

Decarbonizing Development: Getting Carbon Prices and Policies Right

Stabilizing climate change entails bringing net emissions of carbon dioxide (CO₂) to zero. CO₂ stays in the atmosphere for hundreds, if not thousands, of years. As long as we emit more than we capture or offset through carbon sinks (such as forests), concentrations of CO₂ in the atmosphere will keep rising, and the climate will keep warming. Countries can follow three principles in their efforts to create a zero-carbon future: (a) planning ahead for a future with zero emissions, (b) getting carbon prices and policies right, and (c) smoothing the transition and protecting the poor.

This policy note is drawn from *Decarbonizing Development: Three Steps to a Zero-Carbon Future* (2015) by Marianne Fay, Stephane Hallegatte, Adrien Vogt-Schilb, Julie Rozenberg, Ulf Narloch, and Tom Kerr. Washington, DC: World Bank.

Carbon pricing is simply good fiscal and economic policy. Carbon pricing—whether through an increasing tax on CO₂ emissions or a carbon market with a decreasing cap on emissions—is an efficient way to raise revenue and can be easier to administer and harder to evade than other taxes. It is appropriate for countries at all income levels, provided their revenues are used to build support for poor and vulnerable people who are affected by price changes, to reduce distortive taxes on labor and capital, and to invest in a low-carbon, resilient future.

Total decarbonization will require a broad package of climate policies. Multiple market and governance failures come together to make climate change a complex problem to solve. The policy package must be both politically acceptable and robust enough to trigger the long-term investments needed. Carbon pricing is an essential component, but complementary measures can help make individuals and firms more responsive to prices, or can substitute for prices when carbon pricing is ineffective or politically impossible.

Policy packages should be designed carefully, as overlapping policies interact in complex ways. For instance, support for renewable power cannot lead to additional emissions reductions if overall emissions are already capped through a carbon market. In contrast, incentives offered by a carbon tax and a feed-in tariff simply add up. More generally, careful instrument choice and government coordination can help ensure that policies interact positively with one another.

Getting Prices Right—Good Economic and Fiscal Policy

Policies that get energy prices right can raise revenues in an economically and fiscally efficient way, making them good fiscal policies in addition to providing environmental benefits. That result is obvious with the elimination of harmful fossil-fuel subsidies, which reached about \$548 billion in 2013. It is also the case for carbon pricing. Countries can introduce a price on carbon in different ways and can start from different price levels, depending on the local political context and their

economic characteristics, including income, energy efficiency, and the importance of energy-intensive industries. Carbon pricing can offer a double dividend: it provides environmental benefits and it raises revenue efficiently, making it possible to reduce more distortionary taxes, such as taxes on labor or capital.

Carbon sources are also concentrated, making carbon taxes difficult to evade. In the United States, for example, tax collection covering 80 percent of emissions could be accomplished by monitoring fewer than 3,000 points, primarily refineries, coal mines, and natural gas fields. In Sweden, which has had a carbon tax since 1992, tax evasion is less than 1 percent for carbon—much less than for the value added tax. In the United Kingdom, evasion of energy taxes is about 2 percent, much lower than the 17 percent for income tax. A carbon tax offers substantial advantages for developing countries that struggle with tax evasion—and the wedge it introduces between the formal and informal sectors.

The competitiveness impacts of carbon prices are manageable. Available studies do not find any significant impact of existing carbon prices on firm competitiveness, even in heavy industries. Data from the U.K. production census suggests that the introduction of the Climate Change Levy (an energy tax) had a significant impact on energy intensity, but no detectable effects on economic performance or plant exit. The reason is that abatement costs represent only a small fraction of production costs for most industries, and factors such as the availability of capital and skilled labor or proximity to markets are more important determinants of competitiveness. Moreover, carbon revenues can be used to improve competitiveness through investments in education and workers' skills or infrastructure, or through reduction in capital and labor taxes.

Carbon pricing is gaining in use. About 40 national and more than 20 subnational jurisdictions, in both developed and developing countries, have implemented or have scheduled implementation of carbon-pricing instruments. Carbon prices within those

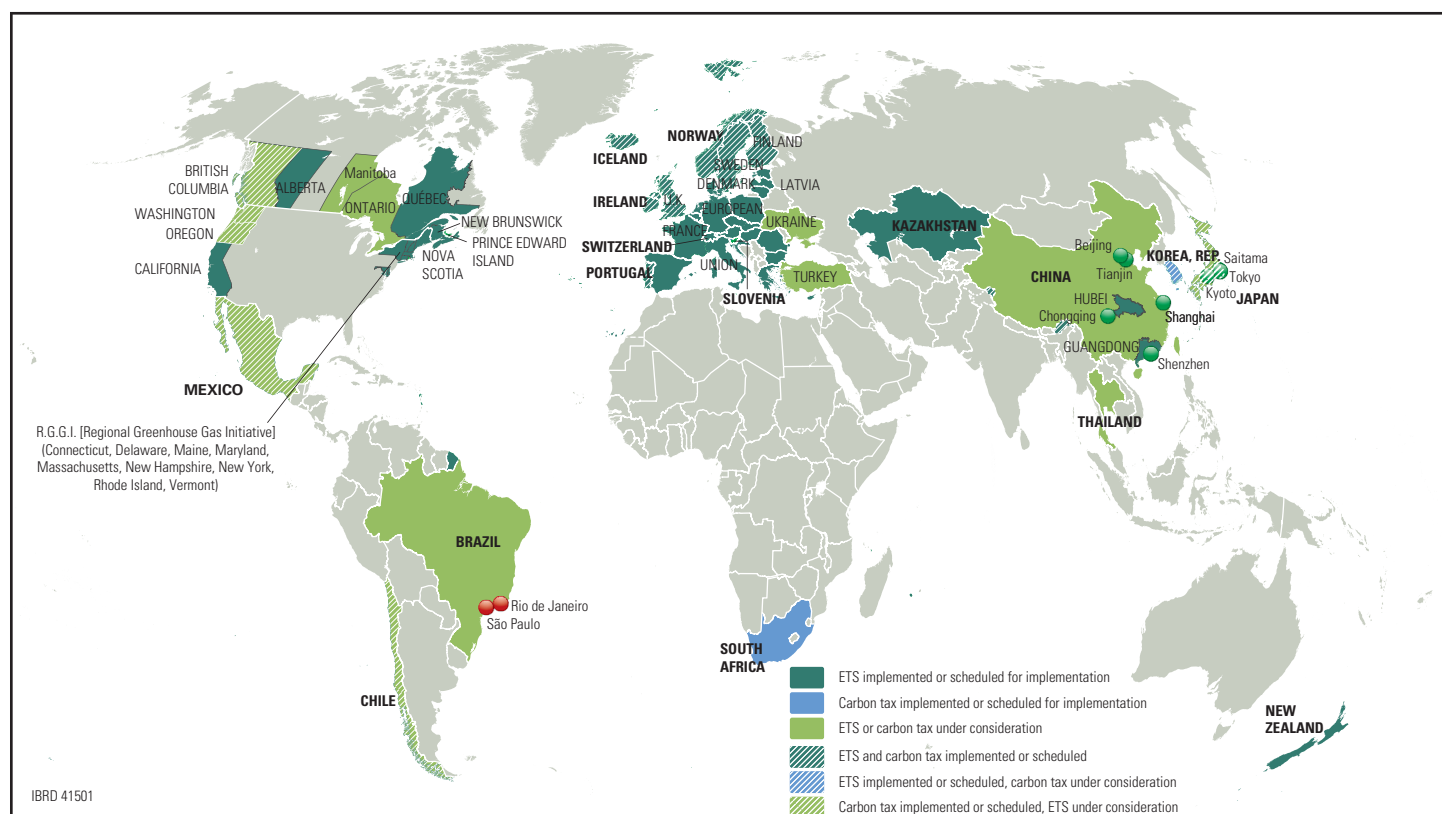
systems are diverse. Mexico's carbon tax is less than US\$1 per ton of CO₂, whereas Sweden's carbon tax is about US\$168 per ton of CO₂. In addition, over the past two years, more than 25 countries, including India, Indonesia, and Malaysia, have significantly reformed their fossil-fuel subsidies (map 1).

Decarbonization Requires a Broader Package of Climate Policies

Countries that have introduced a carbon price that is consistent with their economic and political context can assess whether that price will be sufficient to reach their decarbonization objectives, with regard to carbon content of electricity, electrification and fuel shift, energy efficiency, and increased natural carbon sinks. In most cases, the carbon price will not be sufficient to get there, and additional policies will be required. Those policies need to accomplish several objectives.

- Ensure needed technologies are invented and deployed at scale. Green innovation suffers from a double market failure—environmental externalities and the same knowledge externality that plagues all innovation. Support for green innovation in general is thus essential. In addition, governments may even need to target specific green technologies. For example, solar power is still more expensive than wind energy in most locations, but it has greater potential for addressing the clean-energy challenge. To ensure that green technologies are deployed at scale, countries can use a number of instruments, including the following:
 - Performance standards, such as those commonly used for cars or trucks in China, the European Union, India, Japan, North America, and the Republic of Korea; and energy-efficient lighting or building codes, such as energy-efficient windows, ventilation, or heating and cooling systems.
 - Fiscal instruments, such as auto *feebates*, common in Europe, which combine a surcharge, or

MAP 1 More Countries Are Turning to Carbon Pricing

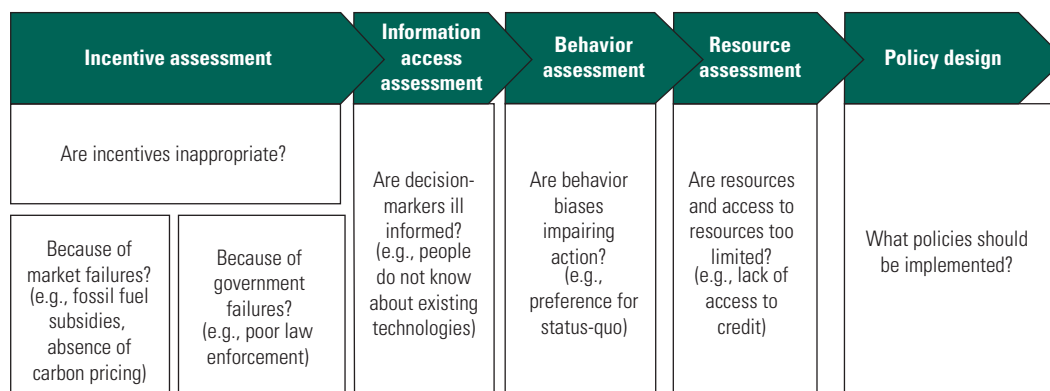


Source: World Bank (IBRD 41501, March 2015). Based on State and Trends of Carbon Pricing report 2014, developed by the World Bank and Ecofys, and updated in February 2015 for the purpose of this report.

- fee, on vehicles with low gas mileage with a rebate on more energy-efficient ones; or a value-added-tax exemption for appliances or energy-efficient lighting, found in China, Ghana, and Tunisia.
- Mandates, such as renewable portfolio standards, that require electricity providers to include a minimum share of clean energy in their output mix. Such mandates have been used throughout the world, notably in Chile, China, Germany, and many U.S. states.
- Trade policies, such as cutting tariffs on green goods—for example, solar panels, wind turbines, and energy-efficient lightbulbs—as the member countries of the Asia-Pacific Economic Cooperation recently agreed to do, to ensure that countries, firms, and households can access the best technologies available worldwide at an acceptable cost.

- Ensure the availability of needed infrastructure. This is critical for the effectiveness of low-carbon strategies and the political acceptability of carbon pricing. For example, imposing significant fuel taxes has proved more difficult in the United States than in Europe, in part because of the lack of public transportation in much of the country. Infrastructure can also make a carbon price more effective by making demand more elastic to price changes. Similarly, some countries have struggled to ensure that the needed electricity transmission system is in place to handle increased shares of renewable energy.
- Harness the financing needed for green infrastructure and technologies. Most developing countries struggle with infrastructure provision and technological development and deployment even without low-carbon objectives. This financing constraint can extend to developing-country

FIGURE 1 How to Assess the Obstacles to Low-Carbon Solutions



Source: Adapted from World Bank (2013), *World Development Report 2014: Risk and Opportunity—Managing Risk for Development*. Washington, DC: World Bank.

businesses, especially small and medium-size ones. The challenge is to increase financing for investments in developing countries and in long-term projects, notably infrastructure, and also to increase the share of these investments that goes toward green projects.

Closing the finance gap involves steps such as improving the investment climate, developing local capital markets, and providing a pipeline of *bankable* projects. Closing the finance gap likely also requires changing regulations mandating risk assessment in the finance sector, so that stress tests use longer time horizons and include exposure of carbon-intensive projects to future carbon prices.

Rebalancing both the actual and perceived risk-adjusted return differential between brown and green

projects is also necessary. The development of green financial products, such as green bonds, is helping mainstream low-carbon investments, connecting green project developers with possible investors, and overcoming the behavioral bias toward conventional investments. The green bond market is growing rapidly, with more than \$36 billion in new issuances in 2014, helping reallocate resources toward low-carbon projects.

Financial costs of low-carbon projects can be reduced through cofinancing from governments or multilateral development banks. In particular, these actors can support the transition by taking on part of the higher up-front costs or the higher technology and regulatory risks of low-carbon projects. Investments can also be redirected with bank regulations that encourage commercial banks to invest in low-carbon projects.