution sources, and employ formal and informal regulatory instruments to counter excessive emissions. They can also promote the development of new links between economic and environmental ministries, thereby increasing the capacity of partner countries to cope with the environmental consequences of future economic changes.

In summary, the coming decade will offer the World Bank many opportunities to assist its partner countries in controlling industrial pollution while working to eliminate poverty. The Bank can promote the new model by encouraging innovative experiments, disseminating their results, expanding the success stories to national programs, and ensuring that economic reform programs incorporate environmental concerns. Through all of these channels, the Bank's activities can hasten the greening of industry in many poor countries.