

Executive Summary

Climate change threatens to derail development, even as development pumps ever-greater quantities of carbon dioxide into an atmosphere already polluted with two centuries of Western emissions. The World Bank, with a newly-articulated Strategic Framework on Development and Climate Change, must confront these entangled threats in helping its clients to carve out a sustainable growth path.

But this is known territory—many of the climate change policies under discussion have close analogues in the past. This phase of the evaluation, focused on the World Bank (and not the International Finance Corporation or the Multilateral Investment Guarantee Agency), assesses the World Bank’s experience with key win-win *policies* in the energy sector—policies that combine gains at the country level with globally beneficial greenhouse gas (GHG) reductions. The next phase will look across the entire World Bank Group at *project-level* experience in promoting technologies for renewable energy and energy efficiency and at some issues related to climate change in the Bank’s transport and forestry portfolios.

Within the range of win-win policies, this report examines two that have long been discussed but are more relevant than ever in light of record energy prices: removal of energy subsidies and promotion of end-user energy efficiency. Energy subsidies are expensive, damage the climate, and disproportionately benefit the well-off. Their reduction can encourage energy efficiency, increase the attractiveness of renewable energy, and allow more resources to flow to poor people and to investments in cleaner power. Though subsidy reduction is never easy, the Bank has a record of accomplishment in this area, especially in the transition countries. About a quarter of Bank energy projects included attention to price reform.

Improvements in the design and implementation of social safety nets can help to rationalize energy prices while protecting the poor.

End-user energy efficiency has long been viewed as a win-win approach with great potential for reducing emissions. It becomes increasingly attractive as the costs of constructing and fueling power plants rise. About 5 percent of the Bank’s energy commitments *by value* (about 10 percent *by number*) have gone to specific efficiency efforts, including end-user efficiency and district heating. Including a broader range of projects identified by management as supporting supply-side energy efficiency would boost the proportion above 20 percent by number. Few projects tackled regulatory issues related to end-user efficiency, though the Bank has invested in some technical assistance and analytical work. This historical lack of emphasis on energy efficiency is not unique to the Bank and reflects the complexity of pursuing end-user efficiency, a pervasive set of biases that favor electricity supply over efficiency, inadequate investments in learning, and inattention to energy systems in the wake of power sector reform.

The record levels of energy prices in 2008, although they have been relaxed, provide an impetus for the Bank and its clients to choose more sustainable long-term trajectories of growth. The mid-2008 oil price was equivalent to

the 2006 price, plus a \$135 per ton tax on carbon dioxide—the kind of level that energy modelers say is necessary for long-term climate stabilization. To help clients cope with the burden of these prices, and take advantage of the signals they send for sustainability, the Bank can do four things:

1. It can make promotion of energy efficiency a priority, using efficiency investments and policies to adjust to higher prices and constructing economies that are more resilient.
2. It can assist countries in removing subsidies by helping to design and finance programs that protect the poor and help others adjust to higher prices.
3. It can promote a systems approach to energy.
4. And it can motivate and inform these actions, internally and externally, by supporting better measurement of energy use, expenditures, and impacts.

Goals and Scope

This evaluation is the first of a series that seeks lessons from the World Bank Group's experience on how to carve out a sustainable growth path. The World Bank Group has never had an explicit corporate strategy on climate change against which evaluative assessments could be made. However, a premise of this evaluation series is that many of the climate-oriented policies and investments under discussion have close analogues in the past, and thus can be assessed, whether or not they were explicitly oriented to climate change mitigation.

This report, which introduces the series, focuses on the World Bank (International Bank for Reconstruction and Development and International Development Association), and not on the International Finance Corporation (IFC) or the Multilateral Investment Guarantee Agency (MIGA). It assesses its experience with key win-win *policies* in the energy sector: removal of energy subsidies and promotion of end-user energy efficiency. The next phase looks at the expanding project-level experience of the Bank and the IFC in promoting technologies for renewable energy and energy efficiency; it also

addresses the role of carbon finance. A parallel study examines the role of forests in climate mitigation. The climate evaluation's final phase will look at adaptation to climate change.

Motivation

Operationally, the World Bank has pursued three broad lines of action in promoting the mitigation of GHG emissions, the main contributor to climate change. First, it has mobilized concessional finance from the Global Environment Facility (GEF) and carbon finance from the Clean Development Mechanism (CDM) to promote renewable energy and other GHG-reducing activities. Second, and to a much more limited extent, it has used GEF funds to stimulate the development of noncommercial technologies. Third, and the subject of this evaluation, it has supported win-win policies and projects—sometimes with an explicit climate motivation, often without. These actions not only provide global benefits in reducing GHGs, but also pay for themselves in purely domestic side benefits such as reduced fuel expenditure or improved air quality. The win-win designation obscures the costs that these policies may impose on particular groups, even while benefiting a nation as a whole. This presents challenges for design and implementation.

Two sets of win-win policies are perennial topics of discussion in the energy sector: reduction in subsidies and energy-efficiency policies, particularly those relating to end-user efficiency. This report looks at these, and at another apparently win-win topic: gas flaring. Flaring is interesting because of its magnitude, the links to pricing policy and to carbon finance, and the existence of a World Bank–led initiative to reduce flaring.

Findings

Development spurs emissions.

A 1 percent increase in per capita income induces—on average and with exceptions—a 1 percent increase in GHG emissions. Hence, to the extent that the World Bank is successful in supporting broad-based growth, it will aggravate climate change.

But there is no significant trade-off between climate change mitigation and energy access for the poorest.

Basic electricity services for the world's unconnected households, under the most unfavorable assumptions, would add only a third of a percent to global GHG emissions, and much less if renewable energy and efficient light bulbs could be deployed. The welfare benefits of electricity access are on the order of \$0.50 to \$1 per kilowatt-hour, while a stringent valuation of the corresponding carbon damages, in a worst-case scenario, is a few cents per kilowatt-hour.

Country policies can shape a low-carbon growth path.

Although there is a strong link between per capita income and energy-related GHG emissions, there is a sevenfold variation between the most and least emissions-intensive countries at a given income level. Reliance on hydropower is part of the story behind these differences, but fuel pricing is another. High subsidizers—those whose diesel prices are less than half the world market rate—emit about twice as much per capita as other countries with similar income levels. And countries with long-standing fuel taxes, such as the United Kingdom, have evolved more energy-efficient transport and land use.

Energy subsidies are large, burdensome, regressive, and damage the climate.

The International Energy Agency's 2005 estimate of a quarter-trillion dollars in subsidies each year outside the Organisation for Economic Cooperation and Development (OECD) may understate the current situation. While poor people receive some of these benefits, overall the benefits are skewed to wealthier groups and often dwarf more progressive public expenditure. Fuel subsidies alone are 2 to 7.5 times as large as public spending on health in Bangladesh, Ecuador, the Arab Republic of Egypt, India, Indonesia, Morocco, Pakistan, Turkmenistan, República Bolivariana de Venezuela, and the Republic of Yemen. At the same time, subsidies encourage

inefficient, carbon-intensive use of energy and build constituencies for this inefficiency.

The Bank has supported more than 250 operations for energy pricing reform.

Success has been achieved in the transition countries—in Romania and Ukraine, for example, where energy prices were adjusted toward market levels, and the intensity of carbon dioxide emissions dropped substantially. Subsidy removal can threaten the poor, however. Recent efforts to assess poverty and welfare impacts systematically appear to have informed the design and implementation of price reform efforts, though not necessarily with direct Bank involvement. Examples include Ghana and Indonesia, where compensatory measures were deployed in connection with fuel price rises.

The Bank has rarely coordinated efficiency improvements with subsidy reductions to lighten the immediate adjustment burden on energy users.

An exception is the China Heat Reform and Building Efficiency Project, which links improved insulation with heat pricing. A growing number of projects sponsor nationwide distribution of compact fluorescent light bulbs, but this has been done in response to power shortages (Rwanda, Uganda) or to stanch utility losses (Argentina, Vietnam), rather than to facilitate subsidy reduction.

Despite emphasis on energy efficiency in Bank statements and in Country Assistance Strategies (CASs), the volume and policy orientation of IBRD/IDA efficiency lending has been modest.

Although the IFC has recently increased its investments in energy-efficiency projects, World Bank commitments for efficiency were about 5 percent by value of energy finance over 1991–2007. This includes investments in demand-side efficiency and district heating, and may also include some supply-side efficiency investments. By this definition, about 1 in 10 projects by number involve energy efficiency. Including a broader range of projects identified

by management as supporting supply-side energy efficiency would boost the proportion above 20 percent by number over the period 1998–2007. Globally only about 34 projects undertaken over the 1996–2007 period had components oriented to demand-side energy-efficiency policy. Among these, many attempts to promote efficiency have had limited success because the Bank has engaged with utilities, which have limited incentives to restrict electricity sales.

There are several reasons why end-user energy-efficiency projects, and especially policy-oriented projects, appear to be under-emphasized in the Bank's portfolio.

The Bank has carried out some successful and innovative efficiency projects. But internal Bank incentives work against these projects because they are often small in scale, demanding of staff time and preparation funds, and may require persistent client engagement over a period of years. There is a general tendency to prefer investments in power generation, which are visible and easily understood, over investments in efficiency, which are less visible, involve human behavior rather than electrical engineering, and whose efficacy is harder to measure. A general neglect of rigorous monitoring and evaluation reinforces the negative view of efficiency.

The Bank-hosted Global Gas Flaring Reduction Partnership (GGFR) has fostered dialogue on gas flaring, but it is difficult to assess its impact on flaring activity to date.

Associated gas (a by-product of oil production) is often wastefully vented or flared, adding more than 400 million tons of carbon dioxide equivalent to the atmosphere annually, or about 1 percent of global emissions. A modestly funded public-private partnership, the GGFR has succeeded in highlighting the issue, promoting dialogue, securing agreement on a voluntary standard for flaring reduction, and sponsoring useful diagnostic studies. But only four member countries have adopted the standard. The GGFR has emphasized carbon finance as a remedy for

flaring, but the use of project-level carbon finance is a mere bandage for policy ailments that require a more fundamental cure.

Recommendations

In mid-2008, real energy prices were at a record high. While this is burdensome for energy users, it opens an opportunity for the Bank to support clients in making a transition to a long-term sustainable growth path that is resilient to energy price volatility, entails less local environmental damage, and is a nationally appropriate contribution to global mitigation efforts.

Clearly the World Bank needs to focus its efforts strategically on areas of its comparative advantage. This would include supporting the provision of public goods and promoting policy and institutional reform at the country level. Furthermore, the Bank can achieve the greatest leverage by promoting policies that catalyze private sector investments in renewable energy and energy efficiency, including those supported by IFC and MIGA.

The analysis in this report supports the following recommendations:

Systematically promote the removal of energy subsidies, easing social and political economy concerns by providing technical assistance and policy advice to help reforming client countries find effective solutions, and analytical work demonstrating the cost and distributional impact of removal of such subsidies and of building effective, broad-based safety nets.

Energy price reform can endanger poor people and arouse the opposition of groups used to low prices, thereby posing political risks. But failure to reform can be worse, diverting public funds from investments that fight poverty and fostering an inefficient economy increasingly exposed to energy shocks. And reform need not be undertaken overnight. The Bank can provide assistance in charting and financing adjustment paths that are politically, socially, and environmentally sustainable. Factoring political economy into the design of reforms and supporting better-targeted,

more effective social protection systems will be elements of this approach.

Emphasize policies that induce improvement in energy efficiency as a way of reducing the burden of the transition to market-based energy prices.

Historically, energy efficiency has received rhetorical support but garnered only a small share of financial support or policy attention. This is beginning to change with such moves as China's commitment to drastically reduce its energy intensity and India's Energy Conservation Act. But the Bank can do much more to help clients pursue this agenda. If a real reorientation to energy efficiency and renewable energy is to occur, the Bank's internal incentive system needs to be reshaped. Instead of targeting dollar growth in lending for energy efficiency (which may skew effort away from the high-leverage, low-cost interventions), it needs to find indicators that more directly reflect energy savings and harness them to country strategies and project decisions. It needs also to patiently support longer, more staff-intensive analysis and technical assistance activities. Increased funding for preparation, policy dialogue, analysis, and technical assistance is required.

Promote a systems approach by providing incentives to address climate change issues through cross-sectoral approaches and teams at the country level, and structured interaction between the Energy and Environment Sector Boards.

To tackle problems of climate change mitigation and adaptation, the Bank and its clients need to think, organize, and act beyond the facility level, and outside subsectoral and sectoral confines. One avenue for this is through greater attention to systemwide energy planning. Integrated resource planning, once in vogue, has been largely abandoned in the wake of power sector privatization and unbundling. Yet current planning methods are inadequate in integrating considerations of end-use efficiency and in balancing the risks of volatile fuel prices and weather-sensitive electricity output from wind and hydropower

plants. Water management, urban management, and social safety nets are other areas where cross-sectoral collaboration is essential to promoting win-win policies and programs.

Invest more in improving metrics and monitoring for motivation and learning—at the global, country, and project levels.

Good information can motivate and guide action.

First, building on the Bank's current collaboration with the International Energy Agency on energy efficiency indicators, the Bank could set up an Energy Scoreboard that will regularly compile up-to-date standardized information on energy prices, collection rates, subsidies, policies, and performance data at the national, subnational, and project levels. Borrowers could use indicators for benchmarking; in the design and implementation of country strategies, including sectoral and cross-sectoral policies; and in assessing Bank performance.

Second, more rigorous economic and environmental assessment is needed for energy investments and those that release or prevent carbon emissions. These assessments should draw on energy prices collected for the Scoreboard; account for externalities, including the net impact on GHG emissions; and account for price volatility. Investment projects should also be assessed, qualitatively, on a diffusion index, which would indicate the expected catalytic effect of the investment in subsequent similar projects. It is desirable to complement project-based analysis with assessment of indirect and policy-related impacts, which could be much larger.

Third, monitoring and evaluation of energy interventions continue to need more attention. Large-scale distribution of compact fluorescent light bulbs is one example of an intervention that is well suited to impact analysis and where a timely analysis could be important in informing massive scale-up activities.