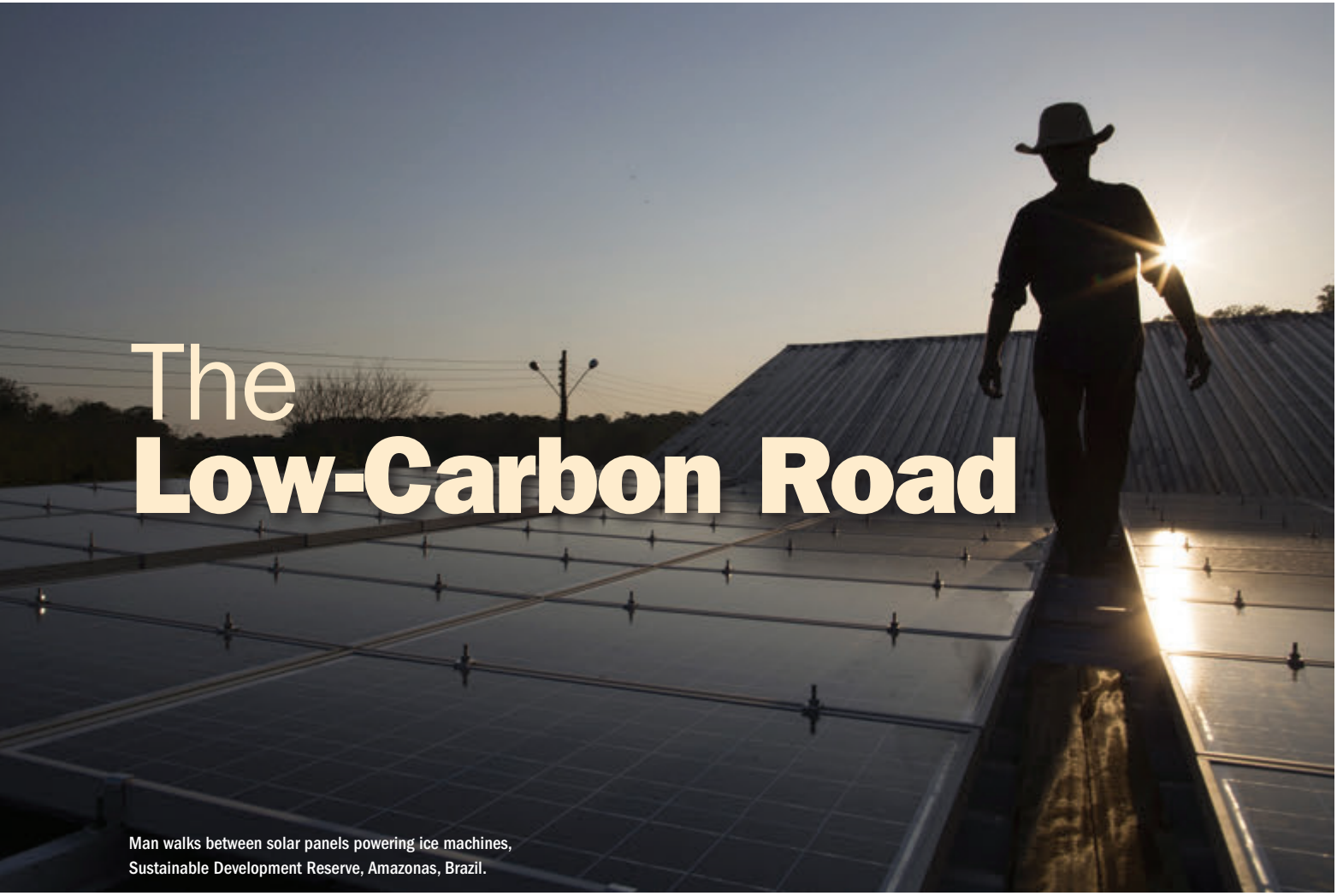

The Low-Carbon Road

Man walks between solar panels powering ice machines, Sustainable Development Reserve, Amazonas, Brazil.

Nicholas Stern

The twin challenges of poverty and climate change are tightly interwoven

TWO defining challenges of this century are overcoming poverty and managing climate change: if we fail on one, we will fail on the other. Success in rising to both challenges depends on shared recognition of how they are profoundly interwoven, and of the complementarity between sustainable development, economic growth, and climate responsibility. Thus the global agenda on sustainable development, adopted at the United Nations in New York in September 2015 (the Sustainable Development Goals, or SDGs) is critically linked to international action on climate change, including what will be agreed at the United Nations climate change summit in Paris (COP21) in December 2015.

New insights

Three critical insights on economic development and climate responsibility emerged after the previous attempt at an international climate agreement, in Copenhagen in 2009. These insights strengthened the prospects for success at Paris and beyond by demonstrating how the twin challenges of poverty and climate change can be overcome together.

First, there is now much greater understanding of *the potential complementarity of economic growth and climate responsibility,* particularly through infrastructure investment (GCEC, 2014). To portray these as in opposition to each other—as is often done—is to misunderstand both economic development and the opportunities created by moving to a low-carbon economy. To pit growth against environmental responsibility is diversionary and can thwart prospects for agreement and sustainable development itself.

Second, there is greater awareness of *the increasing dangers of delay* as the structure of the global economy—particularly in terms of cities, energy systems, and land use—changes over the next two decades. Billions of people are moving into cities, and the number of city dwellers will nearly double in the next three decades or so. Huge and long-lasting investments will pour into the infrastructure of cities—wisely or badly. Energy systems and land use, including the care for and investment in forests and soil, are similarly open to opportunities and risk. High-carbon lock-in of capital and infrastructure is a serious threat: coal and gas power plants,

for instance, often need to operate for many decades to generate a financial return on investment. Another risk is the degradation of carbon sinks—natural systems that absorb and store carbon dioxide. The urgency is intensifying with both the pace of structural change to the global economy and persistently inadequate approaches to the management of cities, energy, and land systems.

Third, we know that *the use of fossil fuels creates a range of severe problems in addition to climate change.* Pollution is destroying lives and livelihoods: many millions a year die globally because of pollution, and many millions more become sick. A recent study by Rohde and Muller (2015) concluded that breathing the air in China is equivalent to smoking 40 cigarettes a day and is responsible for more than 4,000 deaths each day. Air pollution in India is still worse, and Egypt, Germany, Korea, and, indeed, most other countries, rich or poor, have serious problems. Such pollution is mainly domestic, and cutting it sharply is clearly in countries' self-interest. Fossil fuel prices have bounced back and forth over the past few years, and indeed over a very long period without much sign of a trend. But the cost of renewables is still trending downward and will likely continue so for some time. The long-term prospects for renewables are strong, and many are already competing with fossil fuels without correction for the very strong and negative consequences of oil, coal, and gas use, which have been documented by IMF economists (Coady and others, 2015).

These three new or enhanced perspectives can help frame discussions on climate change in two important ways.

First, they help explain the enormous *opportunities* for reducing poverty and raising living standards worldwide in the transition from economies' heavy dependence on expensive fossil fuels and polluting high-carbon technologies to clean and efficient low-carbon alternatives. Plans submitted ahead of the Paris summit show that many countries are already making this transition.

Second, they focus attention on the *urgency* of accelerating the transition to sustainable low-carbon growth and development. Greater international collaboration—built on a strong agreement in Paris—can foster that acceleration.

These new perspectives highlight the crucial importance of effective international coordination, particularly around financing and technology. Some of the architecture for this collaboration between countries was discussed at the Third International Conference on Financing for Development in Addis Ababa and will continue around COP21.

Climate financing

At previous climate change summits, parties to the United Nations convention agreed that by 2020 rich countries should be mobilizing $100 billion a year, from both public and private sources, to help developing economies make the transition to low-carbon growth and become more resilient to the unavoidable impacts of climate change. (Methods of mobilizing this support were examined, for example, in the 2010 report of the United Nations Secretary-General's High-level Advisory Group on Climate Change Financing.) An analysis published in October 2015 by the Organisation for Economic Co-operation and Development and the Climate Policy Initiative estimated that developed economies collectively mobilized $52.2 billion in 2013 and $61.8 billion in 2014 in climate financing for developing economies.

Reaching the $100 billion goal is a good test of the sincerity of rich countries' commitment to supporting poorer countries. Assessing this commitment calls for an understanding of how climate financing, and its associated initiatives, is additional to or represents increments beyond the support rich countries would otherwise extend for economic development. I have argued previously that this can be done in four ways (Stern, 2015).

To pit growth against environmental responsibility can thwart prospects for sustainable development.

First, assessment of funded projects—for example, supporting feed-in tariffs for renewables—can look at whether the projects would have come to fruition without this financing. A second test might gauge whether the contribution stimulates action in areas, such as forest protection, that would not otherwise be covered or financed adequately. Third, does the contribution mobilize new sources of financing, such as expansion of multilateral development banks for climate action or carbon pricing revenue that would not otherwise have been forthcoming or available? And fourth, one can measure total official development assistance (including resources designated for climate action) and ask how much it exceeds the amount that would have been committed in a world unaware of the problem of climate change. This last counterfactual is particularly difficult to measure.

Financing for sustainable development

Still more important than the $100 billion a year commitment from rich countries is strong international collaboration on the infrastructure investments needed over the coming two or three decades to foster poverty reduction and growth in the context of rapid urbanization. It is crucial that these investments in infrastructure promote—rather than derail—sustainable development. Global investment in infrastructure on the order of $90 trillion over the next 15 years is needed (GCEC, 2014).

How these infrastructure investments are made—including their scale and quality—will have a critical effect on both sustainable development and managing climate change. These investments represent a great collection of opportunities to drive faster and better-quality growth over the coming decades: less polluted, less congested, more creative and innovative, more efficient, and more biodiverse. But many of those opportunities could be lost through hesitation. There is a danger that high-carbon, polluting, wasteful, and long-lasting structures will be locked in—that forests will be

destroyed and soil irretrievably eroded. There is so much that can be done now that it is both in countries' self-interest and in the collective interest of all countries, with coordination and collaboration.

Most of the $90 trillion investment in infrastructure needed over the next 15 years will be in emerging market and developing economies. Much of it will happen somehow, but it must include both better quality and greater scale than is currently underway and planned.

Investments in infrastructure are a means to an end: sustainable development as summarized, for example, in the SDGs. At the heart of the SDGs lies the elimination of absolute poverty, which means securing a better life for all and, in particular, a world in which every child can survive and thrive. The SDGs also embody a sustainable future for the planet.

Scarcity of infrastructure is one of the most pervasive impediments to growth and sustainable development. Good infrastructure removes constraints to growth and inclusion while fostering education and health. It can empower children and women by giving them access to education, reduce the burdens of obtaining water and fuel, and provide decentralized electricity. Bad infrastructure kills people and leaves unsustainable economic burdens for future generations. Furthermore, at a time of low world demand, a concerted focus on infrastructure can boost global demand in the short run while raising productivity and long-term growth.

Transformation of the global economy

This is a critical moment in the transformation of the global economy, which requires large investments in sustainable cities, energy systems, and other infrastructure. The world's urban population will increase from about 3.5 billion today to about 6.5 billion by 2050, and forests, agricultural lands, and water systems will come under tremendous pressure. Inadequate infrastructure will cause lasting damage; poorly structured cities and polluting energy infrastructure can impose burdens and inflict damage for decades or centuries to come.

This is a defining moment. Fundamental impediments to the quantity—and quality—of investment, including the risks associated with government action and the availability of appropriate financing, cannot be ignored.

Government-induced policy risk—for example, through inconsistent support for low-carbon technologies or the lack of credible systems for contract enforcement—is the greatest impediment to investment. This is particularly true for infrastructure investment because of the longevity of such investments and their inevitable and intimate links to government policy. As a result, capital for infrastructure financing tends to be priced far too high, often 500 to 700 basis points above the benchmark, when long-term interest rates are close to zero. And the huge pool of private savings—probably $100 trillion or more—held by long-term institutional investors, little of which is currently invested in infrastructure, cannot be mobilized.

The failures around infrastructure in government policy and institutions and the failures of the financial system must both be fixed. Moving on one front alone will not produce the scale of investment needed. The only way to build a better and more productive infrastructure on the scale necessary for climate responsibility and sustainable development is through a concerted set of actions on both fronts (see Bhattacharya, Oppenheim, and Stern, 2015).

On the policy side, first, national authorities should clearly articulate their development strategies on sustainable infrastructure—not one project at a time, but as a comprehensive direction and as development strategies to support the SDGs. This will offer investors confidence that there is clear demand for the services of the infrastructure investment they are considering.

Second, market distortions and policy failures that undermine the quality of infrastructure investments must be tackled. The biggest distortions affecting the quality of infrastructure investments are pervasive fossil fuel subsidies and a lack of carbon pricing, especially a distorted price for coal.

The IMF recently estimated the total cost of fossil fuel subsidies at more than $5 trillion a year, including the failure to price in pollution and climate change, which together account for three-quarters of the total (Coady and others, 2015). And when we take into account the impact of coal on pollution and climate, its real price jumps from $50 to well over $200 a metric ton. Our calculations assume a carbon price of $35 a metric ton of carbon dioxide equivalent (the standard assumption by the U.S. government) and that burning a metric ton of coal produces about 1.9 metric tons of carbon dioxide. If we factor in the carbon costs and, following the findings of Coady and others, we figure the cost of local pollution to be twice that from climate change, we get a cost of about $250 a metric ton for coal. These extra costs are not abstract externalities, but the very real costs of current and future deaths from air pollution and climate change. Without sound policy, these externalities are unpriced, or inadequately priced, so incentives are currently heavily tilted toward bad infrastructure and against sustainability. Wrongly, and perversely, high-carbon is still seen as the low-cost option.

On the financing side, development banks' capacity to invest in sustainable infrastructure and agricultural productivity—that enhances rather than damages lives and livelihoods—should get a substantial boost to allow them to pioneer and support the changes needed. I saw very clearly when I was chief economist of the European Bank for Reconstruction and Development how a development bank's participation in a deal can boost the confidence—and thus the scale of investment—of private participants. And because international development banks, and many national ones, are generally trusted as convenors, their investments can exert much stronger leverage. Governance is as relevant for development banks as for central banks. If such banks are well designed and well run, they can develop strong skills in key areas, such as energy efficiency, and bring a full set of financial instruments to the table, from equity and political risk guarantees to loans.

In addition, central banks and financial regulators could take further steps to promote productive and profitable redeployment of private investment capital from high-carbon to

better low-carbon infrastructure. Over time, the riskiness of and damage from high-carbon infrastructure is becoming ever clearer. But imperfections in the capital markets mean that borrowing can be expensive when real long-run interest rates are very low. This distorts the market against renewables, whose up-front costs are relatively high. These imperfections worry central banks and regulators, as well as others.

The official community, including the Group of 20 industrialized and emerging market economies (G20), Organisation for Economic Co-operation and Development, and other relevant institutions, working with institutional investors, could lay out the policy, regulatory, and other actions needed to increase their infrastructure asset holdings from $3–$4 trillion to $10–$15 trillion over the next 15 years. In other words, the share of funds held by institutional investors could rise from a small percentage to just over 10 percent.

This is all about development and growth.

Together, such action on policy and financing could foster the private sector investment that is essential for fighting poverty and climate change. It would boost both the scale and quality of infrastructure investment and the rate and quality of economic growth. Such a global strategy could galvanize strong and sustainable growth, and it is natural to look to the G20, as the main global economic forum for heads of government and finance ministers, to take the lead.

Prospects for success

So what are the key factors for success in the months, years, and decades ahead? Four lessons should be kept in mind.

First, much, or even most, of the necessary country-level action in the management of climate change is in the vital interest of every country. Second, the urgency of action is even greater than previously thought. Third, it is possible to see ever more clearly the importance of collaboration: rich countries should be setting strong examples and providing efficient and effective financing, and all countries should be sharing and investing in technology. Fourth, strong and collaborative action will usher in a period of extraordinary creativity, innovation, investment, and growth.

These conclusions are particularly important because the so-called intended Nationally Determined Contributions submitted by countries ahead of the Paris summit point to 2030 global emissions that are much higher than consistent with the goal of limiting global warming to 2 degrees Celsius above the preindustrial, 19th century average temperature. And the dangers of warming greater than 2 degrees Celsius are becoming ever clearer.

The pledged action would result in global annual emissions in 2030 of about 55 (or more) billion metric tons of carbon dioxide equivalent (Boyd, Cranston Turner, and Ward, 2015. This is a substantial improvement over projected business-as-usual emissions of more than 65 billion metric tons, but it still far exceeds the 40 billion target most predictions propose to avoid global warming of more than 2 degrees Celsius. The December conference in Paris must not be regarded as a one-off opportunity to set targets, but the first of many steps, followed by regular progress reviews and a focus on learning lessons and accelerating action. In light of the implications of the Paris agreement, it is essential to recognize that the likely high annual emissions over the next 20 years dictate zero carbon dioxide emissions in the second half of this century.

Finally, it is important to understand that climate change is not just an issue for environment ministers and foreign ministers. Implementation of the actions agreed to in Paris must have the support and involvement of presidents, prime ministers, and economy and finance ministries as well. This is about economic development, investment in the future, resource allocation, and priorities: that is the work of government as a whole and economic ministers in particular.

We must remember that this is all about development and growth. This is about the two defining challenges of our century: overcoming poverty and managing climate change. If we fail on one, we will fail on the other. ■

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