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Developments in Climate Action around the World

Sound domestic climate policies in a country can foster growth and change that would bring a wide range of benefits to that country, including but extending well beyond reductions in climate risk. The adoption of such policies is in turn fostered by an understanding of the relevant science, economics, and ethics, and of the many co-benefits of climate action, including learning and discovery, energy efficiency, energy security, cleaner air and water, and so on. These arguments were at the core of the ideas of part II of this book, and of the September 2014 report of the Global Commission on the Economy and Climate.

The case for undertaking the domestic structural reforms and investments required for swift and deep emissions cuts, and which can also deliver better growth, is strengthened still further if countries cooperate with one another. Cooperative climate action does not merely occur between nations. Subnational authorities such as state, city, and local governments as well as firms, financial institutions, multilateral organizations, research institutions, nongovernmental organizations, and ordinary citizens, all have a powerful role to play in the transition to a low-carbon world. It is these international and global interactions, and cooperation more generally, that form the subject of the analysis in the third and final part of this book.

The central message from this analysis is that the international framework for climate action is evolving, in large part in a positive way, but must evolve much faster. That acceleration will depend on a deepening understanding but also on political processes. As I have emphasized throughout, the responses to climate change will involve dynamic learning, innovation, discovery, and growth in ways that cannot be accurately predicted today. Moreover, a low-carbon transition in the coming decades

will coincide with, and must be linked with, responses to the wider set of structural changes and challenges facing our world, particularly the challenge of world poverty. The twin challenges of climate change and world poverty are the defining challenges of the twenty-first century. If we fail on one, we fail on the other. A failure to manage climate change is likely to create a physical environment so destructive as to undermine and reverse development. An attempt to manage climate change that obstructs the fight against poverty in the next two decades will fail and deserves to fail. We can and must tackle both challenges at the same time. If we manage the great structural transformations the world is experiencing in a strong and effective way, we shall make our response to these twin challenges much easier.

The structural transformations are remarkable in scope and speed. The balance of world economic activity continues to change rapidly, with the fast growth of many emerging-market and developing countries. Profound changes across cities, energy systems, and land use continue. Unless a framework for climate action both recognizes the twin challenges and embraces these structural changes, it is unlikely to succeed in supporting a transformation of the scale required. On the other hand, if it does, then the transformation could realize a very attractive new world economy.

This chapter traces some recent global developments in climate action, focusing on the international climate negotiations; global trends in national policymaking; examples from a range of developing and developed countries; and some important transnational interactions beyond national governments. There are two purposes of this chapter. The first is to illustrate the nature and scale of action on climate change now occurring throughout the world. This will counter the widely held belief that very little is happening; and awareness of what different countries are doing is crucial to fostering both national and international action. The second is to highlight how much can happen without a formal international agreement. While an international agreement is, in my view, crucial to accelerating action to the pace and scale required, these developments also illustrate a shift away from the centralized and somewhat legalistic “Kyoto approach” to international climate action and governance.

The first two sections of the chapter examine the UNFCCC mechanisms and the progress from Bali (COP 13 in 2007) to Paris (COP 21

in 2015) via Copenhagen (COP 15 in 2009). Section 7.3, the bulk of the chapter, examines progress in emerging-market and developing countries, in developed countries, at subnational levels, and in businesses, international organizations, and civil society. Section 7.4 concludes.

Chapters 8 and 9 are more prescriptive. Chapter 8 draws on the lessons from chapter 7 to illustrate how the international climate change institutions and negotiations could evolve in the near future to foster more effectively a transition to a low-carbon economy on the scale and with the speed required, and how countries could cooperate better in scaling up their climate actions in this context. Chapter 9 sets out an approach to international equity that should underpin the framework for climate governance sketched in chapter 8, focusing on the notion of “equitable access to sustainable development.” If all countries embraced both the importance of equity and an understanding of how it could be promoted in a dynamic way, then progress could be accelerated and the quality of collaboration and action greatly increased.

Given the timing of this book’s publication, in the months leading up to the important international climate change conference in Paris (December 2015), I will discuss the opportunity that this gathering, and the road toward it and from it, provide to improve the international governance of climate change. However, the evolution of the climate governance framework in the direction I outline implies a shift in the emphasis of such UN meetings away from the attempt to produce a legalistic grand bargain that prescribes a fixed, once-and-for-all “solution” to climate change. The dangers of such an approach lie in its promoting a perception of negotiations as a zero-sum game and thus a lowering of ambition in the pace and scale of emissions reductions, which in turn implies lost opportunities for growth and poverty reduction.

We should be looking for a framework for international climate governance that places greater emphasis on growth, discovery, and poverty reduction and dynamic global interactions to foster those processes. I try to outline key elements of such a framework. It does involve collaboration and commitment, but these can themselves be fostered by an understanding of the opportunities that climate action can create. The national, city, business, and rural examples of low-carbon growth these newer approaches could bring would greatly enhance international collaboration, and that international collaboration could help generate the

political, investment, and finance environment for stronger bottom-up action.

A key theme will be that a top-down agreement and bottom-up unilateral action are mutually reinforcing. The former provides confidence in a sense of direction and in what others are doing, thereby enhancing and enabling political decision-making and investment at the national and firm level. Strong examples at the level of the nation, city, and firm can greatly increase the cooperation and commitment necessary for an international agreement. It is a serious mistake to set top-down against bottom-up.

7.1 The UNFCCC and the “Kyoto approach” to international climate governance

The process of building international action on managing climate change began over two decades ago with the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988. The IPCC was established to provide a clear scientific view on the current state of knowledge on climate change. It has produced five major assessment reports, in 1990, 1995, 2001, 2007, and 2013/2014.¹

The United Nations Framework Convention on Climate Change (UNFCCC) was established at the Rio Earth Summit in 1992 to coordinate action on climate change. The parties to the UNFCCC have met annually since 1995 at Conferences of the Parties (COPs). The third COP was held in Kyoto in 1997 and adopted the Kyoto Protocol, which entered into force in 2005. I have attended all the COPs since Nairobi in 2006 (COP 12); COP 20 was in Lima in 2014 and COP 21 will be in Paris in 2015.

Over the Protocol’s first “commitment period,” spanning 2008–2012, developed countries and “economies in transition” from the Soviet bloc (together, “Annex I” countries) were required to meet quantified greenhouse gas emission targets relative to 1990 levels, which were inscribed in the Protocol. The targets were “legally binding” under international law, and noncompliant parties were subject to potential enforcement action via mechanisms established under the Protocol.² The Protocol also established emissions trading and offset mechanisms, including an International Emissions Trading mechanism for Annex I countries to trade

their surplus emissions allowances among themselves; a Clean Development Mechanism to enable Annex I countries to purchase credits generated from projects registered in non-Annex I (i.e., developing) countries that were designated as producing “additional” GHG abatement relative to a counterfactual, business-as-usual baseline; and a Joint Implementation mechanism to enable Annex I countries to purchase credits generated from projects carried out in other Annex I countries.

It can be seen from these features of the Protocol that the climate governance framework it embodied was an attempt at centralized, legalistic “control” at the international level over a predefined output of domestic GHG emissions from a limited group of countries over a long period of time (targets negotiated in 1997 were to be achieved by the end of 2012). It is important that the future evolution of global climate governance be based on an informed and realistic assessment of the strengths and weaknesses of this “Kyoto approach,” drawing lessons from the achievements and failures of the Protocol’s design and implementation.

On the one hand, the Protocol yielded some valuable achievements: it further developed existing UNFCCC processes and standards for measuring, reporting, and verifying flows of GHG emissions at the country and project level; it led to practical experience in developing market-based mechanisms; and, in developing countries, the Clean Development Mechanism has played a role in building in-country awareness, and some experience, of climate change and firm-level mitigation capacity.

On the other hand, direct climate mitigation outcomes from the Protocol have been poor. On paper, the emissions among the countries with quantified targets in the Protocol as a whole are lower than implied by the targeted reductions (a collective 5% reduction by 2012 below 1990 levels).³ However, much of these reductions were designed into the system via the selection of 1990 as the baseline year (after 1990, emissions in former Soviet and eastern European economies plummeted as a result of industrial restructuring after the decline of Soviet-era central planning characterized by energy profligacy) or were achieved by accident (e.g., as a result of economic downturns including the 2008 financial crisis) or by the “clever” use of accounting rules (as in the case of Australia, which was able to achieve its target of an 8% increase on 1990 levels largely through its negotiation of accounting rules on land use and forestry, even though its fossil-fuel-related emissions have grown by more

than 40% since 1990). While, as noted, the Clean Development Mechanism has helped build awareness and capacity in developing countries, it has been difficult to convincingly establish “additionality” in project-based offset schemes,⁴ in the sense of demonstrating plausible quantitative emissions reductions relative to some notion of “emissions levels that would otherwise have occurred.” And processes for doing so became very bureaucratic. Canada’s withdrawal from the Protocol in 2011 (its emissions having grown more than 18% since 1990 levels—well beyond its target of a 6% decrease in emissions) revealed the lack of credibility of the international legal enforcement mechanisms available under the international climate regime. Thus there were problems with the baselines for target reductions in Annex I countries, with enforcement of compliance, and with the operation of trading mechanisms.⁵

There were lessons for global climate governance from the Kyoto experience. The useful functions that Kyoto, and the broader UNFCCC process, have performed relate to focusing international attention on the issue and facilitating regular interactions among states, the collection and dissemination of technical information, the development of technical standards and processes relating to measuring, reporting, and verifying, and the provision of in-country advice and capacity-building, particularly in developing countries. Far less successful has been the attempt to induce mitigation action through an internationally centralized regime of “legally binding” targets enshrined in a treaty. And the biggest emitter at the time of Kyoto (the US) failed to ratify the treaty. Whatever the merits and disadvantages of shielding non-Annex I countries from specific, quantified mitigation obligations under Kyoto, it must be understood that the Kyoto approach produced relatively poor mitigation outcomes in some of the Annex I countries that it *did* regulate through the use of quantified targets. On the other hand, the shared recognition of the problem and the establishment of forms of agreement, mutual monitoring, and sharing of information should not be dismissed.⁶

7.2 From Bali to Paris via Copenhagen: between Kyoto and “something else”

By the time of the Bali COP in 2007—before the Kyoto first commitment period had even begun—there was widespread belief, particularly among

the developed world, that the factual context had changed so much since the Protocol was negotiated in 1997 that many features of any post-2012 agreement would need to differ greatly from Kyoto. A striking feature of the intervening decade had been the rapid growth in the economies and associated emissions of the major emerging economies.

Developed countries argued that any post-2012 agreement should incorporate binding mitigation obligations for these large emerging economies in order to constitute a credible response to climate change. Indeed, the stark reality of the arithmetic for getting to 2°C implies that strong action from the developing world would be necessary even if developed countries reduced their emissions to zero (see chapter 1). On current plans (as reflected in the Cancún Agreements of COP 16, 2010), emissions in the developing world could rise from around 30 billion tonnes of CO₂e today to around 35 billion tonnes in 2020 to 40 billion tonnes in 2030 (reflecting the changing structure of the world economy)⁷—around or above the entire global budget in 2030 for a 2°C path.⁸ Without strong action from developing nations, then, a 2°C path is simply not possible.

While it was envisaged by many that the obligations of developing countries would be “differentiated” in kind and degree from those of developed countries, many developing countries, and the major emerging economies in particular, have nonetheless resisted calls for them to be “legally bound” by a new international regime of emissions limits (though they have, as I discuss later, taken considerable steps to mitigate their emissions at the domestic level). Many developing countries argue that they should have the freedom to continue to emit greenhouse gases as they develop, and that the developed countries, having disproportionately caused the climate problem in the first place, ought to take the lead in reducing emissions. Nonetheless, the Bali Action Plan (2007), which set out a two-year process to conclude a global deal at COP 15 in Copenhagen in 2009, envisaged the possibility that developing countries would take on some kind of mitigation obligations at the international level for the first time, and many developing countries’ positions have moderated in subsequent negotiations (at least in practice, if not always in rhetoric).

COP 15 in Copenhagen, for the first time, assembled heads of state to discuss climate change directly, and many brought with them new emissions reduction commitments. In the past, most of the negotiations

had been carried out by environment ministers or climate envoys who were not usually at the highest levels of decision-making in their countries. But the conference was far from the strong and progressive meeting that many had hoped for. COP 15 was “cold, chaotic and quarrelsome.”⁹ A number of factors prevented greater progress, including: poor recognition of the total magnitude of the emissions reductions required for a 2°C path; mistrust, misunderstanding, and acrimony between countries; and unwieldy and unproductive preparation, procedures, and organization for the negotiations.

Despite these limitations, the meeting produced a document of value, the Copenhagen Accord. The Accord recognized, among other things, the need to limit global temperature increases to no more than 2°C, the importance of adaptation, the different responsibilities of developed and developing countries, the need for action to reduce emissions from deforestation and degradation (REDD+), and promises from developed countries to provide \$100 billion per annum (in public and private flows) to developing countries by 2020 for mitigation and adaptation measures. Working with Prime Minister Meles Zenawi of Ethiopia, I was very actively involved in negotiating this \$100 billion per annum.

A High-Level Advisory Group was established to study potential sources of revenue for this \$100 billion per annum, and their work was published in 2010.¹⁰ In the short term, the Accord referred to the provision of \$30 billion of new and additional “fast-start finance” from developed to developing countries for the period 2010–2012.

The meeting also led to the submission of emissions plans for 2020 by major emitters. This was a very important step forward. Some countries, including China and the US, presented emission reduction targets for the first time. The resiliency of the Accord has been greater than most expected. It laid a strong basis for future COP meetings. Copenhagen also started the process of developing countries making voluntary emissions reduction pledges. Indeed, in the Accord of December 2009, countries promised to table emissions reductions by the end of January 2010, and on the whole they did so, with pledges coming from countries representing the vast majority of world emissions.

COP 16 in Cancún in December 2010 produced a series of formal COP decisions, confirmed broad acceptance of the principles embodied in the Copenhagen Accord, and led to modest but significant advances

across a range of areas. The Cancún Agreements confirmed the emissions reduction commitments, targets, and plans submitted to the Copenhagen Accord, confirmed the 2°C target, and agreed a review of the adequacy of long-term temperature targets from 2013. The Green Climate Fund was established and progress was made on a REDD+ framework, new technology mechanisms (including a Technology Executive Committee to identify how to better deploy and diffuse technology in developing countries, and the Climate Technology Centre and Network to build capacity, deploy clean technology, and implement adaptation projects), and a new “Cancún Adaptation Framework” to better plan and implement adaptation projects in developing countries. Developing countries also agreed to produce biennial reports on their greenhouse gas emissions.

At COP 17 in Durban in December 2011, the Kyoto Protocol was extended for a second commitment period (2013–2017), mainly with the participation of Europe, though many key developed countries chose not to participate. The Durban Platform for Enhanced Action was another important outcome: the parties agreed to “launch a process to develop a protocol, another legal instrument or an agreed outcome with legal force ... applicable to all parties” by 2015, which would enter into force by 2020.¹¹ A third was that the Durban Platform also recognized the “gap” between Copenhagen-Cancún pledges and a 2°C path, but there was no agreement to enhance the existing Copenhagen-Cancún pledges.¹² There was also progress toward agreement on the design of the Green Climate Fund, but not agreement on how to fund it. There was disagreement over the share of public and private funding and whether the public funds would be “additional” to existing aid commitments. There were also new arrangements for transparency to increase the accountability of both developed and developing countries on actions to reduce emissions.

The intervening COPs in Doha (COP 18, 2012) and Warsaw (COP 19, 2013) were largely stepping stones toward the Paris COP in 2015 and achieved only incremental progress on some issues. Of note was the new discussion of mechanisms for addressing “loss and damage,” the formal agreement on a Kyoto second commitment period through 2020 (though substantively this is not expected to have much effect), and a decision in Warsaw that has begun to give form to the emerging deal in

Paris 2015. The Warsaw COP decision calls on parties to prepare “intended nationally determined contributions” and to communicate them well in advance of COP 21 in Paris.¹³ The idea behind this language is that the substance of countries’ eventual commitments under the Paris agreement will be a matter for each country to determine domestically. Some might see this in a strict sense of domestic choice and others as an opening bid in an international process of discussion. However, the call to get the national contributions in well ahead of time provides an indication of a shared desire to prepare for Paris more carefully and effectively than was done for Copenhagen.

The Warsaw COP decision, and the negotiations in recent years more generally, leave open an important question: How can the UN climate process facilitate the scaling up of countries’ commitments (or “contributions”) over time so as to bridge the gap between current levels of mitigation ambition (i.e., the targets pledged under the Copenhagen/Cancún process, and similarly those likely to be put forward under the Paris process) and the overall mitigation effort required for a 2°C path?¹⁴ This issue is very widely recognized among experts and the parties themselves, and much attention has been directed toward it.

There is an emerging consensus that to overcome the emissions gap, any future agreement will need to be dynamic in the sense of including processes for revising commitments upward over time, and collaborative in the sense of fostering a shared commitment among countries to work together to achieve a mutually beneficial transition to a low-carbon world, with strong, high-quality growth and poverty reduction at its heart. Chapter 8 discusses how this kind of approach could be fostered. This is a very different approach from trying to agree on a centralized and legalistic framework that “solves” climate change by attempting to bind countries to ambitious emissions reductions once and for all. Many (though not all) are beginning to realize that an attempt to build the latter is neither feasible nor sensible, given the structural changes occurring in the global economy, the dynamic nature of these changes, and the reality that climate mitigation can be done in ways that bring many benefits and attractions for countries well beyond the collective reductions in climate risk.

To appreciate the value of this more dynamic and collaborative model of climate governance, it is necessary to look not merely at the modest

progress from the recent history of UN climate negotiations, but also at the responses to climate change emerging within various countries in recent years and in other international processes. Together, lessons from the UNFCCC/Kyoto experiences and from progress around the world point powerfully toward a framework for climate negotiation, governance, and action that I will describe in chapter 8, and its ethical underpinning that I discuss in chapter 9.¹⁵

7.3 Recent climate action around the world

A focus which is mainly on the UNFCCC negotiations in assessing climate action around the world is likely to miss the fact that many of the most significant developments in recent years have come from within individual countries and through international interactions outside the UNFCCC. Understanding what other nations are thinking and doing and their direction of travel is a crucial element in building both national action and international collaboration. We therefore briefly examine climate action around the world.

7.3.1 Global trends in national legislative and policy action on climate change

A recent study by the Grantham Research Institute at the LSE and GLOBE International,¹⁶ which surveys climate change laws and policies in 66 jurisdictions (65 countries plus the EU), shows that, in the overwhelming number of countries surveyed, climate change has become a serious concern at the highest levels of government and that actions to cut emissions and adapt to climate change are being taken through a wide range of legislative and policy measures. In many cases, these actions are supported by new institutions to oversee implementation. Of course, legislation and action are not the same; implementation is crucial. But legislation itself is an important step.

The 20 Annex I jurisdictions covered in the study (19 countries and the EU) had passed an aggregate of 194 climate laws, and the 46 non-Annex I countries studied had passed 293 laws.¹⁷ Moreover, 62 of the 66 jurisdictions have passed unifying climate change legislation, or “flagship laws,” that define their approach to climate change,¹⁸ and at least 27 have a form of carbon pricing legislation in place,¹⁹ including the EU,

several non-EU European countries, China, Japan, India, and Mexico. Explicit and implicit carbon prices across Europe, the OECD, and the G20 range from close to zero in the EU Emissions Trading System (€3–6 per tonne of CO₂ in 2013/14, or around \$5) to over \$100 per tonne of CO₂ (e.g., in Germany, Japan, Norway, South Korea, Sweden, and Switzerland).²⁰

Over the last 15 years, there has been a steady upward trend in climate change regulatory action, with a peak in around 2008–2010—a period during which many developed countries passed their flagship climate change legislation. More recently, legislative activity has been driven mainly by non-Annex I countries: 14 of the 18 new flagship laws passed in 2012–2013 were passed in the non-Annex I countries surveyed.²¹ This highlights an important fact that is poorly understood in the developed world: at the same time as non-Annex I countries have resisted being subject to internationally legally binding mitigation obligations within the UNFCCC, many of them have taken strong legislative or executive steps to tackle climate change within their domestic legal systems. A selection of these developing-country examples is examined briefly below.

7.3.2 Developing-country climate action: strong movement, great potential

A number of developing countries are providing leadership on climate change by undertaking mitigation and adaptation actions tailored to their economic circumstances, and in so doing are providing powerful examples to countries in similar circumstances of how growth and development can be low-carbon, climate-resilient, and attractive. Here are some examples from China, India, Brazil, Korea, Ethiopia, Colombia, and Bangladesh.

China

In the decade to 2025, it is likely that economic growth will lead to around a doubling of China's GDP (associated with an average annual growth rate of around 7%), and another 350 million residents will be added to China's cities.²² China's emissions, already the largest in the world, were at 10.5 billion tonnes of CO₂e in 2011 (nearly 8 tonnes per capita) and likely reached more than 12 billion tonnes of CO₂e in 2014 (around 9 tonnes of CO₂e per capita).²³ The simultaneous challenge and

opportunity that China's future economic growth poses to efforts to cut its greenhouse gas emissions are unparalleled in the world today.

China's new leadership recognizes the enormous challenges it faces in regard to climate change, energy security, pressure on resources, and local environmental pollution (particularly air pollution in eastern cities). China's commitment to take action is strongly founded on five key reasons: vulnerability to climate change; energy security; pollution from hydrocarbons; recognition of the influence of its action on others; and economic opportunities for new markets and higher-value activities. It is the strength of these reasons, and of China's recognition of them, that gives confidence that China's commitment will remain strong.

China's vulnerability to climate change is illustrated by the importance of the Himalayas and their snow, ice, and surrounding rainfall to their river and water systems, and to the concentration of populations in coastal areas. China's growing economy and industrialization have put great strain on energy systems, with increasing resort to imports of coal and gas. Technical analysis prepared for the New Climate Economy report finds that the morbidity costs to China from air pollution (PM_{2.5} exposure) equated to 9.7–13.2% of GDP in 2010.²⁴ Further, China's leaders have recognized that not only is China the world's largest emitter of GHGs, but it is also large in the sense that others will be strongly influenced by what it does. With its great size and growth, China is now, inevitably, a leader. And with its very large investments that yield economies of scale and learning, and its growing technological strength, China is in a strong position in world markets. With Germany, it is the world's largest producer and exporter of clean goods—the two countries have between them one-third of the market for globally traded climate-related goods.²⁵

In a wide-ranging reform blueprint published in November 2013, China's party leadership resolved to “accelerate the transformation” of its growth model “to make China an innovative country” and “promote more efficient, equal and sustainable economic development.”²⁶ China already has a target to reduce emissions per unit of GDP (emissions intensity) by 40–45% between 2005 and 2020 (submitted for COPs 15 and 16 in Copenhagen and Cancún). There is a target of a 17% reduction in emissions intensity during the twelfth five-year plan (2011–2015). China takes targets and plans very seriously. It aims to achieve

this reduction in emissions intensity alongside other reform objectives, including moving to a growth model driven by higher consumption levels (of private and government goods and services) and lower investment and savings levels; shifting its industrial structure away from energy-intensive heavy industry and toward a combination of services and high-tech manufacturing; using market, financial, and corporate reforms to improve the efficiency of capital allocation and resource use across its economy; implementing energy efficiency measures to reduce the energy use of firms and households; reducing the share of coal-fired power generation in its energy mix; rapidly expanding its renewable and nuclear generation capacity; and taking a wide range of additional measures to reduce emissions in transport, industry, land use, and beyond.²⁷

China's twelfth five-year plan charts a course for the development of seven "strategic emerging industries,"²⁸ some of which are explicitly low-carbon and all of which will be critical to the country's future decarbonization efforts. China is aiming for these industries to achieve a 15% share of GDP by 2020, compared with 3% in 2010. It is also leading the world in renewable energy investment, having invested around \$56.3 billion in 2013, about 26% of the world total—more than Europe for the first time.²⁹ The largest sector was onshore wind with around 14 GW of capacity added in 2013, taking total onshore wind capacity to over 89 GW. The target is for 100 GW of installed grid-connected capacity by 2015. China deployed 12 GW of solar capacity in 2013,³⁰ almost double its existing capacity, and has targeted a total capacity of 35 GW by 2015.³¹ In the joint announcement of Presidents Obama and Xi Jinping in Beijing on 12 November 2014, China announced it would peak its CO₂ emissions around 2030, with the intention of peaking earlier, and would increase the non-fossil fuel share of primary energy to around 20% by 2030. China's plans suggest that they will peak coal use by 2020 or earlier.³²

The growth in China's economy as it continues to develop and urbanize means it will remain a large energy user for many years to come, and its consumption of coal, oil, and gas continues to rise alongside its renewable energy capacity. In 2012–2013, roughly 2.5 new coal plants were coming online per week in China, though the rate has slowed to around 2 per week in 2014 and 2015 (expected),³³ and China's plans for coal also indicate rapid slowing in the next few years.³⁴ It is not surprising that China's emissions, despite its targets and plans, are expected to

continue rising for some time. If recent trends continued (factoring in China's emissions intensity targets), China's emissions would be heading for around 13 billion tonnes or more of CO₂e by 2020, and potentially 15 billion by 2030. This would clearly be incompatible with a 2°C path involving a worldwide 2030 budget of around 35 billion tonnes: China, with around 20% of the world's population in 2030, would be taking up around 40% of the carbon space in terms of annual flows of emissions.

The implications of this trajectory are understood in Chinese policy-making circles, and a vigorous debate has occurred in China about measures to constrain its emissions in an absolute sense and not only in terms of emissions intensity. In June 2014, He Jiankun, chairman of China's Advisory Committee on Climate Change, indicated publicly that China is considering introducing an absolute cap on its emissions as part of its thirteenth five-year plan (he expected emissions would still grow until a peak in around 2030, but annual caps would mean they are more tightly regulated).³⁵ At the UN Secretary-General's Climate Summit in New York in September 2014, Chinese Vice-Premier Zhang Gaoli promised that China would soon announce further efforts to tackle climate change, including "the peaking of total carbon dioxide emissions as early as possible"³⁶; and, as noted above, on 12 November 2014 President Xi Jinping announced a date of around 2030 or before.

Many in the west point to the rapid expansion of Chinese coal consumption since the early 2000s to argue that climate actions in developed countries would be futile. China currently accounts for around half the world's annual consumption of coal. It has, however, taken strong steps in recent years to moderate the growth in its coal consumption, and a number of experts have been predicting that Chinese coal consumption could peak at some point within the next decade, now envisaged for around 2020.³⁷ How quickly coal can be reduced is of critical importance for the world when it comes to tackling climate change, since it will not only strongly influence China's, and hence the world's, future emissions trajectory but it is also bound up with the question of energy innovation—the research, development, demonstration, and deployment of low-carbon energy sources in China and globally.

I have argued elsewhere that a Chinese plan to peak its coal consumption by 2020 or earlier, and to phase it out, e.g., by around 2040, could bring major benefits to China in the form of greater energy security,

lower air pollution, reduced pressure on scarce water supplies, and greatly reduced risks of climate damages.³⁸ Such a phase-out could be implemented through a combination of national planning targets, a coal tax, and regulatory measures, and complemented with expanded energy efficiency measures, green city planning, a comprehensive set of energy innovation policies (aimed especially at reducing the costs of a range of low-carbon technologies with high potential for cost and emissions reductions), and much-needed fiscal and governance reforms. This package of macroeconomic and sectoral measures could bring major medium-term economic, social, and environmental benefits to China (quite aside from reduced climate risk). Moreover, the long-term benefits for China and the world in terms of reduced greenhouse gas emissions, combined with knock-on effects including the likely stimulation of low-carbon policy and investment responses by other countries and firms, could be immense: greatly reduced emissions and climate risks, and the opening of large new markets for low-carbon technologies and services.³⁹

China's emissions reduction efforts and challenges provide a number of important lessons for international climate action, collaboration, and governance. First, China shows how countries' climate actions can be credible without necessarily being internationally legally binding. China's low-carbon targets and measures are typically expressed in its planning instruments and national laws. China's five-year plans are strong domestic commitments against which leadership is judged and are supported by institutional structures to carry them out. While the enforcement of central instruments at the provincial and local level can be patchy, China has, overall, a good track record of setting and achieving ambitious economic and climate-related goals expressed in such instruments.

Second, China's approach shows how countries often do not view the greenhouse gas abatement benefits of low-carbon measures in isolation; rather they see climate change as intimately connected with other important issues, including energy security (both access and affordability), local environmental pollution, local natural resource pressures, industry policy and competitiveness, macroeconomic reform, poverty reduction, social policy, equity, innovation, and growth. An international framework focused overly narrowly on binding targets to reduce emissions per se

can risk artificially separating climate mitigation from the other policy concerns with which it is, and is perceived by many countries to be, integrated. Emissions reduction targets are important and valuable, but we must not lose sight of the interconnections between carbon emissions and other issues. Of special importance, we must think about combining climate responsibility and poverty reduction, in all its dimensions. Fortunately good policy can and should put these together rather than seeing them as automatically in tension.

A third point, related to the second, is that while both domestic and international factors shape China's decision-making on climate change, we must recognize that domestic factors (economic, political, social, and environmental) have a very strong influence, including those involving growth, poverty reduction, and environmental pollution. Global factors influencing China's decision-making include prices for fossil fuels (which affect China's energy strategy as a significant importer); developments in global markets and technologies (which affect China's economic and industrial policies in ways relevant to climate change); opportunities for leadership in global markets, especially for clean technologies; international pressure on climate change and a desire to build a reputation as a responsible international stakeholder (such pressure is a factor, irrespective of whether China's obligations are legally binding).

Fourth, China's energy challenges demonstrate the critical importance of low-carbon energy technology innovation (globally and in China) to the country's future emissions trajectory. If China is to peak and phase out its coal use, it will be crucial for the global community, including China, to invest more heavily, and in a focused and intelligent way, in energy innovation to create alternatives to coal—from basic research through to early-stage deployment of key energy technologies that have high potential for both cost reductions and emissions reductions, and later-stage deployment of near-cost-competitive technologies. Again, while it is important that all countries pay attention to their own long-term emissions reduction goals, an overly narrow focus on individual-country long-term emissions targets can displace attention from key short-to-medium-term questions, including how other countries can collaborate with China to help it peak and phase out coal.

Fifth, whereas the Kyoto approach is concerned with legally “ensuring” (in theory) that countries meet a particular emissions target through

the threat of international punishment if they fall below that amount, China's experience suggests that it would be more valuable to structure international interactions so as to provide *upward* flexibility in ambition. In other words we should look, in international discussions and agreements, for ways to ramp up commitments over time, for example by using ranges that embody ambition, and work together to move toward the upper end of ranges for emissions reductions. A critical problem with a focus on strict targets (imposing upper limits on emissions), plus punishments for exceeding them, is the incentive for a country to try to make the target as easy as possible. Even if the formal punishment for exceeding limits is negligible, there are countries like China that do take targets very seriously and might have ambition deterred by a single upper limit on emissions. This discussion is taken further in the next chapter.

Finally, China's efforts are a powerful influence on other emerging market and developing countries through technology, finance, priorities, opportunities, relations with developed countries, and its example more generally. China has a powerful influence over the G77 in UNFCCC processes and elsewhere. It has been a prime mover in the Asian Infrastructure Investment Bank and the BRICS-led development bank. China is showing how the new balance of economic and political power in the world is providing opportunities for the international agenda to be shaped outside the developed countries, while at the same time bringing new global responsibilities for emerging economies.

India

India (with emissions of around 2.5 billion tonnes per year CO₂e in 2011, or around 2 tonnes per capita)⁴⁰ has made a number of voluntary emissions reduction commitments, including the declaration by then Prime Minister Manmohan Singh in June 2007 that India will never exceed the average per capita emissions of developed countries. India has announced a voluntary target to reduce emissions intensity of GDP by 20% to 25% by 2020 compared to the 2005 level.⁴¹ In June 2008, the prime minister released India's first National Action Plan on Climate Change, outlining existing and future policies and programs for climate mitigation and adaptation.⁴² The plan identifies eight core "national missions," such as the National Solar Mission running through 2017. The twelfth five-year plan, released in May 2012, included these missions and

recommendations from the report on “Low-Carbon Strategies for Inclusive Growth.”⁴³ Interestingly, one of the last publications from the Planning Commission initiated during Prime Minister Singh’s ten years in government (published in May 2014) made more optimistic assumptions about low-carbon innovation, thus lowering India’s estimates of costs of climate action.⁴⁴ However, progress is variable, and the development of state action plans is proving a very slow process.

At the time of writing, the newly elected Indian government of Narendra Modi has signaled a proactive stance on climate change both internationally and domestically. For example, “climate change” was added to the name of the Ministry of Environment and Forests, and the new minister in charge of these portfolios, Prakash Javadekar (a member of the GLOBE network of climate legislators; see section 7.3.1 above), signaled that India will strengthen its international climate negotiation team and engage more strongly in the UN negotiations.⁴⁵ Prime Minister Modi plans to harness solar power to ensure that every Indian household, including the 400 million people who lack access to electricity, can run at least one light bulb by 2019, i.e., before the end of his elected term of office.⁴⁶ And he has signaled his intention to reform India’s ailing power sector. Prime Minister Modi’s track record on solar power is strong—as chief minister of Gujarat state, he helped make Gujarat home to some 40% of India’s solar capacity.⁴⁷ At the UNFCCC conference in Lima in December 2014, Minister Javadekar announced that “comprehensive climate legislation” would be introduced in 2015 and the 2020 target for the solar mission would be raised from 20 GW to 100 GW capacity.

As with China, the question of whether India’s future growth and development will be hydrocarbon-based or focused around renewable energy is critical for the world. Its answer is likely to be situated within its ambitions for growth and poverty reduction and to be driven by domestic factors (including the domestic co-benefits of climate mitigation), by technology developments, and by global access to, and relative prices for, different energy sources and technologies (fossil, nuclear, and renewable). Again, this points in the direction of a global climate framework that is more focused on collaborative approaches to finance and technology innovation, encouraging greater ambition in global commitments over time, credible policy and institutional developments, and

support for countries to undertake domestic structural transitions that also deliver short- and medium-term domestic co-benefits such as decentralized access to electricity and cleaner air. The benefits of the latter would likely be particularly strong given the damaging health effects of air pollution in India—the mortality costs of pollution associated with PM_{2.5} exposure in India are estimated at 5.5–7.5% of GDP.⁴⁸ China now wishes it had peaked its coal use much earlier: there is an important lesson for India here.

India is very conscious that its emissions per capita are low, perhaps a quarter of China's and one-tenth those of the US. It argues that rich countries grew their incomes on the back of high-carbon technologies and were responsible for the bulk of current concentrations of GHGs in the atmosphere. India would therefore be very sensitive to what it might see as attempts to restrict its efforts to build better lives for its citizens. That is why it is so important to show how climate responsibility can be combined with growth and poverty reduction, why it is so important that rich countries show leadership, and why it is so important to build technological and financial support.

Brazil

Brazil (with emissions of around 1.1–1.4 billion tonnes of CO_{2e} in 2011, or 6–7 tonnes per capita)⁴⁹ is another major emerging economy whose future trajectory on climate change is of global importance, particularly in relation to its management of the Amazon forests. Brazil adopted a National Plan on Climate Change in 2009 and incorporated this into national legislation. The law includes a national emissions target and a reduction on projected business-as-usual greenhouse gas emissions of between 36% and 39% by 2020, and it requires emissions reductions to be quantifiable and verifiable. Brazil also aims to cut deforestation in the Amazon by 80% by 2020 (the baseline is the average deforestation rate of 19,600 km² annually between 1996 and 2005). From a peak level of deforestation of close to 28,000 km² in 2004, the annual rate has decreased at a fairly steady pace over subsequent years, reaching a low of 4,571 km² in 2012 (76% below the baseline).⁵⁰ In October 2013 Brazil adopted a new Forest Code, which was supported by agribusiness but heavily criticized by environmentalists. It preserved the requirement to

maintain forest cover on 80% of rural properties in the Amazon, 35% in the central savannah (Cerrado) region, and 20% in other areas of the country. However, the total amount of forested land to be preserved by private owners was reduced. The law also grants amnesty to landowners who illegally cleared their land prior to July 2008. After this date, all forest areas cleared beyond the legal percentage limit must be reforested.

As Brazil's situation demonstrates, reducing emissions from deforestation and forest degradation is complex and sensitive: multiple groups and stakeholders are involved; deforestation is integrated with a variety of other environmental, social, and economic issues (understanding the local and global drivers of in-country deforestation is very important); and appropriate policies are strongly influenced by locally specific conditions. To be effective, efficient, and equitable, measures to stem deforestation should be created in a participatory way, particularly involving local communities. Such measures should be integrated with efforts to improve livelihoods and with other related measures and tailored to local conditions. They are likely to require various types of institutions and policy interventions.⁵¹ These may include transparent land use systems (land tenure systems, planning/zoning systems, monitoring and reporting systems, law enforcement institutions), protected areas, payments for ecosystem services, and development of sustainable livelihood opportunities for people living in and around forested areas. It is crucial that local communities see a direct incentive to participate in protecting and managing the forests.

Further action at the global level, building on many existing initiatives, can play an important role in helping reduce and halt deforestation. Governments can help to develop and finance payments for ecosystem services and REDD+ mechanisms that support sustainable forest management through a combination of technical capacity-building and pay-for-performance.⁵² They can also help to combat the underlying drivers of deforestation by influencing the demand for goods associated with deforestation, including by improving regulatory standards and certification for imported goods such as timber and paper products. And there is much that companies can do, as illustrated in the examples considered later in this chapter.

South Korea

Understanding the actions of countries that have embarked on domestic low-carbon transitions in ways that successfully deliver domestic co-benefits can help to provide models and examples. South Korea (with emissions of around 690 million tonnes of CO₂e per year in 2011, or 14 tonnes per capita—similar per capita to Japan)⁵³ is one such country. Its National Strategy and Five-Year Plan for Green Growth involves a “Green New Deal” launched on 6 January 2009 as part of a wider economic stimulus package. A total of \$30.7 billion (about 80% of the package) was allocated over the period 2009–2012 across a range of low-carbon initiatives, including renewable energy, energy efficiency, transport, and water and waste management. The Five-Year Plan for Green Growth incorporates many of the projects from the “Green New Deal” package and outlines a set of three strategies, 10 policy directions, and 50 core projects to shift Korea to a low-carbon growth path.⁵⁴ Korea has also instituted an emissions trading scheme that will begin operation in 2015.

Ethiopia

There are powerful opportunities for low-carbon economic development in lower-income countries. Ethiopia (with emissions of around 120–150 million tonnes per year of CO₂e in 2011, or 1.4–1.7 tonnes per capita)⁵⁵ is one such country that is acting to shift to a low-carbon development path. Ethiopia has developed a Climate Resilient Green Economy Strategy to support its Economic Transformation Plan, the aim of which is to achieve middle-income status by 2025 without increasing emissions. The strategy focuses on the key sectors of agriculture, forests, renewables, and energy efficiency, and is now being implemented across government. Around 80% of abatement potential is estimated to cost under \$15 per tonne of CO₂ and will require investment of around \$150 billion over the two decades from 2011.⁵⁶ Important actions include forest management and the regrading of land, raising incomes, giving greater resilience to climate, and reducing emissions. For example, in Humbo in the south-east of the country, local livelihoods have been transformed through investment in agriculture that enhances the land through terracing, water management, and other measures, to improve crop yields, increase fodder and firewood, and reduce soil erosion.

Colombia

Colombia (with emissions of around 170–220 million tonnes of CO₂e per year in 2011, or 3.7–4.7 tonnes per capita)⁵⁷ also has strong ambitions to incorporate climate change into its national development strategy. In 2011 the government published the Institutional Strategy to Articulate Climate Change Policies and Actions in Colombia. This aims to create a new institutional framework in which the National Planning Department will have responsibility for climate change policy (through the Climate Change Mitigation Group) and real power to coordinate relevant ministries including environment, finance, water, mines and energy, transport, and so on. Under this new structure Colombia is developing a National Climate Change Policy and a low-carbon development strategy with a multisector and regional approach. The Colombian government has also set a range of targets, including to achieve a renewable energy share of 77% of total installed capacity by 2020; a biofuels penetration rate of at least 20% by 2020; and zero deforestation in the Colombian Amazon by 2020.

Bangladesh

Developing sustainably also involves building resilience to the impacts of climate change that are already locked in through existing and future emissions, and that are already being felt around the world. Bangladesh (with emissions of around 130–160 million tonnes of CO₂e per year in 2011, or around 1 tonne per capita)⁵⁸ is one country at the forefront of climate impacts. It recognizes its vulnerability to climate change and has taken steps to manage the impacts. A National Adaptation Program for Action was adopted in 2005 and, following this, the government adopted its first major climate change action plan, the Bangladesh Climate Change Strategy and Action Plan. This laid out a ten-year program (2009–2018) and identified six priority areas for action: food security, social protection, and health; disaster management; infrastructure; research and knowledge management; mitigation and low-carbon technology development; and capacity building and institutional strengthening. To finance its plans for climate adaptation and mitigation, the government established a National Climate Change Fund in 2009 with an initial capitalization of \$45 million. To complement this initiative, a Multi-Donor Trust Fund was established with the support of the UK;

current funding is around \$170 million, and it is administered by the World Bank.

Ethiopia, Colombia, and Bangladesh, from very different parts of the world and with very different characteristics, exemplify the sorts of low-carbon, climate-resilient development that will be needed to mitigate and adapt to climate change. The lessons learned from the implementation of low-carbon development strategies and policies in pioneering countries like these could be useful for countries with similar characteristics in their respective regions. So too can their demonstration that adaptation, mitigation, and development/poverty reduction are closely interwoven and can and should be achieved together.

It is striking and important that countries such as Ethiopia and Bangladesh (and Mauritius and many others) that have contributed little to past global emissions and have very low emissions per capita are nevertheless committed to keeping their own emissions low as they work to raise living standards and fight poverty. That commitment to act responsibly and eschew free-riding should be much more widely understood and respected. It is the type of perspective that contributes greatly to the collaborative foundations for international action.

The international community should continue to support development initiatives of this kind. Many such initiatives will relate to climate-smart agriculture, in which, as in Ethiopia, Colombia, and Bangladesh, poverty reduction, increasing agricultural productivity, mitigation, and adaptation are intertwined (see section 2.5.1 and the examples discussed there). The role of multilateral institutions such as the World Bank, IMF, and regional development banks can be of great value. The increasing recognition of the importance of integrating low-carbon and climate-resilient strategies and measures in their work in the last few years is a promising development, discussed further below, after considering recent developments in a number of OECD countries.

7.3.3 Developed-country climate action: a mixed picture

A survey of recent national-level climate action in developed countries paints a mixed picture. At precisely the time when developed countries should be leading the world to develop and implement the institutions, policies, technologies, and services needed to transform their

economies into engines of low-carbon growth, many are displaying a politics of doubt, dithering, and delay. From North America to Australia to the UK and other parts of Europe, climate deniers, vested interests, and ideologues have attacked both the scientific evidence on climate change and politicians' attempts to regulate emissions and build strong carbon prices. The global financial crisis, and subsequent economic stagnation in the euro area and elsewhere, have diverted attention from longer-term issues. This represents a major missed opportunity since there is no better time to invest in the growth story of the future—low-carbon—than when interest rates are low and there are unemployed resources. However, as I have argued, the opportunities are still there, even though it would have been better to have accelerated earlier.

Some countries have witnessed reversals in climate policy action. Australia's conservative government, under the prime ministership of Tony Abbott, has repealed the carbon pricing scheme introduced by the former Labor government and plans to replace it with a so-called "direct action plan" that has been nearly universally derided by experts as ineffective, inefficient, and inequitable; and the government is promoting the large-scale expansion of Australia's coal exports. The implications of taking this route are that Australia's already weak target of 5% below 2000 levels by 2020 is unlikely to be met, and Australian coal exports will continue to help fuel the coal-fired power stations of Asia, slowing the transition to low-carbon energy in that region.

Canada's federal government, having repudiated its commitments under the Kyoto Protocol, continues to promote a high-carbon development path based on unconventional oil development. Canada overshot its Kyoto targets by a large margin.⁵⁹ In principle, the sanction in the "legally binding" Kyoto Agreement was to require Canada to take on extra reductions in the next commitment period—hardly a very strong sanction or incentive given that, when the next period comes around, it can (and did) just walk away.

Japan, in a major reversal of energy policy following the Fukushima nuclear disaster, has become increasingly reliant on hydrocarbons for energy and announced in 2013 a projection that its emissions will *grow* by roughly 3% above 1990 levels by 2020, well in excess of its 2008–2012 Kyoto Protocol target.⁶⁰

There is, nevertheless, considerable action taking place within many developed countries at all levels, including at the national and subnational levels in the US, at the EU regional level, and in the nations of the EU.

In the US, President Obama, having failed to steer nascent climate legislation through a hostile Congress in his first term of office, made a major statement (at Georgetown University in June 2013) that his plans for his second term would be strong on climate change and focused on measures that did not require legislation to be passed through Congress. He will use his executive powers to regulate large point sources of emissions, and stimulus funds to invest in energy innovation. The president's energy plan looked forward to the use of revenue from federal oil and gas projects to support clean energy R&D, support for energy efficiency actions by states, action to reduce wind and solar costs, measures to reduce regulation of the gas industry, and measures to produce cleaner-burning gas. In addition, the 2014 US budget allocated \$615 million to support deployment and reduce costs of clean energy from solar, wind, geothermal, and hydro.

In his Georgetown University speech, President Obama reemphasized the US commitment to reduce its GHG emissions 17% below 2005 levels by 2020. His plans include: playing a leading role in international climate negotiations; reducing carbon emissions from power plants by directing the Environmental Protection Agency (EPA) to complete CO₂ emissions standards for new and existing power plants (standards for new plants were released in September 2013); increasing use of renewable energy and energy efficiency; reducing hydrofluorocarbon and methane emissions; and adapting to climate impacts. It was important that the 2007 Supreme Court ruling in *Massachusetts v. EPA*⁶¹ had confirmed that greenhouse gases are pollutants within the meaning of the Clean Air Act and thus that the EPA has the power to regulate them. This cleared the way for the EPA to raise emissions standards for vehicles, which it did during the Obama Administration's first term, and to regulate emissions standards for power plants, as it is proposing to do. The EPA has also introduced mercury and air toxics standards for power plants. These will force coal plant operators to adopt more stringent pollution controls, and many older and dirtier plants may now become uneconomical and close.

The centerpiece of the US commitment to tackling climate change—a plan to reduce emissions from US power plants—was announced by President Obama in early June 2014.⁶² Under the plan, the EPA will work with states to reduce the carbon intensity of power plants at state level according to a set of differentiated state targets. It would give the states the flexibility to meet targets using a range of measures. The administration predicts that these measures will result in a 30% reduction in US power-sector emissions below 2005 levels by 2030. On 12 November 2014 in a joint announcement with President Xi of China, President Obama announced a target of 26–28% cuts in US GHG emissions, 2005–2025. The joint announcement of targets by the two largest emitters sent a powerful signal of collaboration.

The US military is also showing leadership in reducing energy use and emissions. The US Navy is involved with advanced biofuel trials and has a target to run a “Great Green Fleet,” a carrier strike group composed of nuclear ships and hybrid electric ships running only on biofuel. It also has an ambitious 2020 target for 50% of total energy consumption, ashore and afloat, to come from non-fossil fuel sources.

There is also strong action in many US states and cities, as we shall see in section 7.3.4, and many businesses in the US and elsewhere are moving strongly too (see also section 7.3.4).

The EU had an ambitious climate change policy framework based on 20% reductions of emissions by 2020 relative to 1990 and having 20% of energy come from renewable sources by 2020. However, the economic stagnation and resultant reduction in energy demand in Europe following 2008 has made those targets look less ambitious. The EU is actively engaged in building its 2030 package; in early 2014 the European Commission recommended an EU-wide GHG reduction target of 40% below 1990 levels by 2030 (along with nonbinding targets for renewable energy and energy efficiency), and the European Parliament called for still more ambitious targets. That 40% target was agreed by the European Council in October 2014.

However, the EU Emissions Trading System remains plagued by a large surplus of emissions allowances that, without major structural reform, will likely leave prices throughout Phase III of the scheme (2013–2020) far too low to play any major role in inducing significant low-carbon structural change and innovation. This surplus arose partly from

excessive allowances at the beginning (firms seem to have gamed the system and exaggerated initial emissions, thus gaining extra allowances) and partly from economic stagnation reducing energy demand. The obvious response would have been to reduce the number of allocated permits, but that response failed to materialize (see chapter 3). The October 2014 Council meeting recognized the problem, and remedial action is now under discussion.

In reflections on how global climate agreements and frameworks could better promote action in developed countries, the recent experience of these countries reinforces the lessons from developing countries discussed earlier. One such lesson is that internationally “legally binding” targets are no substitute for credible, domestic (or EU-level) climate policy, as Canada’s defection from Kyoto illustrates starkly. Domestic commitments can indeed arise, partly as a result of domestic pressures and understanding of responsibilities, partly as a result of the attractions of new technologies and markets, partly as a result of quests for energy security in a volatile world, and partly from the various co-benefits in terms of cleaner, quieter, more biodiverse, and generally more attractive ways of living. It is thus important to build the evidence and examples of these very real domestic advantages to climate action. This was central to the work of the Global Commission on the Economy and Climate (see section 2.10).

Further, better evidence and communication about the actions taken by other countries, and examples of successful low-carbon growth initiatives, are likely to help businesses and civil society support change and encourage policymakers to decide on climate action. An international agreement and mechanisms to promote greater ambition in commitments could be effective at scaling up action country by country, giving confidence to investors and policymakers about where the world is going. It is very important for the world to get such an agreement.

I have emphasized repeatedly that progress is too slow for a 2°C (50–50 chance) path. Yet there is much that is moving in developing, emerging, and developed countries in the transition to the low-carbon economy. And we should note that the three biggest emitters (China, the US, and the EU), responsible for around 50% of global emissions, are on track to meet their Copenhagen-Cancún commitments for 2020. International targets can have real traction.

7.3.4 Global action by subnational and nonstate actors

While action at the country level and by national-level governments has been mixed in recent years, there has been an upsurge of local action and transnational cooperation by nonstate actors.

Subnational governments: states, cities, and local authorities

Subnational governments in many countries have shown leadership in developing and implementing low-carbon policies and measures.

In the US, for example, California has operated a GHG cap-and-trade scheme since 2013 and has linked its scheme with that of Quebec since 2014. And California's longstanding energy efficiency policies have caused the state's per capita electricity use to flat-line while it has grown in the rest of the country.⁶³ Texas, long considered an oil and gas heartland, is pushing ahead with wind farm deployment: it now has the largest wind farm capacity of any US state at around 12 GW in 2012 (Iowa is second with around 4 GW). At the city level, New York City developed a green growth plan in 2007, PlaNYC, which includes a target to reduce emissions by 30% over the period 2005–2030. In 2013, the city's greenhouse gas emissions were 19% below 2005 levels.

Transnational cooperation among the world's cities, particularly among the C40 network of “megacities,” is playing a valuable role in accelerating the transfer of knowledge and good practice in low-carbon urban development across the world, and in facilitating collaborative action. For example, the C40 network's 2014 research, which compares city actions audited in 2013 with a similar audit undertaken in 2011, showed that the number of cities with programs for sharing bicycles has grown from six to 36, and whereas bus rapid transit systems were deployed widely only in South America in 2011, now 35 C40 cities across the world have or plan on developing them.⁶⁴ As Michael Bloomberg, president of the C40 board of directors, has put it: “cities have the power, the expertise, the political will and the resourcefulness to continue to take meaningful climate action, and are, more than ever before, at the forefront of the issue of climate change as leaders, innovators and practitioners.”⁶⁵

Cities have the ability to go beyond the sharing of examples and learning from each other. Together they can influence the overall sense of direction; and they can collaborate in setting standards for bidding for

contracts. For example, if all cities have similar and strong emissions standards for buses, they can foster scale and cost reduction in manufacturing these buses.

The increasing prominence of city-level actors in global climate governance was marked by the 2014 appointment, by UN Secretary-General Ban Ki Moon, of Mr. Bloomberg as UN Special Envoy on Climate Action. One of his key tasks was to engage city mayors in the process of climate action in advance of and following the Secretary-General's High Level Summit on Climate Change in September 2014. The summit brought together heads of state along with leaders from subnational jurisdictions and from business, finance, and civil society with a view to catalyzing ambitious climate change action on the ground and building the political case for a strong global agreement in Paris in 2015.

Cities were absolutely central to the work of the Global Commission on the Economy and Climate. They are responsible for more than 70% of emissions and contain more than 50% of the world's population. They can also have a sense of community which allows for stronger public action than may be possible at a national level. They will be crucial to the future of climate change.

Multilateral economic and financial institutions

Global and regional multilateral economic and financial institutions are increasingly taking action on climate change at the highest levels. The managing director of the IMF, Christine Lagarde, has called climate change "the greatest economic challenge of the 21st century."⁶⁶ The IMF has integrated climate change risks and policy responses into its analyses and policy recommendations, focusing in particular on the need to get energy and transport prices "right" through the reduction of fossil fuel subsidies and the incorporation of broad-based charges on greenhouse gas emissions and other environmental externalities, such as carbon and air pollution taxes.⁶⁷ Recognizing the extraordinary challenge that climate change poses to development and poverty reduction,⁶⁸ the World Bank is also supporting work on better energy pricing and ending fossil fuel subsidies, in addition to focusing on urban development, climate-smart agriculture, investment in energy efficiency and renewable energy, and reducing short-lived climate pollutants.⁶⁹ The World Bank has also led on carbon pricing, with the Bank's president, Jim Kim, announcing

at the UN Secretary-General's Climate Change Summit in New York in September 2014 that 73 countries, 22 states, provinces, and cities, and over 1,000 businesses and investors had signaled their support for carbon pricing.⁷⁰

Transnational research commissions

In addition to the climate-relevant research being produced in the world's universities and think tanks, a number of international research commissions have arisen to focus attention on particular aspects of climate change.

The Global Commission on the Economy and Climate, chaired by Felipe Calderón (I co-chair), includes former heads of government and finance ministers, mayors, and leaders from economics and business, and was established to analyze and communicate the economic benefits and costs of acting on climate change, and in particular how to combine growth and climate responsibility. The New Climate Economy, the commission's flagship project, released its report titled *Better Growth, Better Climate* in September 2014, which provided independent and authoritative evidence on the relationship between actions that can strengthen economic performance and those that reduce the risk of dangerous climate change. The commission has a number of partner research institutes from around the world, from Beijing to Stockholm, and is working with a number of other institutions in various aspects of the research program, including the World Bank and regional development banks, the International Monetary Fund, the International Energy Agency, the Organisation for Economic Co-operation and Development, and UN agencies. See section 2.10 for further discussion of the report.

Taking as its premise that climate change constitutes a global public health emergency, the Climate Health Commission—a partnership established in 2014 between the medical journal *The Lancet*, University College London, Tsinghua University, and the Stockholm Resilience Centre—aims to identify policy responses to climate change that will improve public health and to catalyze climate mitigation and adaptation that reduces the health risks associated with climate change.⁷¹ For example, cities that burn less coal and are more friendly to cycling will have populations that are much healthier.

The Deep Decarbonization Pathways Project (DDPP), another transnational research project, brings together research teams from 15 developed and developing countries (together accounting for 70% of world emissions) to understand and demonstrate how individual countries can decarbonize their economies, sector by sector, toward zero net emissions by the second half of the century. Its first major report was released in September 2014.⁷²

Efforts such as these to highlight, with careful analysis, the economic, health, and other co-benefits of climate action can play an important role in mobilizing policymakers beyond the traditional climate-focused ministries of energy and environment, along with civil society groups beyond environmental NGOs.

Social movements and investors: decarbonizing portfolios, divestment, and stranded-asset risks—diverse sources of pressure

Investments in the fossil fuel supply chain are coming under increasing pressure from a diverse range of sources, from parts of the financial community concerned about the risk of “stranded assets” to local and transnational social movements pushing for institutional investors (such as pension funds) and civic-minded institutions (such as universities) to decarbonize portfolios or divest from fossil fuels. For example, the Swedish national pension fund, AP4, examines sector by sector the environmental and carbon performance of companies in its portfolio and sells off the worst-performing on these criteria. It has found that application of this policy has increased financial returns.

Climate change, and the need to decarbonize the global energy sector, have given rise to additional risks associated with investments in fossil fuel assets. Climate policy measures, such as carbon prices, imply risks of reduced revenue in fossil fuel industries, making investments in those industries less attractive over time. Indeed, strengthening carbon pricing raises the price that users pay for fossil fuels and reduces the price that producers receive. That is the point of the policy—to discourage the unabated use of fossil fuels.

Strong global action on climate poses major risks to these industries. Staying within the limited global carbon “budget” for any 2°C scenario (with a 50% or higher probability) implies that the bulk of the world’s remaining fossil fuel reserves cannot be burned unabated (i.e., without

carbon capture and use or storage). If we burned known proven hydrocarbon reserves uncaptured, we would emit an estimated 2,860 billion tonnes of CO₂.⁷³ This is around 2–3 times the remaining CO₂ budget—of approximately 1,000–1,500 billion tonnes⁷⁴—for holding to 2°C (with at least a 50% probability).

It would appear that the probability of strong action on climate change is not now factored into the price. For listed companies, the breakdown of proven reserves (measured in CO₂) is 36% coal, 51% oil, and 13% gas (listed-company reserves make up around a quarter of the total reserves measured in CO₂), hence oil and coal companies are particularly exposed.⁷⁵ A number of investors have begun to draw attention to these risks, often termed “unburnable carbon” and “stranded assets.”⁷⁶ In many cases regulators are behind the curve in how they treat risk, thereby encouraging institutional investment in areas subject to stranded-asset risks and limiting investment in new technologies which may well carry less risk in the longer term.⁷⁷

At the same time, we see a groundswell of social pressure calling on institutions to divest their fossil fuel assets, with a particularly strong focus on coal. Large fossil fuel infrastructure projects, and the companies that invest in them, have historically been favored by institutional investors because they have provided a risk-return profile suitable to long-term investments: they involve large assets in well-understood, traditionally low-risk industries that generate a stable return on their investment over a long time period. As it is fund managers who typically make investment decisions as agents acting on behalf of pension funds and other institutional investors (with whom many individuals invest their savings and pensions), many entities and individuals have become passive investors in fossil fuel assets, and are therefore exposed both to the associated stranded-asset risks and to the ethical implications of financing fossil fuels. Civil society groups at the local and global level are raising awareness of these financial entanglements and mounting vigorous campaigns to persuade university endowment funds, religious groups, cities, and other entities considered to be in the vanguard of moral leadership to divest from fossil fuel assets. The incentive structures induced by policies to decarbonize portfolios are more precise than policies of generalized divestment in that they incentivize the worst performers to do better.

It remains to be seen what effect these initiatives will have, but insofar as they raise awareness about the implications of fossil fuel investment for the climate, and attempt to change the normative status of fossil fuels, they will be an important part of the political process. And in any case, investors should recognize that the world has embarked on a transition and that it makes sense both prudentially and ethically to be on its frontier. For now, that means, for example, divesting from much or all of unabated coal and from companies behaving disreputably by attacking, or funding attacks on, climate science.

Businesses

Many businesses are also demonstrating leadership on climate change and wider issues of environmental sustainability, showing what is possible when leaders and boards prioritize these issues. They do it because it is right and because it makes business sense.

For some time now, leading businesses have understood the potential competitive benefits they can gain from internal initiatives to improve their energy and resource efficiency, as exemplified by the companies discussed in section 2.3.1. Increasingly, businesses at the forefront of sustainable practice are going beyond efficiency measures that reduce their operating costs and are seeking to influence sustainability practices along their supply chains. Walmart has been a powerful example here, having introduced supplier sustainability assessments (scorecards) and required suppliers to evaluate and disclose their environmental impacts. Marks & Spencer's Plan A and BT's Better Future programs also exemplify this trend in providing wider sustainability leadership, beyond reducing the companies' internal environmental and carbon footprints.

On climate change, an important way in which businesses can show leadership in regard to their supply chain is to source their electricity from renewable sources. We are beginning to see this particularly in the technology sector, as illustrated in the case of Google (see chapter 2). The CEO of Apple Inc. recently warned investors to “get out of this stock” if they did not want Apple to continue to invest in sustainable energy.⁷⁸

Another important area of supply chain decarbonization is deforestation. Many companies are facing pressure from consumers, shareholders, and NGOs to scrutinize and reduce their use of products arising from deforestation within their supply chains, and leading businesses are

responding innovatively, helping to build a global public-private movement in support of “zero deforestation supply chains.” For example, members of the Consumer Goods Forum such as Unilever and Nestlé have committed to achieving deforestation-free commodity supply chains by 2020. And members of the Tropical Forest Alliance 2020, which includes companies, governments, and civil society, are working together to reduce deforestation in tropical forests that is driven by production of four major global commodities: palm oil, soy, beef, and paper and pulp.⁷⁹

A further area in which many businesses are playing a leadership role is in carbon pricing. Many businesses, including 150 companies globally that report to the Carbon Disclosure Project, are applying an internal carbon price as part of their business planning as a way of directing investments toward lower-carbon projects and products, and of managing future policy risks.⁸⁰ Such internal carbon-pricing initiatives can also move companies toward a wider low-carbon policy and regulatory environment, including economy-wide or sectoral carbon pricing, which many businesses have advocated publicly, as discussed in chapter 10.

7.4 Conclusions

In summary, the lessons we have learned from this chapter are:

- Around the world, many countries are taking action on climate change, demonstrating that, with good policies, growth, poverty reduction, and a wide range of other local benefits and opportunities can go hand in hand with cutting emissions. We are seeing the real possibility of a “better growth”—more inclusive and effective in reducing poverty, cleaner and less polluted, quieter and less congested, more energy-efficient and energy-secure, and much more attractive and strong in relation to the environment and biodiversity.
- Progress at the national level would be greatly facilitated by a deeper and broader understanding of what is happening around the world in the movement toward a low-carbon economy.
- However, progress at the national level, and within the UN climate negotiations, remains much too slow in relation to what is necessary to avoid dangerous climate change in the sense of retaining a reasonable

chance of limiting temperature increases to 2°C. If the 2°C ambition is to have a chance of success, action must be scaled up.

- At the same time, many subnational and nonstate actors, including cities and businesses, are providing strong leadership in reducing emissions, demonstrating tangibly the associated opportunities and benefits and providing strong examples of what works well and what works less well.
- International financial institutions and transnational research collaborations are marshaling the knowledge base that is helping to build an understanding of the structural changes occurring in the global economy, the dynamic nature of these changes, and the reality that climate mitigation can be done in ways that bring many benefits for countries well beyond the collective reductions in climate risk—all key themes of this book.
- In order to raise ambition, the framework for global climate governance should be tied much more closely to this emerging story of “better growth, better climate” and the opportunities for development and poverty reduction it can bring.

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