



Chapter 8

INTERNATIONAL COOPERATION

Main points

- International trade and supply-chain integration have played a key role in driving down the costs of low-carbon technologies. International trade in environmental goods and services totals nearly US\$1 trillion per year, or around 5% of all trade. Trade in low-carbon and energy-efficient technologies alone is expected to reach US\$2.2 trillion in 2020, a tripling of current levels.
- A new international legal agreement on climate change is essential to enable the large-scale transition to a low-carbon pathway needed to have a good chance of keeping global warming under 2°C. A strong agreement could act as a powerful macroeconomic policy instrument, sending clear signals to businesses and investors about the direction of the global economy. This should include a long-term goal to reduce greenhouse gas emissions to near-zero or below in the second half of the century.
- It is important that a new international agreement is equitable. This means developed countries will have to make deep long-term cuts in their emissions, and mobilise finance, capacity-building assistance and technology to support developing-country efforts. Larger developing countries will have to make serious commitments to reducing their emissions trajectories.
- Globally, financial flows to low-carbon and climate-resilient investment totalled around US\$359 billion in 2012, much of it to renewable energy projects. Only about a quarter (US\$84 billion) of these flows were international, of which an estimated US\$39–62 billion (46–73%) were directed at developing countries, mostly from public sources in developed countries.
- Around a third of climate financing comes from development finance institutions, including multilateral development banks, national development banks, and bilateral and regional financial institutions. These have considerable potential to scale up low-carbon and climate-resilient financing, both directly and by leveraging private capital.
- Some 14% of World Trade Organization trade disputes concern renewable energy technologies, as competition has increased for market share. Faster dispute resolution processes are needed, and the environmental elements of international trade agreements should be strengthened.
- There is potentially significant scope for business-led initiatives to reduce emissions in some internationally traded sectors dominated by relatively small numbers of firms, such as commodities deriving from forest areas.
- The rules and norms of the international economic system need to be aligned more closely with the transition to a low-carbon, climate-resilient global economy. Corporate reporting on climate risk and mitigation strategies should now be integrated with financial reports and standardised. Investors with around half of total institutional assets (US\$45 billion) under management now subscribe to responsible investing principles, and climate risk management now needs to become part of investors' fiduciary duty.
- Economic growth and climate risk are intertwined; the institutions and forums charged with fostering economic cooperation – such as the World Bank, the International Monetary Fund, the Organisation for Economic Co-operation and Development, and the G20 – should reflect climate risk assessment and reduction in their national economic surveillance processes and assessments.

1. Introduction

Globalisation has been a major driver of both high- and low-carbon growth over the last 25 years. World trade more than tripled in that period, reaching US\$18 trillion in 2012.¹ This has provided an important boost to developing and emerging economies as well as developed ones, but, as discussed in Chapter 1: Strategic Context, it has also led to a significant shift in production to countries with weaker pollution controls and predominantly coal-based energy systems. Thus, the trade boom has likely increased global greenhouse gas (GHG) emissions.²

Yet trade has also played a major role in accelerating the diffusion of low-carbon technologies such as solar and wind power, and light-emitting diodes (LEDs). The ability to produce components in low-cost countries, combined with expanding global markets, has led to a dramatic reduction in the cost of those technologies, enabling broader deployment.

The low-carbon economy is now a global phenomenon. International trade in environmental goods and services totals nearly US\$1 trillion per year, or around 5% of all trade.³ Trade in low-carbon and energy-efficient technologies alone is expected to reach US\$2.2 trillion in 2020, a tripling of current levels.⁴ Two-fifths of that market are expected to be in emerging and developing economies,⁵ and the companies supplying these markets come from all over the world.

Most of this new activity has been driven by national and sub-national policies. This new global economy has largely been driven by national policy-making, as individual countries have introduced incentives for low-carbon energy supply and energy efficiency and other climate-related policies. Outside the European Union, whose single market policies cover 27 countries together, there has been little attempt to harmonise national policies. In some cases, such as vehicle fuel efficiency standards, independent policy-making has led to a convergence of policy between countries; in others, such as carbon pricing, coordination has proved more elusive.⁶

But there is considerable potential for international cooperation to expand and enhance it. This chapter focuses on five areas in particular:

- A new international legal agreement to provide a foundation of multilateral rules and principles to underpin national climate action.
- International climate finance, including both public- and private-sector investments in mitigation and adaptation.
- Trade agreements to lower tariffs on environmental goods and services, enable faster resolution of trade disputes, and raise standards for low-carbon goods.
- Voluntary collaborations among businesses,

governments and other actors in the global economy to help catalyse action in specific sectors and fields.

- Changes to the international rules and norms which influence the economic behaviour of businesses, financial institutions and governments.

This review is by no means comprehensive; it focuses on areas where international cooperation has the potential to make a significant impact on the prospects for low-carbon and climate-resilient growth. It cross-refers to other chapters of this report which also discuss cooperative actions of various kinds, particularly Chapter 3: Land Use, Chapter 5: Economics of Change, Chapter 6: Finance, and Chapter 7: Innovation.

2. A new international climate agreement

Most of the recommendations presented in this report can be implemented by individual countries – or by the cities, states, regions and businesses within them. Much of what needs to be done to achieve better growth and a better climate is in these actors' economic self-interest even if comparable action is not occurring elsewhere.

Still, an international agreement on climate change is vital, for several reasons.

First, the more action is taken globally, the easier it is to win political support for action at home. Climate change mitigation requires collective action; greenhouse gas molecules have the same effect wherever their origin, and no single country (or small group of countries) can slow the processes of warming alone. Thus, it is easy to resist climate action by asking, "What difference can our contribution make if other countries are not acting?" The greater the collective effort, the easier it is for political and business decision-makers to justify the effort and costs required for actions at home. (This is discussed further in Chapter 5: Economics of Change.)

Second, the wider the international field of low-carbon policies, the less likely they are to affect business competitiveness. When firms face different climate policies in different jurisdictions, there is always a risk that those facing more stringent regulations or higher carbon prices might lose market share, or even seek to move to areas with weaker policies.

Third, an international agreement is needed to strengthen the climate finance flows, technology transfer and capacity-building that developing countries need to implement low-carbon strategies and adapt to climate change. Even where measures are economically beneficial, they are often not affordable, particularly when their upfront costs exceed those of equivalent but higher-carbon investments.

Fourth, as the report has argued, actions and policies with net economic benefits are unlikely to be sufficient to keep the average global temperature increase under 2°C. Other measures will be required whose sole or primary purpose is to combat climate change, such as deployment of carbon capture and storage (CCS) or early retirement of coal power plants. These will be much more feasible in the context of a global agreement to tackle climate change.

A new legal agreement is thus essential to drive the investment and innovation in low-carbon, climate-resilient growth at a sufficient scale to reduce the risk of dangerous climate change. Such an agreement is currently being negotiated under the United Nations Framework Convention on Climate Change (UNFCCC), as a successor, or supplement, to the Kyoto Protocol signed in 1997.⁷ That agreement had been the subject of considerable controversy. The United States refused to ratify it because it did not require binding emission reduction commitments from major developing economies. The US withdrawal, in turn, discouraged stronger action by those countries. The emission reduction targets for the first Kyoto commitment period, which amounted to just a 5.2% reduction by 2012 from 1990 levels, were also clearly inadequate to the growing scale of the climate problem.⁸ The commitments have also proven difficult to enforce, as became evident when Canada, which was not on track to meet its target, withdrew in late 2011 and thus avoided any penalties.⁹

Negotiations to achieve a new international agreement have not been easy. Hopes that a new legally binding agreement might be secured at the UN Climate Change Conference in Copenhagen in 2009 were not fulfilled. The conference ended with only partial agreement, and amid considerable acrimony.¹⁰ The following year, in Cancun, Mexico, a UN agreement was reached, under which countries made pledges to reduce their emissions trajectories and to provide financial support to developing countries, but it was not legally binding.¹¹

This experience has led some commentators, businesses and others to question whether a global legal agreement is either possible or necessary. Some have argued that, since the vast majority of global emissions come from a relatively small group of countries, it might be better to shift international efforts away from the often tortuous negotiations of the UN, where all countries have to agree, to smaller forums of the major emitting countries, such as the G20.¹²

But this analysis underestimates both the importance of a global agreement and the viability of the UNFCCC negotiations. Even if only a few countries are major GHG emitters, the impacts of climate change affect all – particularly some of the smallest and least developed countries, including small island states whose very survival is threatened by sea-level rise.¹³ An agreement reached without these countries at the table would be neither

fair nor legitimate. At the 2011 UN Climate Change Conference in Durban, South Africa, countries laid the groundwork for negotiating a new legal agreement to come into effect in 2020.¹⁴ The agreement is expected to be finalised and approved at the UN Climate Change Conference in Paris in December 2015.

An international agreement cannot force countries to tackle climate change. They will act of their own volition, through domestic political and policy processes. This is recognised in the ongoing negotiations, which have agreed that each country should submit its “intended nationally determined contributions”.¹⁵ What an agreement can provide is the global framework that facilitates stronger action by all countries simultaneously. Only strong and simultaneous action will make it possible to keep global warming under 2°C.

Countries need to feel confident that all are doing their fair share, so it is important that the new agreement be equitable. Climate change embodies a form of injustice: it has been overwhelmingly caused by the historical emissions of the now developed countries,¹⁶ but its impacts will hit some of the poorest, lowest-emitting countries the hardest. A majority of the accumulated greenhouse gases in the atmosphere today were emitted by the developed economies. Yet developing countries’ emissions now exceed those of high-income countries, driven primarily by fast-growing upper-middle-income economies, and their share is increasing.¹⁷ Slowing emissions in developing countries is thus essential to avoiding dangerous climate change. The question is how to do this fairly, as these countries still have significant populations living in poverty, and they rightfully wish to continue developing their economies. Most also have much lower per capita emissions than developed countries.¹⁸

For these reasons the perceived fairness of an international agreement matters. In practice, what this means is that, while both developing and developed countries will have to take serious action, developed countries will have to make earlier and deeper absolute cuts to their own emissions, on a path to near-complete decarbonisation of their economies by mid-century. They will need to provide strong examples of how good policy can drive economic growth and climate risk reduction together; develop and disseminate new technologies; share know-how, including through collaborative ventures; strengthen funding sources and financial institutions to bring down the cost of capital; and provide climate finance to developing countries for adaptation, mitigation and capacity-building.

By providing a core framework of multilateral rules, an international legal agreement on climate change would represent a strong form of global governance. But an even more important goal is economic. The ultimate

purpose of an international agreement should be to drive investment into low-carbon and climate-resilient growth and development.

One of the key observations of this report, as argued in particular in Chapter 5: Economics of Change, is the importance of expectations in determining the level and direction of investment and consumption. Uncertainty weakens both. Yet it is uncertainty which currently characterises low-carbon policy in many countries. Businesses and investors frequently have little confidence that government targets will be met or policies sustained. Weak and inconsistent policies send mixed signals about governments' own commitments, creating "policy risk" which raises the cost of capital. The result is lower investment overall, and the now-familiar strategy of investors hedging their bets between high- and low-carbon assets.

An international agreement cannot in itself give confidence in the policies of specific countries – that comes from the credibility of domestic action. But it could send a powerful overall signal on the future direction of the global economy. A strong agreement in which all countries commit to a low-carbon future could significantly change business and investor expectations about the relative returns on low- and high-carbon investments. It would indicate to the suppliers of low-carbon goods and services that their markets are going to grow, not just in individual countries, but throughout the world. The stronger the agreement's legal form, and the longer-term its commitments, the greater the confidence generated that low-carbon policies are likely to endure, and not be reversed.

For these reasons a strong international agreement has the potential to act as a powerful macroeconomic policy instrument, sending clear signals to businesses and investors about the future low-carbon direction of the global economy.

The 2015 agreement looks likely to combine a set of common rules and norms, internationally agreed, with "intended nationally determined contributions" submitted by each participating country. These contributions will be decided through domestic political and economic policy-making processes, which has the important advantage of grounding the agreement in national realities. But it also carries the evident risk that the contributions will not add up to a collective effort sufficient to put the world on track to meet the agreed 2°C goal. There has therefore been discussion of potential processes to compare intended contributions with one another and against the 2°C goal, to encourage further effort.¹⁹

What are not likely are negotiations which seek to divide up a global GHG budget among the different countries. But if it is recognised, as this report shows, that prosperity and a low-carbon future can go together, climate

negotiations should not be a competition for the right to emit as much as possible. Some countries, especially those with ample fossil fuel resources, will unquestionably find it challenging to make the low-carbon transition. But the incentives should not be to maximise each country's "carbon allowance". Instead, the aim of the new agreement should be to help all countries seize the opportunity to improve their growth prospects and living standards while reducing their dependence on emissions-generating activities.

It is not the Commission's place to recommend the detailed components of a new agreement. From an economic standpoint, however, there are several features which would greatly enhance its ability to send a clear signal to businesses, investors and governments on the future low-carbon character of the global economy.

First, it is important that the agreement establish a clear long-term direction. A good way to do this is to include a long-term goal. Countries have agreed to the goal of keeping global warming below 2°C, but while this is valuable, it is unclear what it means for actual emissions. One idea which has gained some attention recently is that the long-term goal should be to phase out net greenhouse gas emissions altogether.²⁰ ("Net" emissions allows for the fact that increasing the stock of forests and other natural "sinks" and using effective carbon capture technologies could compensate for some level of emissions, and even potentially generate "negative emissions".)

The Intergovernmental Panel on Climate Change (IPCC) shows that for a two-thirds or better chance of holding warming to 2°C, GHG emissions will need to fall to near-zero or below in the second half of the century.²¹ A world of no net emissions (sometimes described as "carbon neutrality") sounds radical today, but within 40–50 years, technological innovation is very likely to make it achievable – even likelier if governments adopt the goal and incentivise its achievement.²² One only needs to compare today's technologies with those of the 1960s and 70s to appreciate this. Adoption of a long-term goal of this kind within an international agreement would send a powerful economic signal about the direction of the future global economy.

Second, the agreement should aim to establish a **predictable and synchronised process of national policy-making**. Under a five-year cycle of international negotiations, for example, countries would set targets for 5–10 years ahead (in 2015 this would be for 2020–2025), with an indicative, revisable target for a further five years. A specific requirement that emissions targets must be progressively tightened would be particularly helpful. The degree of tightening would need to be determined by each country on its five-year cycle, but the principle would ensure clarity of direction. A combination of firm five-year

commitments, plus indicative 10-year targets aiming for the long-term goal, would provide appropriate time frames for action and planning across sectors and governments.

For major economies, the agreement might go further, obliging or encouraging governments to publish long-term economic development and growth strategies outlining how they plan to move in a long-term low-carbon and climate-resilient direction. Such strategies – and the underlying political and policy-making processes – would greatly help businesses, investors and the wider public to understand and debate the possibilities, benefits and costs of the low-carbon transition. Guidance for such strategies could include encouragement of carbon pricing (including the removal of fossil fuel subsidies), along with strategies to shift towards low-carbon energy and low-carbon policies in transport, urban development, agriculture, forests and other sectors.

Third, an agreement should strengthen countries' **incentives and capacities to adapt to climate change** and to reduce their vulnerability. In particular, it could encourage all parties to develop and implement national adaptation plans. These should incorporate action by sub-national governments and municipalities, and set out the requirements on businesses and others to understand and take action to address climate risks. It should incentivise regional collaboration to support adaptation planning, given shared exposure to some climate risks and the benefits of pooling resources for climate change research and information systems. Adaptation plans will benefit from including a diverse set of government agencies, alongside business, academia and civil society, and can provide a vehicle for international financial and technological support.

Fourth, it is important that an agreement establishes **common accounting and reporting rules** on the commitments countries make, and their progress towards achieving them. International confidence in the agreement, and in the national actions which follow it, will be undermined if there is doubt about whether claimed emissions reductions are accurate or credible. Transparency and clear verification processes are therefore vital.

Last, a new international agreement should provide a **framework for increased financial flows** into low-carbon and climate-resilient investment and development. This should include the obligations of the richest countries to provide support to developing countries, and mechanisms designed to facilitate increased flows of private-sector finance. It should also include provisions to enhance the development and dissemination of low-carbon technologies, and those which can improve climate resilience. These are discussed further in the following section.

An international agreement will contain many other provisions; this is by no means a comprehensive description. But an agreement which included these elements would provide a major boost to international economic confidence.

3. Increasing climate finance

In 2012, global investment to support GHG emission reductions, low-carbon development, and climate change adaptation was about US\$359 billion.²³ Three-quarters of these financial flows involved renewable energy projects (particularly solar and wind power), with most of the remainder directed at energy efficiency, transport, agriculture and adaptation activities. Just under half of total investments (US\$177 billion) occurred in developed countries (members of the Organisation for Economic Co-operation and Development), particularly in the EU and US; just over half (US\$182 billion) were in developing countries (non-OECD), particularly in China. Total investment in 2011–12 was around the same as in 2010–11.

Around a quarter (US\$84 billion) of these financial flows in 2012 were international; the rest were in the investor's own country. An estimated US\$39–62 billion (46–73%) of international climate finance flows went to non-OECD countries from sources in OECD countries. Most of this “North–South” financing (US\$35–49 billion, or 80–90%) came from public sources. These included official development assistance (ODA) provided directly by governments, and funding through multilateral development banks, UN agencies, bilateral finance institutions and national development banks.²⁴

Development finance institutions (DFIs) play an increasingly important role in climate finance. These include not only the multilateral development banks (the World Bank and regional development banks), but a range of national development banks, and bilateral and regional financial institutions. Altogether, they committed around a third (US\$121 billion) of all domestic and international climate finance in 2012.²⁵ The ability of DFIs to raise funds of their own on the capital markets gives them additional resources beyond their public capital base. They are able to blend low-cost project debt with market-rate loans (and occasionally also equity and grants), and co-finance projects with the private sector. This makes them particularly suited to investments that may involve some additional risk or unfamiliarity to private investors.

Most national development banks are focused on domestic lending, but increasingly the larger ones, such as the Brazilian Development Bank (BNDES) and the China Development Bank (both considerably bigger than the World Bank), are also financing projects outside their home countries. At the same time, new multilateral banks are being established, such as the Asian Infrastructure

Investment Bank (AIIB) and the New Development Bank set up by the so-called BRICS countries (Brazil, Russia, India, China and South Africa).²⁶

The growth of development institution financing presents considerable opportunities to increase global investment in low-carbon and climate-resilient infrastructure and related projects. Over recent years the “traditional” multilateral development banks have all considerably increased their commitment to climate finance, even adopting quantitative targets for their lending portfolios. Some, including the World Bank, the European Bank for Reconstruction and Development, and the European Investment Bank, have also pledged to limit or cease funding for most coal-fired power generation projects.²⁷ But there are now many more players in this field. If commitments of these kinds were adopted across the wider group of development finance institutions, a considerable increase in global funding could be mobilised.

A major target for this must be financing for developing countries. At the Copenhagen conference in 2009, developed countries made two climate finance pledges: to provide US\$30 billion in “Fast-start Finance” in 2010–2012,²⁸ and to mobilise US\$100 billion per year in public and private finance by 2020. In 2013 they reported that the first goal had been achieved, with US\$35 billion in public climate finance having been provided in 2010–12.²⁹ Some concerns have been raised over how much of this was “new and additional” funding, as agreed in Copenhagen: most of it came under ODA, and therefore from sums which many developing countries felt they were due to receive anyway.³⁰ But in terms of climate-specific funding, it represented a significant increase on prior levels.³¹ The issue now under discussion therefore is how developed countries will meet the second pledge. There is still no consensus on what precisely it means to “mobilise” US\$100 billion, how much should come from public sources, and how different forms of finance should be counted.³²

Given that private-sector investment accounts for over 60% of current global climate finance (in 2011–12, around US\$224 billion), but under 20% of North–South flows,³³ it is widely accepted that a key priority should be to encourage greater private-sector investment in low-income countries. As discussed in Chapter 6: Finance, the problem in general is not lack of global capital; rather it is a lack of low-carbon and climate-resilient development projects which can provide the required risk-adjusted returns to investors. In many countries this is partly due to a shortage of viable projects in the pipeline, partly due to lack of investor confidence in regulatory frameworks and policies, and other related risks.³⁴ For national governments, and the multilateral development banks and international agencies working with them, improving investment conditions while maintaining national determination of policy is therefore often the priority.

A number of countries are now establishing national financing strategies of various kinds to coordinate their low-carbon and climate-resilient development financing needs.³⁵

At the same time, there have been several efforts in recent years to use public finance and policy instruments to mitigate the risks faced by private investors, in order to leverage greater private flows. Such instruments include partial risk, “first loss” and export credit guarantees, policy risk insurance and various kinds of pooled funds.³⁶ The World Bank Group and other multilateral banks have pioneered these, but only a few types of instruments have yet been used to any great extent, and institutional investors in particular have not yet been attracted at scale into the low-carbon and climate-resilient project field.³⁷ Developing instruments and funds which can attract larger flows from these sources needs to be a priority.

The more traditional forms of direct grant funding and concessional lending also remain vital. This is particularly true for adaptation projects in low-income countries, where commercial returns from investments (making them suitable for lending) may not be available. Adaptation expenditure, in areas such as water, land use and resource management, coastal and infrastructure protection, and disaster risk management, accounted for a little under half of all direct government climate finance to developing countries in 2012.³⁸ As this report has argued, the distinction between adaptation and wider development expenditure is increasingly difficult to define, and many investments can meet both low-carbon and resilient development objectives. Nevertheless, it is clear that current funding levels represent only a fraction of total adaptation investment requirements.

There is also considerable scope for direct public finance of low-carbon development projects and other mitigation activities. Increasing attention is being paid to various options for “performance-related” funding, in which finance is tied to specific emissions reduction outcomes. As discussed in Chapter 3: Land Use, the Commission recommends that funding to prevent tropical deforestation and forest degradation is increased to at least US\$5 billion per year from 2015 to 2030, increasingly linked to performance. In some countries, the additional or incremental costs of renewable energy policies such as feed-in tariffs are also now being supported by international climate finance.³⁹ There are considerable opportunities to develop and expand such schemes further.

Public financial flows are also needed for capacity-building, technological cooperation (see Box 1) and various kind of policy support for developing countries pursuing low-carbon and climate-resilient development strategies. Public finance is likely to flow through a range of bilateral and multilateral channels, but significant capitalisation of

Box 1:

Accelerating the diffusion of low-carbon and climate-resilient technologies

Access to new technologies is an important requirement for developing countries seeking to pursue low-carbon and climate-resilient development. A Chatham House analysis suggests that recent diffusion rates of relevant technologies need to be at least doubled if the 2°C goal is to remain within reach.⁴⁶ As discussed in Chapter 7: Innovation, several mechanisms are being pioneered that could enhance technology transfer by making climate-related patents available free or at low cost. These include voluntary patent pools, open source innovation and open licensing arrangements.

For example, an Eco-Patent Commons launched in 2008 by IBM, Nokia, Pitney Bowes, Sony and the World Business Council for Sustainable Development (WBCSD) has already collected 100 environment-related patents pledged by companies to be made available for free use by all.⁴⁷ In June 2014 Tesla Motors Inc. announced that it would open the company's patents for electric cars freely to others. CEO Elon Musk argued that this would speed the adoption of electric cars without damaging Tesla's competitive position, in which its main competitors are gas and diesel-fuelled vehicles.⁴⁸

Experience in other areas, such as medicines for infectious diseases, shows that multilateral financing to cover licensing fees or to buy out patents on key technologies of public interest can be useful if they are well designed. One example in the climate field might be new crop varieties that are more resilient to climate change impacts, for which the intellectual property rights

may constitute a significant part of the costs. But they may not be as relevant for clean energy technologies and their components, many of which are variations on what is already available in the market. In many cases developers have not applied for patent protection for these technologies in developing countries, as there is little commercial benefit from doing so; there are therefore often no patent-related restrictions on their use.⁴⁹ Less than 1% of the world's principal climate mitigation-related technologies have been registered as patents in Africa.⁵⁰

More generally, there is strong evidence that a key factor in enabling greater clean energy technology transfer is having local capacity to successfully adopt the new technologies.⁵¹ Strengthening technical and scientific capacities in developing countries is therefore a critical step toward enhanced technology transfer.

One option might be to establish a platform for public-private collaboration on innovation in access to distributed energy. Governments and others could collaborate to establish a network of regional institutions which would undertake publicly funded research and development in off-grid electricity, household thermal energy, and micro-grid applications. It could also support the incubation of new enterprises to apply the new technologies and develop new business models for distributed energy access.⁵² Such a network could build on the strengths of the Consultative Group on International Agricultural Research (CGIAR) model for key agricultural applications, discussed further in Chapter 3: Land Use.⁵³

the Green Climate Fund established under the auspices of the UNFCCC will be an important signal of confidence in a new international agreement.⁴⁰

There is no doubt that increasing the flows of public finance from developed countries in the current economic conditions will be challenging. It is therefore important to identify new sources of public revenue which can expand the existing funding base. In 2010 the High-Level Advisory Group on Climate Change Financing (AGF) established by the UN Secretary-General identified a series of potential sources of new and additional public finance which could together meet the US\$100 billion per year goal. These included revenues from carbon taxes and emissions trading schemes and from reductions on fossil fuel subsidies, new taxes on the emissions of the aviation and maritime sectors, and an increase in the capital base of the multilateral development banks.⁴¹ A financial transactions tax was also discussed, but was regarded as too difficult to implement without a global agreement.

In addition, the AGF's report noted the potential for increasing revenues under the Clean Development Mechanism (CDM). Established under the Kyoto Protocol,

the CDM allows buyers in developed countries to offset their emissions by purchasing emission reduction credits from projects in developing countries. Since 2004, the CDM has registered more than 7,000 projects in 89 countries and is estimated to have leveraged around US\$315 billion in capital investment in mitigation and sustainable development projects.⁴² But (as also with funds from auctioning emissions trading permits) the revenues from CDM depend on tight emissions reduction targets and a strong carbon price. The demand for offsets declined dramatically in 2013 as the European carbon price fell.⁴³ Still, there is continued interest in market-based approaches, and as part of ongoing UNFCCC negotiations, a new market-based mechanism is being discussed.⁴⁴

None of these new funding sources will be easy to achieve. But there is a strong case to revisit them as part of the process by which developed countries identify a pathway to achieve the US\$100 billion goal by 2020. This should also include a clear and agreed set of accounting methods for climate finance adopted by all donors and recipients.⁴⁵ It is important that these flows, and their additionality over existing funds, are transparent and verifiable.

4. Trade agreements

The international trade in low-carbon goods and services increasingly reflects the globalisation of supply chains, with companies optimising manufacturing costs by taking advantage of the comparative advantage of different locations for producing different inputs or services (see Box 2). This growing interdependence has stimulated a widespread move to reduce import tariffs on such products, in order to boost trade and lower costs. However, it has also led to some bitter disputes between major trading partners.

Although import tariffs on environmental goods are not especially high in many countries relative to those of other product groups, they can rise to 35% in some countries. As the global trade in such goods increases, there would be clear benefit to low-carbon growth if they could be reduced. In 2011 leaders of the Asia-Pacific Economic Cooperation (APEC) countries committed to cut tariffs on a list of more than 50 environmental goods, including wind turbines and solar panels, to 5% or less by 2015.⁵⁵ And in early 2014, 14 countries accounting for 86% of global trade in such goods (including the US, China, the EU, Japan and the Republic of Korea) announced plans to eliminate tariffs on them altogether through the World Trade Organization (WTO).⁵⁶ These are promising intentions.

Yet at the same time, many of the same countries have become embroiled in serious trade disputes over specific low-carbon products in which there is particularly fierce competition for market share. It is estimated that 14% of WTO disputes since 2010 have related to renewable energy, at least in part.⁵⁷ They are of two principal types.

First, separate disputes between the EU and China and the US and China over the price of Chinese solar panels (and in the US case wind power equipment as well) have centred on claims that Chinese manufacturers were effectively subsidising production and therefore “dumping” cheap goods onto export markets in contravention of WTO rules. These, it was claimed, were unfairly undercutting domestically produced products. The Chinese government vigorously denied the allegations. Both the EU and US reacted by imposing “anti-dumping” duties against these goods, leading China to place comparable duties on EU and US exports. Although the EU and China reached an agreement in 2013 (placing a minimum price and a maximum volume on Chinese solar panel imports to the EU), disagreement over compliance remains, and China has made a counter-claim against EU solar-grade polysilicon. The US and China remain in dispute.⁵⁸

Second, a number of trade cases have arisen over subsidies for renewable energy supply such as feed-in tariffs. These include disputes between the EU and

Box 2: Global value chains and clean energy trade: the case of solar power⁵⁴

A striking example of the growing trade in low-carbon goods and services is the solar photovoltaic sector, for which the various components can be produced in multiple countries. The US and China traded more than US\$6.5 billion worth of solar photovoltaic products and services in 2011. According to a study by the Pew Charitable Trusts, finished solar modules account for 95% of the solar products exported by China to the US, in addition to US\$151 million of solar cells. These products reflect China’s relative strengths in mass assembly and high-volume manufacturing.

The US competitive advantage is in producing high-value inputs (such as polysilicon wafers used in photovoltaic cells) and the capital equipment and systems for solar factories. Firms based in the US exported more than US\$3.7 billion worth of solar photovoltaic goods and services to China, while Chinese companies exported US\$2.8 billion worth of products to the US. The globalisation and increasing integration of these supply chains has helped to drive down the costs of renewable energy production, allowing the different components to be produced wherever costs are lowest.

Canada, and between India and the US. The principal issue at stake has been the use of “local content” rules, under which renewable energy subsidies are only available to suppliers using locally sourced equipment. These rules are usually designed to support local industry and employment, but to overseas manufacturers they frequently look like protectionist measures designed to keep imports out.⁵⁹ In a ruling on the EU–Canada case, the WTO declared that local content rules were indeed discriminatory and had to be rescinded. But the feed-in tariffs themselves were not held to be in violation of anti-subsidy rules, since there was no “unregulated” price of energy against which they could be compared.⁶⁰ A more general declaration of the compatibility of renewable energy subsidies with WTO rules would now be of considerable assistance.

These disputes reflect the increasing importance of markets for renewable energy products as low-carbon policy spreads throughout the world, and in some respects they are inevitable as domestic producers compete with those overseas. But they are damaging to the growth of low-carbon policy, raising prices for renewable energy just as it becomes competitive with fossil fuels. It is notable that the installers of solar panels in the US have not supported the countervailing duties against Chinese imports, arguing that higher prices are slowing down the growth of solar power in the US, with a larger overall impact on jobs – as well as emissions – than in domestic

solar manufacturing.⁶¹ The increasing interdependence and complexity of global value chains means that trade restrictions may even backfire, with domestic producers facing higher costs for imported components.⁶²

It would clearly be beneficial to all sides if these disputes were avoided if possible, and resolved more quickly when they occur. One option would be to change WTO rules to prohibit in these cases the use of “trade remedies” such as anti-dumping and countervailing duties, which tend to lengthen disputes, and to establish a more rapid dispute resolution procedure.⁶³ Another would be to use bilateral and regional trade agreements between smaller groups of countries to do this.

Regional trade agreements in fact offer wider potential in this field. As negotiations under the WTO have stalled in recent years, such “plurilateral” agreements have become more common: there are now over 350 in force between various groups of countries.⁶⁴ Most now incorporate an environmental chapter, but this in itself determines very little: it depends whether the provisions of the agreement strengthen or weaken environmental protection across the signatory countries.⁶⁵ But there are clear opportunities in trade agreements currently being negotiated – such as the Transatlantic Trade and Investment Partnership (TTIP) between the US and Europe, the Trans-Pacific Partnership (TPP) in the Asia-Pacific region, and the EU–China Investment Agreement – to strengthen measures which can support low-carbon growth.

Such measures include common energy efficiency standards for appliances and industrial equipment; common technology standards for low-carbon systems, such as electric cars and their associated charging infrastructure; liberalisation of public procurement rules in low-carbon sectors; strengthening the rules governing investment in natural resources such as forests and energy; and liberalisation of trade in services in major sectors such as construction and urban planning. In the context of the development of more connected and compact cities, as proposed in this report, the latter offers considerable potential. Traditionally largely closed to international trade, these sectors now have major opportunities for innovation, such as modular construction techniques and use of information technologies in energy and transport, which could help accelerate the development of lower-carbon production methods and urban design.

5. Voluntary cooperative initiatives

A growing number of international cooperative initiatives have been established in recent years to support and enhance the impact of climate action by national and local governments, businesses and civil society. Most of these initiatives focus on specific sectors and fields such as renewable energy, energy efficiency, transport,

avoided deforestation, agriculture, short-lived climate pollutants⁶⁶ and finance. Some are collaborations between governments; some are collaborations in specific business sectors; most are “multi-stakeholder” in form, bringing together governments, the private sector, civil society and others.⁶⁷ They have different functions. Some are aimed at disseminating best practice and providing technical advice and support to public authorities and businesses wanting to take action in specific areas; others are coalitions of such actors wanting to take more ambitious action than their peers. Box 3 provides some examples.

These voluntary initiatives should not be seen as substitutes for formal multilateral agreements between governments, or national regulatory processes. Their purpose is generally to support governments in implementing nationally determined climate goals and policies. Some may even offer the potential to achieve additional impact through the independent decisions of important actors such as cities and major businesses.

The voluntary nature of these initiatives is both a strength and a weakness. As “coalitions of the willing”, their impact is inevitably limited by the number and scale of the participants they can attract. But because they do not need universal participation, they have considerable scope for ambition and innovation. They can have particular value in fostering learning. Integrating economic goals with climate risk management is not easy; governments, businesses, city authorities and others are all working out how to do it as they go along. In this context, voluntary cooperative initiatives can play a useful role in exchanging best practices and supporting mutual “learning by doing”.

Nevertheless, the diverse (and in some cases overlapping) nature of these initiatives, and in some cases their relatively recent creation, makes it difficult to assess their impact in any systematic way.⁶⁹ For many, an important next step will be to develop quantifiable commitments subjected to standardised and verifiable methods of measurement and reporting. This will help ensure both clarity of impact and public accountability. Building on the UN Secretary-General’s Climate Summit in September 2014,⁷⁰ and using protocols developed by international research institutes, welcome moves are now under way in many of these initiatives to move towards such commitments and methods.⁷¹

One of the most interesting developments in this field has been the establishment of business-led initiatives in certain sectors of the global economy where products are internationally traded and it is therefore almost impossible to achieve strong national regulation of emissions. If complying with such regulations is perceived as costly by the companies that would be regulated, they will almost certainly put up resistance; and since the benefits of such emissions reductions are global, not local (unlike, for example, air or water pollution standards), governments

Box 3:

International cooperative initiatives

International cooperative initiatives which aim to reduce climate risk while promoting economic and business growth come in a variety of forms. Recent surveys have suggested that, depending on what is included within the scope, there are around 100 such initiatives.⁶⁸ The following list provides a flavour of the kinds of initiatives which now exist.

Renewable Energy and Energy Efficiency Partnership (reeep). A non-profit organisation focused on supporting clean energy business models in developing and emerging economies. The Partnership has 400 official member organisations, including businesses, NGOs, industry associations, financial institutions and other civil society entities, as well as 45 national governments. To date, reeep has funded more than 180 clean energy projects in 58 countries. See: <http://www.reeep.org>.

en.lighten. A joint initiative of United Nations Environment Programme (UNEP), OSRAM and Philips Lighting, with the support of the Global Environment Facility (GEF), en.lighten aims to eliminate inefficient lighting by 2030. The initiative estimates that achievement of the goal could cut carbon emissions by 500 million tonnes of CO₂ annually in 2030, and cut electricity bills globally by more than US\$100 billion. See: <http://www.enlighten-initiative.org>.

Partnership for Clean Fuels and Vehicles (PCFV). A partnership of 72 governments, international organisations and industry. It aims to reduce air pollution through the introduction of cleaner fuels and vehicle standards. See: <http://www.unep.org/transport/new/pcfV>.

R20 – Regions of Climate Action. A group of more than 500 sub-national regions that work to promote and implement major GHG emission reduction and other environmental projects. R20 aims to address barriers

that prohibit sub-national governments from developing low-carbon and climate resilient economic development projects. See: <http://www.regions20.org>.

Climate and Clean Air Coalition to Address Short-Lived Climate Pollutants (CCAC). A coalition of around 40 countries and 60 non-state partners aiming to address short-lived pollutants such as black carbon, methane and hydrofluorocarbons (HFCs), which are responsible for a substantial proportion of current global warming. CCAC's aims are to raise awareness, enhance national action by overcoming barriers, promote best practices, and improve scientific research. See: <http://www.unep.org/ccac>.

C40 Climate Cities Leadership Group. A global network of more than 60 large cities committed to sustainable urban development and GHG emission reduction, providing best practices, advice and support. Together C40 cities represent more than 20% of world GDP, and have taken over 8,000 actions to mitigate and/or adapt to climate change since the network's founding in 2005. See: <http://www.c40.org>.

REDD+ Partnership. An intergovernmental partnership of 75 countries to improve the effectiveness of measures to tackle deforestation and forest degradation in developing countries, including the transparency and coordination of REDD+ initiatives and financial instruments. The Partnership facilitates knowledge transfer, capacity enhancement, mitigation actions, and technology development and transfer. See: <http://www.reddpluspartnership.org>.

Low Emissions Development Strategies Global Partnership (LEDS-GP). Launched in early 2011, the partnership brings together more than 120 governmental and international institutions, aiming to strengthen support for low-emissions development in regions and to foster capacity-building. See: <http://en.openei.org/wiki/LEDSP/home>.

may find them hard to justify. Yet if businesses in such sectors cooperate to regulate themselves on a global basis, they can, at least in principle, overcome the competitiveness problem.

The Consumer Goods Forum (CGF), an association of around 400 manufacturers, retailers, service providers and other stakeholders across 70 countries, has established a number of initiatives to reduce GHG emissions from the consumer goods sector on this basis.⁷² One is the Global Protocol on Packaging Sustainability (GPPS). Launched in 2011, it provides a means for consumer goods firms to assess the sustainability of their packaging practices throughout their supply chains.⁷³

A second initiative is the Tropical Forest Alliance 2020 (TFA 2020).⁷⁴ As described in Chapter 3: Land Use, TFA

2020 is a partnership of businesses, governments and non-governmental organisations (NGOs) committed to reducing the deforestation in Southeast Asia, Latin America and Africa which is driven by production of four major global commodities: palm oil, soy, beef, and paper and pulp. It includes many of the major global companies that trade these products, manufacture consumer goods and foodstuffs containing them, and sell them in supermarkets.

The participating companies undertake to remove products deriving from deforested areas from their supply chains by 2015–2020. TFA 2020 works with national and state governments to introduce appropriate regulatory and enforcement policies and support for local producers. A group of banks brought together by the Banking

Environment Initiative have also committed to work with companies and their supply chains to develop appropriate financing solutions for sustainably produced commodities.⁷⁵

In the case of palm oil, companies participating in the initiative have 15% of the total consumer market by volume, and well over 50% of the global trade in the commodity. Analysis suggests that such significant participation rates might be sufficient to tip the entire global market towards sustainable palm oil, since it is highly inefficient to separate out differently sourced kinds of bulk-traded commodities.⁷⁶

It is too early to say whether this will happen. But the potential to transform the environmental and climate impact of these major agricultural and forest commodities is clearly significant. Between them, the four commodities targeted by TFA 2020 are estimated to be responsible for around 40% of global deforestation. So if by 2020, the Alliance's target of ending deforestation throughout the supply chains for these products could be achieved, that would represent a reduction of up to 6% of total global GHG emissions.⁷⁷

Why would companies collaborate in this way? There are a number of reasons. Fierce campaigning by NGOs such as Greenpeace has provided a powerful motivation.⁷⁸ For companies with well-known brands, adverse publicity for their role in causing deforestation provides a strong market incentive to adopt more sustainable policies. Many companies increasingly acknowledge a social and ethical responsibility to reduce their environmental impact. Many have also found that the costs of doing so have not been very large relative to the companies' size and profitability. Indeed, high environmental standards demanded by retailers and consumers tend to support the market position of large multinational companies, requiring local firms in regional markets to meet the same standards despite otherwise lower costs.

There is clearly potential for business-led initiatives of these kinds in other sectors where products are globally traded and national regulation is therefore particularly difficult or unlikely. (The desirability of common carbon regulation is also discussed in Chapter 5: Economics of Change, with the possibility of border tariffs to adjust for differential carbon regulation.) Examples of such sectors, with high emissions and relatively small numbers of large companies, include oil and gas, iron and steel, and cement.

Such cooperation need not be confined to individual sectors. Although in recent years many businesses have begun to identify and invest in measures to improve their energy efficiency, there is still huge scope for further energy and resource productivity improvement in industry throughout the world.⁷⁹ There is clearly the potential for a new initiative in this field to take up this challenge, led by existing business organisations such as the World

Business Council on Sustainable Development (WBCSD). The WBCSD's Action2020 initiative, which has developed roadmaps for a variety of key fields of business action on sustainable development, provides a valuable template.⁸⁰

6. Changing the rules and norms of the global economy

Cooperative initiatives provide valuable ways to make progress in specific sectors and fields of activity, but they are not enough. To achieve a broad, long-term transition to low-carbon growth and development, a deeper shift is needed. All major economic actors – national governments, sub-national and city authorities, companies and financial institutions in both the private and public sector – will need to integrate climate risk management into their core economic and business strategies.

Each can act individually, but many more will do so if it is demanded by the “rules of the game” under which they operate. In a global economy, these rules are increasingly determined at an international level.

Business reporting provides an important example. In recent years, more than 4,000 global companies have been reporting their greenhouse gas emissions at the behest of their major investors. CDP (formerly the Carbon Disclosure Project) operates on behalf of more than 750 institutional investors, publishing annual reports on corporate emissions using data collected under a standardised methodology, the Greenhouse Gas Protocol. By publicly scoring companies' performance, CDP aims to strengthen their emissions reductions programmes.⁸¹

But these reports are not part of these businesses' mainstream financial reports, and are not treated in the same way by the companies or by their shareholders. The same is true of the reports that many companies produce today on their wider environmental and social impacts, which have no common reporting framework and which vary widely in scope and depth. Financial reports – which are legally required – are standardised around the key indicators that measure business performance. They allow shareholders to benchmark individual companies against one another and to assess the financial risks they face. Climate risk – the extent to which business assets, activities and future profits are made vulnerable by climate change and climate change policy – now needs to be understood as a significant additional risk factor facing most major businesses. It therefore needs to form part of their standard reporting processes, giving managements and shareholders the information and analysis required to address it properly. The same is true of companies' exposure to natural disasters.⁸² There is therefore a strong case for business reporting on each of these wider issues – GHG emissions, climate risk, and environmental and social impacts – to be integrated with financial reports and standardised.⁸³

That is beginning to happen. The Carbon Standards Disclosure Board, a consortium of business, investor and environmental organisations, has published a Climate Change Reporting Framework which enables businesses to report on their climate impacts in a systematic way linked to information about their financial performance.⁸⁴ At the same time the concept of “integrated reporting” has gained momentum under the auspices of a global business and investor partnership, the International Integrated Reporting Committee. Results from the partnership’s pilot study suggest that integrated reporting leads to higher-quality data collection and provides management with a better understanding of how the business creates value over time.⁸⁵ This is consistent with the results achieved by existing forms of social and environmental reporting. Companies required to report on these issues consistently perform better in areas such as energy and water consumption and waste (which, in turn, almost always leads to lower costs) than those not facing mandatory reporting.⁸⁶ This should not be surprising. The rules under which companies operate affect their behaviour. Integrating the reporting of climate and other environmental and social risks into financial reports will almost certainly motivate company boards to pay closer attention to these issues and to give higher priority to their management.

There are two routes through which integrated reporting could become the new internationally agreed norm. One is through investor demand. As they have already done with emissions reporting, major shareholders could require companies to report financial and non-financial information together, with climate risk a standard feature. A second route is through national stock exchanges. The Johannesburg Stock Exchange has already pioneered this, introducing listing rules in 2010 which include the requirement to publish an integrated report.⁸⁷ The Brazilian Stock Exchange has announced that it will encourage businesses to produce an integrated report on a “report or explain” basis.⁸⁸ There is clearly significant scope for other stock exchanges to follow suit. Cooperation between stock exchanges in different countries and global investors would enable momentum to be accelerated towards mandatory and standardised integrated reporting.

Moreover, if investors require stronger climate risk management and reporting of the companies they own, they also need to apply it to themselves. As discussed in Chapter 6: Finance, investors’ asset portfolios are subject to climate risk in different forms – both the risks resulting from climate change itself, and the risks of devaluation or “stranding” arising from changes in climate policy and fossil fuel prices. In the last few years a number of investors have begun to recognise this and conduct more systematic and integrated assessments of their portfolios. A few have also examined how far they are, and should be, investing in lower-carbon sectors.⁸⁹

But though sector leaders can set precedents for change, individual investors do not determine the behaviour of the sector as a whole. That arises from the rules and norms which apply to all. The UN Principles for Responsible Investment, which seek to drive greater consideration of economic, social and governance factors in investment decision-making and ownership practices, have provided some impetus for this. Signatories now include 1,200 investors with US\$45 trillion in assets, around half the global institutional total.⁹⁰ Smaller associations of institutional investors are also seeking to drive change.⁹¹ But this could be considerably accelerated through collaboration among stock exchanges and financial regulators in major economies. By requiring investors to conduct climate (and wider environmental) risk assessments of their portfolios as part of their recognised fiduciary duty, stock exchanges and financial regulators could drive significant behaviour change throughout the global economy.⁹²

A comparable shift in rules and norms is needed in government accounting systems. As discussed in Chapter 5: Economics of Change, some governments and international institutions are now experimenting with forms of measurement of national economic activity which more strongly reflect environmental conditions. These include adjustments to GDP to account for the depreciation of natural capital, the introduction of “natural capital accounts”, and the establishment of alternative indicator sets of national progress.⁹³ Again, it will be at the international level that such practices will become established as the global norm. The adoption by the UN Statistical Committee of a “central framework” for a System of Environmental-Economic Accounting is a start, but there is considerable way to go before such measurements become a routine part of governments’ mainstream economic performance measurement.⁹⁴

International institutions can play a particularly helpful role here. Over the last few years a number of major international economic organisations have begun to integrate climate and environmental risk management into their core economic analyses, policy advice and operations. These include the OECD, the World Bank, the major regional multilateral development banks, and UN agencies such as the United Nations Development Programme (UNDP) and the Food and Agriculture Organization (FAO). Most would acknowledge that more integration is still needed to cover all areas of their work, with sufficient priority given to climate risk among other growth challenges. The multilateral development banks in particular are under some pressure to reconcile the demands they face to finance high-carbon infrastructure with their own analysis of the benefits, both national and global, of lower-carbon pathways. Attention is also now focusing on how finance provided by export credit agencies can be shifted to support efforts to tackle climate change.⁹⁵

In other cases there is potential to do much more. The International Monetary Fund (IMF), for example, has acknowledged that climate change is a long-term risk to growth in its overall analysis of the global economy, and has contributed valuable research and policy advice on key aspects of fiscal policy, including fossil fuel subsidy reform.⁹⁶ But climate risk is not a routine element in its country advice or its influential economic analyses, such as the annual World Economic Outlook. There is now considerable scope for the IMF, along with other major international organisations concerned with the management of the global economy, such as the OECD and the multilateral development banks, to reflect climate risk assessment and reduction in their national economic surveillance processes and assessments.

It is particularly noticeable how small a role climate risk has played in many of the major international and regional forums where countries gather to discuss international economic cooperation and coordination.⁹⁷ The G20 group of nations, for example, has developed a strong interest in long-term and infrastructure investment as a key driver of growth. Yet it has not integrated this either with concern about climate risks to investment or the potential for low-carbon infrastructure. At some of its high-level meetings the G20 has acknowledged the potential for “green growth” strategies to combine economic development with climate risk reduction, and in 2009 agreed to the phasing out of inefficient fossil fuel subsidies.⁹⁸ But its attention has been sporadic at best, and on some occasions it has deliberately sought to avoid discussing climate issues. This is no longer a tenable position. Economic growth and climate risk are intertwined; institutions and forums charged with fostering economic cooperation – particularly those involving the countries with the highest emissions and emissions growth – should be engaging deeply with the challenges discussed in this report.

7. Recommendations

In light of this analysis, the Global Commission recommends that:

- **All countries should seek to achieve an equitable, ambitious and durable international legal agreement on climate change at the UN conference in Paris in 2015**, with a view to sending a clear policy signal to businesses and investors about the future low-carbon direction of the global economy. Such an agreement should include a long-term goal to reduce annual GHG emissions to near zero or below, should establish a coordinated five-yearly policy-making cycle with a clear downward trajectory underpinned by long-term economic strategies, and should support developing countries to move towards lower-carbon and climate-resilient development paths.
- **Developed countries should increase financial support for developing countries’ efforts to tackle climate change**, drawing up a clear pathway to meet the goal to mobilise US\$100 billion per year in public and private finance by 2020, and exploring new and innovative sources of revenue. Multilateral and national development banks, including the new banks created by emerging economies, should increase their lending for low-carbon and climate-resilient infrastructure, both in direct lending and to leverage much greater flows of private investment.
- **Governments should negotiate the elimination, where possible, of import tariffs on low-carbon goods and services, and agree more rapid resolution processes for trade disputes in low-carbon sectors.** They should strengthen the environment-related elements of Regional Trade Agreements.
- **Major international businesses in globally traded sectors with high emissions, such as food and forest commodities, HFCs, oil and gas, steel and cement, should seek to establish and strengthen cooperative initiatives to reduce their GHG emissions.**
- **Institutional investors and stock exchanges should establish a timetable to move towards mandatory integrated corporate reporting of financial and non-financial performance and risks on a standardised model.** They should require institutional and other major investors to undertake mandatory climate risk assessments.
- **All global economic institutions and forums should integrate climate risk into their economic growth and development strategies and discussions.** The G20 should make climate risk assessment and reduction a standing agenda item in its meetings. Major international organisations concerned with the management of the global economy, such as the IMF, the OECD and the multilateral development banks, should reflect climate risk assessment and reduction in their surveillance processes and policy assessments as relevant to their mandates.

Endnotes

- 1 United Nations Conference on Trade and Development (UNCTAD), 2013. UNCTAD Handbook of Statistics 2013. United Nations, New York and Geneva. Available at: http://unctad.org/en/PublicationsLibrary/tdstat38_en.pdf.
- 2 Peters, G.P. and Hertwich, E.G., 2008. CO₂ embodied in international trade with implications for global climate policy. *Environmental Science & Technology*, 42(5). 1401–1407. DOI:10.1021/es072023k.
- 3 The OECD and Eurostat have defined the sector thus: "The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems. This includes cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use."
See: OECD and Eurostat, 1999. *The Environmental Goods and Services Industry: Manual for Data Collection and Analysis*. Organisation for Economic Co-operation and Development, Paris, and Statistical Office of the European Communities, Brussels.
Available at: <http://dx.doi.org/10.1787/9789264173651-en>.
- Data cited are from: Office of the United States Trade Representative (USTR), 2014. *WTO Environmental Goods Agreement: Promoting Made-in-America Clean Technology Exports, Green Growth and Jobs*. Fact sheet, July 2014.
Available at: <http://www.ustr.gov/about-us/press-office/fact-sheets/2014/July/WTO-EGA-Promoting-Made-in-America-Clean-Technology-Exports-Green-Growth-Jobs>.
- Total global trade was estimated at US\$18 trillion in 2012. See: UNCTAD, 2013. UNCTAD Handbook of Statistics 2013.
- 4 United Nations Environment Programme (UNEP), 2013. *Green Economy and Trade – Trends, Challenges and Opportunities*. Available at: <http://www.unep.org/greeneconomy/GreenEconomyandTrade>.
- 5 Carbon Trust and Shell, 2013. A "MUST" Win: Capitalising on New Global Low Carbon Markets to Boost UK Export Growth. Available at: <http://www.carbontrust.com/resources/reports/advice/a-must-win-capitalising-on-new-global-low-carbon-markets-to-boost-uk-export-growth>.
The estimate uses the International Monetary Fund classification of emerging and developing economies: <http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/weoselgr.aspx>.
- 6 An, F., Gordon, D., He, H., Kodjak, D. and Rutherford, D., 2007. *Passenger Vehicle Greenhouse Gas and Fuel Economy Standards: A Global Update*. The International Council on Clean Transportation. Available at: <http://theicct.org/passenger-vehicle-greenhouse-gas-and-fuel-economy-standards>.
Tuerk, A., Mehling, M., Flachsland, C. and Sterk, W., 2009. Linking carbon markets: concepts, case studies and pathways. *Climate Policy*, 9(4). 341–357. DOI:10.3763/cpol.2009.0621.
- 7 See: http://unfccc.int/kyoto_protocol/items/2830.php.
- 8 See Victor, D.G., 2004. *The Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming*. Council on Foreign Relations and Princeton University Press, Princeton, NJ, US. Available at: <http://press.princeton.edu/titles/7029.html>.
See also: Barrett, S., 1998. Political economy of the Kyoto Protocol. *Oxford Review of Economic Policy*, 14(4). 20–39. DOI:10.1093/oxrep/14.4.20.
- 9 Hovi, J., Skodvin, T. and Aakre, S., 2013. Can Climate Change Negotiations Succeed? *Politics and Governance*, 1. 138–150. DOI:10.12924/pag2013.01020138.
See also: Jull, O., 2012. Canada withdraws from Kyoto Protocol to avoid non-compliance penalties. *Canadian Bar Association newsletter*. Available at: http://www.cba.org/cba/newsletters-sections/pdf/2012-04-international_jull.pdf.
- 10 Vidal, J., Stratton, A. and Goldenberg, S., 2009. Low targets, goals dropped: Copenhagen ends in failure. *The Guardian*, 19 December. Available at: <http://www.theguardian.com/environment/2009/dec/18/copenhagen-deal>.
See also: Jacobs, M., 2010. Copenhagen was not a (complete) failure. *Huffington Post*, 9 September 2010. Available at: http://www.huffingtonpost.com/michael-jacobs/copenhagen-was-not-a-comp_b_780831.html.
- 11 See: http://unfccc.int/meetings/cancun_nov_2010/items/6005.php.
- 12 See, for example, Falkner, R., Stephan, H. and Vogler, J., 2010. International climate policy after Copenhagen: Towards a "building blocks" approach. *Global Policy*, 1(3). 252–262. DOI:10.1111/j.1758-5899.2010.00045.x.
- Council of Foreign Relations, 2013. *The Global Climate Change Regime*. Available at: <http://www.cfr.org/climate-change/global-climate-change-regime/p21831>.
- 13 IPCC, 2014. Summary for Policymakers. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects*. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastandrea et al. (eds.). Cambridge University Press, Cambridge, UK, and New York. 1–32. Available at: <https://www.ipcc.ch/report/ar5/wg2/>.
- 14 For a summary of the Durban Platform for Enhanced Action and supporting documents, see: http://unfccc.int/key_steps/durban_outcomes/items/6825.php.
- 15 The "intended nationally determined contributions" process was laid out in the outcome documents of the UN Climate Change Conference in Warsaw in November 2013; see: http://unfccc.int/key_steps/warsaw_outcomes/items/8006.php.
See also: Höhne, N., Ellermann, C. and Li, L., 2014. *Intended Nationally Determined Contributions under the UNFCCC*. Discussion paper. Ecofys, Cologne, Germany. Available at: <http://www.ecofys.com/files/files/ecofys-giz-2014-intended-nationally-determined-contributions-under-unfccc.pdf>.
- 16 The Intergovernmental Panel on Climate Change (IPCC) warns that historical GHG data are quite uncertain, especially for the more distant past (e.g. the 18th and 19th centuries). The allocation of historical responsibility also changes based on the starting point chosen (1750, 1850 or as late as 1990), the gases considered (CO₂ or all GHGs) and whether emissions from land use, land use change and forestry (LULUCF) are included. Citing den Elzen et

al., 2013 (see below), the IPCC notes that, for example, developed countries' share of historical emissions is almost 80% when non-CO₂ GHGs, LULUCF emissions and recent emissions are excluded, or about 47% when they are included. Citing Höhne et al., 2011 (see below), the IPCC adds: "As a general rule, because emissions of long-lived gases are rising, while emissions of the distant past are highly uncertain, their influence is overshadowed by the dominance of the much higher emissions of recent decades."

See: Victor, D. and Zhou, D., 2014, Chapter 1: Introductory Chapter. In *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner et al. (eds.). Cambridge University Press, Cambridge, UK, and New York. Available at: <http://www.mitigation2014.org>.

Also: den Elzen, M. G. J., Olivier, J. G. J., Höhne, N. and Janssens-Maenhout, G., 2013. Countries' contributions to climate change: effect of accounting for all greenhouse gases, recent trends, basic needs and technological progress. *Climatic Change*, 121(2). 397–412. DOI:10.1007/s10584-013-0865-6.

Höhne, N., Blum, H., Fuglestvedt, J., Skeie, R. B., Kurosawa, A., et al., 2011. Contributions of individual countries' emissions to climate change and their uncertainty. *Climatic Change*, 106(3). 359–391. DOI:10.1007/s10584-010-9930-6.

17 As of 2010, low- to upper-middle-income countries (as defined by the World Bank) accounted for 61% of global GHG emissions (29.6 Gt of 48.3 Gt). See: Victor and Zhou, 2014. Chapter 1: Introductory Chapter, Figures 1.4 and 1.6.

18 See Victor and Zhou, 2014. Chapter 1: Introductory Chapter.

See also: Winkler, H., Jayaraman, T., Pan, J., de Oliveira, A.S., Zhang, Y., Sant, G., Miguez, G., Letete, T., Marquard, A., and Raubenheimer, S., 2011. *Equitable Access to Sustainable Development: Contribution to the Body of Scientific Knowledge. A paper by experts from BASIC countries*. BASIC Expert Group, Beijing, Brasilia, Cape Town and Mumbai. Available at: http://www.erc.uct.ac.za/Basic_Experts_Paper.pdf.

19 See Höhne et al., 2014. *Intended Nationally Determined Contributions under the UNFCCC*.

20 "Net emissions" takes into account the possibility of storing and sequestering some emissions. See: Haites, E., Yamin, F. and Höhne, N., 2013. *Possible Elements of a 2015 Legal Agreement on Climate Change*, Working Paper N°16/13. IDDRI, Paris. Available at: <http://www.iddri.org/Publications/Possible-Elements-of-a-2015-Legal-Agreement-on-Climate-Change>.

21 IPCC, 2014. *Summary for Policymakers*. In *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, et al. (eds.). Cambridge University Press, Cambridge, UK, and New York. Available at: <http://www.mitigation2014.org>.

22 Höhne, N., van Breevoort, P., Deng, Y., Larkin, J. and Hänsel, G., 2013. *Feasibility of GHG Emissions Phase-out by Mid-century*. Ecofys, Cologne. Available at: <http://www.ecofys.com/files/files/ecofys-2013-feasibility-ghg-phase-out-2050.pdf>.

23 Buchner, B., Herve-Mignucci, M., Trabacchi, C., Wilkinson, J., Stadelmann, M., Boyd, R., Mazza, F., Falconer, A. and Micale, V., 2013. *The Landscape of Climate Finance 2013*. Climate Policy Initiative, San Francisco, CA, US. Available at: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2013/>.

"Climate finance" includes public- and private-sector capital investments, costs and grants targeting low-carbon and climate-resilient development, with direct or indirect greenhouse gas mitigation or adaptation objectives and outcomes. The data relate to 2011–12.

24 Buchner et al., 2013. *The Landscape of Climate Finance 2013*.

25 Buchner et al., 2013. *The Landscape of Climate Finance 2013*.

26 For BNDES, see: http://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/. For the China Development Bank, see: <http://www.cdb.com.cn/english/>. For discussions of the Asian Investment Bank and the New Development Bank, see: Tortajada, C. and Biswas, A., 2014. *Asian investment bank: Realigning the status quo*. The Straits Times, 2 September.

Available at: <http://www.straitstimes.com/news/opinion/more-opinion-stories/story/asian-investment-bank-realigning-the-status-quo-20140902>.

Chen, D., 2014. *3 Reasons the BRICS' New Development Bank Matters*. The Diplomat, 23 July.

Available at: <http://thediplomat.com/2014/07/3-reasons-the-brics-new-development-bank-matters/>.

27 African Development Bank Group, Asian Development Bank, European Bank for Reconstruction and Development, European Investment Bank, Inter-American Development Bank, International Finance Corporation and the World Bank, 2013. *Joint Report on MDB Climate Finance 2012*. Available at: http://www.worldbank.org/content/dam/Worldbank/document/SDN/Joint_MDB_Report_Climate_Finance_2012.pdf.

The World Bank, 2013. *World Bank sets direction for energy sector investments*. 16 July.

Available at: <http://www.worldbank.org/en/news/feature/2013/07/16/world-bank-group-direction-for-energy-sector>.

European Bank for Reconstruction and Development, 2013. *The EBRD's Energy Strategy and the Switch from Coal*. Last updated 10 December. Available at: <http://www.ebrd.com/pages/sector/powerenergy/the-switch-from-coal.shtml>.

See also: Utility Week, 2013. *European Investment Bank commits to phasing out coal power investment*. 24 July.

Available at: <http://www.utilityweek.co.uk/news/european-investment-bank-commits-to-phasing-out-coal-power-investment/905202#VAjtLldU1w>.

28 For an overview of Fast-start Finance, see: https://unfccc.int/cooperation_support/financial_mechanism/fast_start_finance/items/5646.php.

29 For a review of Fast-start Finance, see: Fransen, T., Nakhooda, S., Kuramochi, T., Caravani, A., Prizzon, A., Shimizu, N., Tilley, H., Hilimanjaya, A. and Welham, B., 2013. *Mobilising International Climate Finance: Lessons from the Fast-Start Finance Period*. World Resources Institute, Washington, DC. Available at: <http://www.wri.org/publication/mobilising-international-climate-finance>.

30 For a discussion of the implications of channelling climate finance via ODA, see: Kehler Siebert, C., 2013. *Footing the Bill: What is Sweden's "Fair Share" of Global Climate Finance?* Report prepared by the Stockholm Environment Institute, Stockholm, for the Church of Sweden. Available at: <http://www.sei-international.org/publications?pid=2338>.

31 Fransen et al., 2013. *Mobilising International Climate Finance: Lessons from the Fast-Start Finance Period*.

See also: Cipler, D., Fields, S., Madden, K., Khan, M. and Roberts, T., 2012. *The Eight Unmet Promises of Fast-Start Climate Finance*. IIED Briefing Paper 17141IIED. International Institute for Environment and Development, London. Available at: <http://pubs.iied.org/17141IIED.html>.

32 This is discussed in: United Nations, 2010. *Report of the Secretary-General's High-level Advisory Group on Climate Change Financing*. New York.

Available at: http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGF_reports/AGF%20Report.pdf.

33 Buchner et al., 2013. The Landscape of Climate Finance 2013.

34 See the Climate Policy Initiative's 2013 "Risk Gaps" project: <http://climatepolicyinitiative.org/publication/risk-gaps/>.

35 Naidoo, C., Amin, A.-L., Dimsdale, T. and Jaramillo, M., 2014. Strategic National Approaches to Climate Finance. E3G, London. Available at: <http://www.e3g.org/news/media-room/strategic-national-approaches-to-climate-finance>.

36 Hascic, I., Rodríguez, M., Jachnik, R., Silva, J. and Johnstone, N., 2014 (forthcoming). Public Interventions and Private Finance Flows: Empirical Evidence from Renewable Energy Financing. Organisation for Economic Co-operation and Development Environment Working Papers. OECD Publishing, Paris. See also Chapter 6: Finance.

37 Buchner et al., 2013. The Landscape of Climate Finance 2013.

38 Buchner et al., 2013. The Landscape of Climate Finance 2013.

39 Nganga, J., Wohlert, M., Woods, M., Becker-Birck, C., Jackson, S. and Rickerson, W., 2012. Powering Africa through Feed-in Tariff Policies, Advancing renewable energy to meet the continent's electricity needs. World Future Council, Heinrich Böll Foundation and Friends of the Earth England, Wales & Northern Ireland. Available at: http://www.foe.co.uk/sites/default/files/downloads/powering_africa_summary.pdf.

40 For more information about the Green Climate Fund, see: http://unfccc.int/cooperation_and_support/financial_mechanism/green_climate_fund/items/5869.php.

41 United Nations, 2010. Report of the Secretary-General's High-level Advisory Group on Climate Change Financing.

42 CDM Executive Board, 2013. Clean Development Mechanism: Executive Board Annual Report 2013. United Nations Framework Convention on Climate Change, Bonn, Germany. Available at http://unfccc.int/resource/docs/publications/pub_cdm_eb_annualreport_2013.pdf.

43 CDM Executive Board, 2013. Clean Development Mechanism: Executive Board Annual Report 2013.

44 See: https://unfccc.int/cooperation_support/market_and_non-market_mechanisms/items/7710.php.

For a summary of the discussions around the "new market-based mechanism" and its prospects for contributing to GHG emission reduction, see: Lazarus, M., Schneider, L. and Kollmuss, A., 2013. Potential for International Offsets to Provide a Net Decrease of GHG Emissions. SEI Policy Brief. Stockholm Environment Institute, Seattle, WA, US. Available at: <http://www.sei-international.org/publications?pid=2428>.

45 United Nations, 2010. Report of the Secretary-General's High-level Advisory Group on Climate Change Financing.

For a wider discussion on how climate finance can be made more effective, see: Chaum, M., Faris, C., Wagner, G., Buchner, B., Falconer, A., Trabacchi, C., Brown, J. and Sierra, K., 2011. Improving the Effectiveness of Climate Finance: Key Lessons. Environmental Defense Fund, Climate Policy Initiative, Overseas Development Institute and Brookings.

Available at: <http://climatepolicyinitiative.org/wp-content/uploads/2011/12/Improving-Effectiveness-of-Climate-Finance.pdf>.

See also: Atteridge, A., 2012. Monitoring, Reporting and Verifying Climate Finance: A Framework for Transparency of Support Provided to Developing Countries. SEI Policy Brief. Stockholm Environment Institute, Stockholm.

Available at: <http://www.sei-international.org/publications?pid=2195>.

46 Lee, B., Iliev, I. and Preston F., 2009. Who Owns Our Low Carbon Future? Intellectual Property and Energy Technologies. Chatham House, London. Available at: http://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Energy,%20Environment%20and%20Development/r0909_lowcarbonfuture.pdf.

47 World Business Council for Sustainable Development, n.d. Eco-Patent Commons.

Available at: <http://www.wbcd.org/work-program/capacity-building/eco-patent-commons.aspx>. [Accessed 3 September 2014.]

48 Musk, E., 2014. All our patent are belong to you. Tesla Blog, 12 June. Available at: <http://www.teslamotors.com/blog/all-our-patent-are-belong-you>.

49 Haverkamp, J., 2009. Testimony submitted on 29 July at the hearing "Climate for Innovation: Technology and Intellectual Property in Global Climate Solutions", held by the US House of Representatives Select Committee on Energy Independence and Global Warming. Available at: <http://www.gpo.gov/fdsys/pkg/CHRG-111hrg62451/html/CHRG-111hrg62451.htm>.

50 Hascic, I., Silva, J. and Johnstone, N., 2012. Climate Mitigation and Adaptation in Africa: Evidence from Patent Data. Organisation for Economic Cooperation and Development Environment Working Papers, No. 50. OECD Publishing, Paris. Available at: <http://dx.doi.org/10.1787/5k8zng5smxjg-en>.

51 Hascic, I. and Johnstone, N., 2011. CDM and international technology transfer: empirical evidence on wind power. Climate Policy, 11(6). 1303-1314. DOI:10.1080/14693062.2011.579311.

52 Granoff, I., 2014 (forthcoming). What Can Crop Scientists and Venture Capitalists Teach us about Delivering Energy Access? Overseas Development Institute, London.

53 See: <http://www.cgjar.org>.

54 This box is based on: The Pew Charitable Trusts, 2013. Advantage America: The U.S.-China Clean Energy Trade Relationship in 2011. Philadelphia, PA, US.

Available at: <http://www.pewtrusts.org/en/research-and-analysis/reports/2013/03/06/advantage-america-the-uschina-clean-energy-technology-trade-relationship-in-2011>.

55 International Center for Trade and Sustainable Development (ICTSD), 2014. APEC talks "green goods," trade remedies in background. BIORES, 22 August.

Available at: <http://www.ictsd.org/bridges-news/biores/news/apec-talks-%E2%80%9Cgreen-goods%E2%80%9D-trade-remedies-in-background>.

56 The White House, 2014. Promoting Green Goods Trade to Address Climate Change. The White House Blog, 24 January.

Available at: <http://www.whitehouse.gov/blog/2014/01/24/promoting-green-goods-trade-address-climate-change>.

- 57 Ghosh, A. and Esserman, E., 2014. India-US Cooperation on Renewable Energy and Trade, India-US Track II Dialogue on Climate Change and Energy. Available at: <http://www.aspeninstitute.org/sites/default/files/content/docs/ee/IndiaUSCooperationRenewableEnergyTrade-ArunabhaGhoshSusanEsserman%5BIndiaUSTradeRenewableEnergy%5D.pdf>.
- 58 International Center for Trade and Sustainable Development (ICTSD), 2014. US confirms new import duties on Chinese solar products. BIoRES, 4 June. Available at: <http://www.ictsd.org/bridges-news/biores/news/us-confirms-new-import-duties-on-chinese-solar-products>.
Reuters, 2014. China condemns US anti-dumping duties on solar imports. 28 July. Available at: <http://uk.reuters.com/article/2014/07/28/uk-china-usa-solar-idUKKBN0FX09D20140728>.
International Center for Trade and Sustainable Development (ICTSD), 2014. China moves forward with duties on EU polysilicon. BIoRES, 22 May. Available at: <http://www.ictsd.org/bridges-news/biores/news/china-moves-forward-with-duties-on-eu-polysilicon>.
- 59 Meyer, T., 2013. Energy subsidies and the World Trade Organization. *Insights*, 17(22). American Society of International Law. Available at: <http://www.asil.org/insights/volume/17/issue/22/energy-subsidies-and-world-trade-organization>.
- 60 Jha, V., 2014. Keeping up with the changing climate: The WTO's evolutive approach in response to the trade and climate conundrum. *The Journal of World Investment & Trade*, 115(1-2). 245-271. DOI:10.1163/22129000-01502007.
- 61 International Center for Trade and Sustainable Development (ICTSD), 2014. US Commerce Dept confirms preliminary duties on China, Taiwan solar products. BIoRES, 4 August. Available at: <http://www.ictsd.org/bridges-news/biores/news/us-commerce-dept-confirms-preliminary-duties-on-china-taiwan-solar-products>.
- 62 Sugathen, M., 2013. The E15 Initiative, Strengthening the Multilateral Trading. International Center for Trade and Sustainable Development. Clean Energy and Trade System Group; Proposals and Analysis. Available at: <http://www.ictsd.org/downloads/2014/01/e15-clean-energy-compilation.pdf>.
- 63 Horlick, G.N., 2013. Solar Energy Wars and Peace. International Center for Trade and Sustainable Development, Clean Energy and Trade System Group; Proposals and Analysis. Available at: <http://www.ictsd.org/themes/global-economic-governance/research/solar-energy-wars-and-peace>.
- 64 World Trade Organization, n.d. Regional Trade Agreements. Available at: www.wto.org/english/tratop_e/region_e/region_e.htm. [Accessed 3 September 2014.]
- 65 Gallagher, P. and Serret, Y., 2011. Implementing Regional Trade Agreements with Environmental Provisions: A Framework for Evaluation. Trade and Environment Working Papers. Organisation for Economic Cooperation and Development (OECD). Available at: <http://dx.doi.org/10.1787/5kg3n2crpxwk-en>.
- 66 For an overview of short-lived climate pollutants (SLCPs), see the website of the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants: <http://www.unep.org/ccac/Short-LivedClimatePollutants/Definitions/tabid/130285/Default.aspx>.
- 67 For surveys, see:
Harrison, N., Bartlett, N., Höhne, N., Braun, N., Day, T., Deng, Y. and Dixon-Declève, S., 2014. Enhancing Ambition through International Cooperative Initiatives. Nordic Council of Ministers, Copenhagen. Available at: <http://dx.doi.org/10.6027/TN2014-518>.
Stavins, R. and Ji, Z., 2014. Chapter 13: International Cooperation: Agreements and Instruments. In *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner et al. (eds.). Cambridge University Press, Cambridge, UK, and New York. Available at: <http://www.mitigation2014.org>.
United Nations Environment Programme (UNEP), 2013. The Emissions Gap Report 2013: A UNEP Synthesis Report. Nairobi. Available at: <http://www.unep.org/publications/ebooks/emissionsgapreport2013/>.
Friends of Rio+20, 2012. A Message from the Friends of Rio+20 Message, World Economic Forum 2012. Available at: http://www3.weforum.org/docs/WEF_FriendsRio20_Message_2012.pdf.
- 68 UNEP, 2013. The Emissions Gap Report 2013.
Harrison et al., 2014. Enhancing Ambition through International Cooperative Initiatives.
- 69 Jinnah, S. and Morgera, E., 2013. Environmental provisions in American and EU free trade agreements: A preliminary comparison and research agenda. *Review of European, Comparative & International Environmental Law*, 22(3). 324-339. DOI:10.1111/reel.12042.
- 70 See: <http://www.un.org/climatechange/summit/>.
- 71 See: <http://www.ghgprotocol.org>.
- 72 See: <http://www.theconsumergoodsforum.com>.
- 73 See: <http://globalpackaging.mycgforum.com>.
- 74 See: <http://www.tfa2020.com>.
- 75 See: <http://www.cisl.cam.ac.uk/Business-Platforms/Banking-Environment-Initiative.aspx?#fragment-3>.
- 76 Estimates from private communication with TFA 2020.
- 77 TFA 2020 estimates that deforestation associated by the four commodities amounts to around 40% of all deforestation. Global emissions from deforestation are estimated at about 11% of global GHG emissions (see Searchinger et al., 2013, below).
GHG emissions estimate: Searchinger, T., Hanson, C., Ranganathan, J., Lipinski, B., Waite, R., Winterbottom, R., Dinshaw, A. and Heimlich, R., 2013. *Creating a Sustainable Food Future: A Menu of Solutions to Sustainably Feed More than 9 Billion People by 2050*. World Resources Report 2013-14: Interim Findings. World Resources Institute, the World Bank, United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP), Washington, DC. Available at: <http://www.wri.org/publication/creating-sustainable-food-future-interim-findings>.

⁷⁸ See: <http://www.greenpeace.org/international/en/>.

⁷⁹ McKinsey Global Institute, 2011. Resource Revolution: Meeting the World's Energy, Materials, Food and Water Needs. McKinsey & Company, London. Available at: http://www.mckinsey.com/insights/sustainability/resource_revolution.

⁸⁰ World Business Council for Sustainable Development, n.d. Action2020 - Setting the pace for progress. Available at: <http://www.wbcsd.org/action2020.aspx>. [Accessed 3 September 2014.]

⁸¹ CDP, 2013. CDP Global 500 Climate Performance Leadership Index 2013. Available at: <https://www.cdp.net/en-US/Results/Pages/CDP-2013-performance-scores.aspx>.

⁸² See: Douglas, R., 2014. Integrating Natural Disaster Risks and Resilience into the Financial System. Willis Research Network. Available at: <http://www.willisresearchnetwork.com/publications/integrating-natural-disaster-risks-and-resilience-into-the-financial-system.html>.

⁸³ World Business Council on Sustainable Development (WBCSD), 2013. Reporting Matters 2013 Baseline Report. Available at: <http://www.wbcsd.org/reportingmatters.aspx>.

⁸⁴ See: <http://www.cdsb.net>.

⁸⁵ See: <http://www.theiirc.org/companies-and-investors/>.

⁸⁶ Ioannou, I. and Serafeim, G., 2014. The Consequences of Mandatory Corporate Sustainability Reporting. Working paper. Harvard Business School, Cambridge, MA, US. Available at: http://www.hbs.edu/faculty/Publication%20Files/11-100_7f383b79-8dad-462d-90df-324e298acb49.pdf.

⁸⁷ Minney, T., 2010. South Africa listed companies have to integrate sustainability reports. African Capital Markets News, 9 June. Available at: <http://www.africancapitalmarketsnews.com/439/sa-listed-companies-have-to-integrate-sustainability-reports/>.

⁸⁸ BM&FBOVESPA, 2014. 'Report or explain' now encourages integrated reporting among listed companies, 11 April. Available at: <http://www.bmfbovespa.com.br/en-us/News/2014/Report-or-Explain-now-encourages-integrated-reporting-among-listed-companies-2014-04-11.aspx?tipoNoticia=1&idioma=en-us>.

⁸⁹ A full list of Institutional Investors Group on Climate Change (IIGCC) reports is available at: <http://www.iigcc.org/publications/category/Corporate-Climata-Risk-Management>. A full list of Ceres investor reports (including ones on risk) is available at: <http://www.ceres.org/resources/reports/investor-reports>.

⁹⁰ See: <http://www.unpri.org/about-pri/about-pri/>.

⁹¹ These include the Institutional Investors Group on Climate Change (<http://www.iigcc.org>), Ceres (<http://www.ceres.org>) and the Asset Owners Disclosure Project (<http://aodproject.net>).

⁹² United Nations Environment Programme (UNEP), 2014. Inquiry into the Design of a Sustainable Financial System: Policy Innovations for a Green Economy. Available at: <http://www.unep.org/greeneconomy/financialinquiry/>.

See also the Carbon Tracker Initiative: <http://www.carbontracker.org>.

⁹³ Organisation for Economic Co-operation and Development (OECD), 2014. Green Growth Indicators 2014, OECD Green Growth Studies. OECD Publishing, Paris. Available at: <http://dx.doi.org/10.1787/9789264202030-en>.

⁹⁴ United Nations Statistical Commission, n.d. System of Environmental-Economic Accounting (SEEA). Available at: <http://unstats.un.org/unsd/envaccounting/seea.asp>. [Accessed 3 September 2014.]

⁹⁵ Organisation for Economic Co-operation and Development (OECD), 2014. 2014 Ministerial Statement on Climate Change. Paris. Available at: <http://www.oecd.org/mcm/MCM-2014-Statement-Climate-Change.pdf>.

See also: OECD, n.d. OECD work on Financing Climate Change Action. Paris. Available at: [http://www.oecd.org/env/cc/Financing%20Climate%20Change%20brochure%20\[update\]%20\[f2\]%20\[lr\].pdf](http://www.oecd.org/env/cc/Financing%20Climate%20Change%20brochure%20[update]%20[f2]%20[lr].pdf). [Accessed 3 September 2014.]

Independent Evaluation Group (IEG), 2010. Phase II: The Challenge of Low-Carbon Development, Climate Change and the World Bank Group. The World Bank, Washington, DC. Available at: http://ieg.worldbank.org/Data/reports/cc2_full_eval_0.pdf.

⁹⁶ Lagarde, C., 2014. Promoting Responsible Energy Pricing. Prepared speech for delivery at the Center for Global Development, 31 July. Available at: <http://www.imf.org/external/np/speeches/2014/073114.htm>.

Clements, B.J., Coady, D., Fabrizio, S., Gupta, S., Coleridge Alleyne, S.T. and Sdralevich, C.A., 2013. Energy Subsidy Reform, Lessons and Implications International Monetary Fund, Washington, DC. Available at: <http://www.imf.org/external/np/pp/eng/2013/012813.pdf>.

Mooij, R. A., Keen, M. and Parry, I., 2012. Fiscal Policy to Mitigate Climate Change: A Guide for Policymakers. International Monetary Fund, Washington, DC. Available at: <http://www.imf.org/external/pubs/cat/longres.aspx?sk=25864.0>.

⁹⁷ Such forums include the G7 and G20 groups of nations, Asia-Pacific Economic Cooperation (APEC), Central Asian Economic Cooperation (CAEC), the African Union, the Caribbean Community, and in Latin America Mercosur and the Pacific Alliance.

⁹⁸ The Group of Twenty (G20), 2012. Meeting Mexico Final Communiqué, Mexico City, 4–5 November 2012. Available at: <http://www.treasury.gov/resource-center/international/g7-g20/Documents/G20%20Ministerial%20Communique%20November%204-5-2012-Mexico%20City.pdf>.

G20, 2009. G20 Leaders' Statement, The Pittsburgh Summit, 24–25 September 2009.

Available at: http://www.treasury.gov/resource-center/international/g7-g20/Documents/pittsburgh_summit_leaders_statement_250909.pdf.

G20, 2011. Cannes Communiqué, G20 Leaders Summit, Cannes, 3–4 November 2011.

Available at: <http://www.treasury.gov/resource-center/international/g7-g20/Documents/Cannes%20Leaders%20Communique%204%202011.pdf>.

