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of funding the transition  
to low-carbon,  
climate-resilient societies

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## Scaling-up private sector climate finance

*The transition to a low-carbon world requires substantial investments – which can only be financed through a higher level of private sector involvement. Scaling up private financing is vital – so how best to support the process?*

EDITORIAL BY LAURENCE TUBIANA

CHAIRMAN OF AFD 'S BOARD OF DIRECTORS  
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At a time when the eyes of the world are turned on the Paris Climate Change Conference to deliver an ambitious agreement on greenhouse gas (GHG) emissions, the issue of financing the transition to a low-carbon world is more relevant than ever. The investment volumes needed to finance this transition are colossal indeed: approaching USD 1 trillion per year from 2035. This will necessarily involve not just mobilising public funds but also re-channelling a substantial flow of private capital towards sustainable projects. Thanks to a number of fiscal, regulatory, technological and economic advances, private investment in low-carbon projects is already significant – in the renewable energies sector in particular. Renewables are becoming increasingly competitive, while conventional energies are starting to be penalised for their environmental impacts.

From one sector to another, investors will need different tools and approaches to address the specific risks involved and make their climate-compatible investments economically and financially attractive. Some of these tools are already available; some others need to be created. Development finance institutions have already played a key role in their evolution. Now we face the critical challenge: scaling-up these programmes and mechanisms so that private sector investment flows can attain the requisite level.

This twenty-second issue of *Private Sector & Development* investigates the private sector's role in financing the energy transition, exploring pathways for achieving the expansion that is so crucial for our future. It looks at the challenges facing the Paris Climate Change Conference and private sector engagement, assesses the mechanisms developed within the framework of the Kyoto Protocol and explores specific pathways that could unlock a scaling up effect.

# Meeting the challenge of funding the transition to low-carbon, climate-resilient societies

*Current funding levels are insufficient to limit global warming to 2°C above pre-industrial levels, despite resources such as some of the Kyoto Protocol mechanisms. For a successful transition to a low-carbon, climate-resilient society, we need to change the scale of financings and rethink our energy paradigm and development models. Public funding has to support the most sustainable projects on a massive scale and steer more private-sector funding towards investments with climate co-benefits.*

**Caroline Edant**

Senior Climate Expert, AFD

Concentrations of CO<sub>2</sub> in the atmosphere have increased by 40% since the pre-industrial era. This increase and the change in climate observed since the 1950s cannot be explained without taking account of the impact of human activities.<sup>1</sup> Most of the blame

lies in the burning of fossil fuels (coal, oil and natural gas). Despite the growing number of policies introduced to combat climate change, total anthropogenic greenhouse gas (GHG) emissions continued to rise between 1970 and 2010, with a net acceleration at the end of the period.<sup>2</sup> The so-called developed countries<sup>3</sup> - which in 2010 accounted for around 18% of the population, 54% of GDP and 36% of GHG emissions - are no longer solely responsible for this increase. In 2005, China became the world's biggest emitter, ahead of the United States, accounting for 28% of global emissions in 2013. To contain this increase, it is vital to change the energy and development paradigm, not just in the North

but also in the South. However, new models have to be developed and must also lead to more resistant development that is adapted to the effects of climate change. As cited by the Intergovernmental Panel on Climate Change (IPCC), the impacts of climate change are already visible and pose a challenge for international solidarity since the consequences are felt more keenly in the developing world, especially in the least developed countries.

## STATUS OF INTERNATIONAL NEGOTIATIONS

Having failed in Copenhagen in 2009 to negotiate an agreement to succeed the Kyoto Protocol, the 196 parties to the United Nations Framework Convention on Climate Change (UNFCCC) are meeting once again to limit the increase in global warming to 2°C<sup>4</sup> by the end of the century. This threshold would still allow societies to adapt to new climate conditions, even though we are currently headed towards a 3° to 5° warming by 2100 (IPCC, 2014).

In 2011 in Durban, the countries committed to reaching a new international agreement in 2015 at the Paris Conference of the Parties (COP21) that will come into force in 2020. The aim in Paris (Box 1) is

*'The aim in Paris is to reach a universal, legally binding agreement that will apply to all while taking into account national circumstances.'*

<sup>1</sup> According to the Intergovernmental Panel on Climate Change (IPCC), the link between human activities and the increase in temperatures observed since 1950 was deemed likely in 2001 (66% certainty) and extremely likely today (95% certainty).

<sup>2</sup> GHG emissions increased by 1.3% per year between 1970 and 2000 and by 2.2% per year between 2000 and 2010.

<sup>3</sup> Annex 1 Parties to the United Nations Framework Convention on Climate Change.

<sup>4</sup> The warming levels indicated in the article are compared with pre-industrial temperatures.



CAROLINE EDANT

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## BOX 1: COP21 CHALLENGES

France, as chair of the 21st UNFCCC Conference of the Parties (COP21) from 30 November to 11 December, wants to use the occasion to set up an alliance based on four interrelated pillars. This will first mean achieving a legally binding universal agreement with differentiated national commitments and common rules to ensure

transparency and commitment comparability. Furthermore, national contributions will state what climate action each government is able to define and implement. A financial and technological package will also have to be drawn up to support developing countries that undertake to combat climate change. This will mean

in particular implementing the USD 100 billion per year of funding pledged in Copenhagen in 2009 by developed countries to aid the developing South. Lastly, numerous initiatives are currently being developed by non-government actors in what can genuinely be referred to as a “Lima Paris Action Agenda” to supplement state commitment.

to reach a universal, legally binding agreement that will apply to all while taking into account national circumstances, particularly those of the most vulnerable countries. This agreement will address mitigation<sup>5</sup> as well as adaptation.<sup>6</sup> Although developed countries historically bear responsibility for the current levels of CO<sub>2</sub> concentrations, the energy consumption profiles of emerging economies and the challenges that adaptation poses for all countries suggest the need for a holistic solution. If the increase in GHG emissions is to be contained to any meaningful degree, new development models clearly need to be found. And this means that international climate negotiations are intrinsically linked to development issues – and vice versa.

### LACK OF ‘CLIMATE’ FUNDING

A recent OECD study estimates that in 2014 climate finance mobilised by the developed world for climate action in developing countries was USD 62 billion – including 16.7 billion in private funding mobilised by public financial interventions. Other estimates state that from 2010 to 2012, climate funding totalled between USD 340 and USD 650 billion per year. Developing countries have received between USD 40 and USD 175 billion per year in funding from developed countries, USD 5 to USD 125 billion of which was from private funding (SCF, 2010).<sup>7</sup> Although the Kyoto Protocol’s flexibility mechanisms, such as the Clean Development Mechanism, have allowed the

private sector to fund low-carbon projects in developing countries (Focus) the amount of funding required for the ‘2°C scenario’ is still far from being achieved. Furthermore, many developing countries are increasingly keen to integrate climate into their development policies but are waiting to see if the developed countries keep to their commitments to provide financial support – commitments that were written into the Convention as early as 1992.

The issue of funding new production and consumption methods will inevitably be a key part of the COP21 discussions. The transition to a low-carbon society requires massive investment – over 1,000 billion dollars per year between now and 2035 (IEA, 2015) – in renewable energy generation, the conversion to renewable energies of the highest-emitting power generation plants, and the implementation of more energy-efficient technologies. According to the International Energy Agency (IEA), investment in renewable energies should increase from USD 270 billion in 2014 to USD 400 billion in 2030 to approach the 2°C target.

But public policies can sometimes be contradictory when it comes to guiding energy investments. Thousands of billions of dollars continue to be invested every year in infrastructure and power plants that emit greenhouse gases, sometimes in huge quantities. In OECD countries, fossil resources account for two-thirds of the investments made in the energy sector, while the private sector receives between €50 and €82 billion per year in public aid (OECD et al., 2015). By contrast, public funding for research and development in the energy sector has been cut by two-thirds in IEA countries over the past 30 years or so. In deve- ►►►

<sup>5</sup> Mitigation refers to the efforts made in all industry sectors to reduce GHG emissions to limit global warming to below 2°C.

<sup>6</sup> Adaptation means strengthening the resilience of food, water and healthcare systems, infrastructure and ecosystems, and improving the livelihood of vulnerable people, communities and regions.

<sup>7</sup> There are no precise estimates of overall private funding, beyond the private co-financing mobilised.

## FOCUS

The Group **Agence Française de Développement** (AFD, Proparco, FFEM) is a key player – both quantitatively and qualitatively – in climate funding at the international level. Since 2005, it allocated 18 billion to the issue. The Group has developed a range of innovative climate-related funding methods and instruments that can meet increasing demand from countries and economic actors – both public and private. As such, the Agency is actively involved in preparing for the 21st climate forum (COP21) taking place in Paris in December 2015.

**BOX 2: THE AFD, A BILATERAL BANK COMMITTED TO RECONCILING CLIMATE AND DEVELOPMENT**

With €18 billion awarded since 2005 to projects incorporating climate action – €2.86 billion of it in 2014 alone – the AFD Group is one of the main international public funders of the battle against climate change. The agency is sponsoring renewable energies projects in Morocco and Burkina Faso, public transport in Cairo, Bangalore and Medellín, and

agroecology in Madagascar. It is also supporting national policies that take account of climate issues in Indonesia, Vietnam, Mexico and Benin. These projects are enshrined in the AFD's 'climate and development' strategy, whose aim is first and foremost financial commitment on a long-term basis. For instance, 50% of the agency's activity to developing

countries and 30% of its private arm Proparco's activity are directed to projects that include action against global warming. Proven, transparent methodology is used to calculate the carbon footprint of each funded project. Lastly, the project selection process considers a project's impact on climate as well as the development level of the country concerned.

▶▶▶ loping countries, subsidies allocated to fossil fuel projects in particular have hindered investment in energy efficiency and renewable energies.

**THE NEED FOR ACTIVE INVOLVEMENT OF ALL ACTORS**

Public budgets must therefore be redirected and also used to encourage more private investment in climate change mitigation and adaptation projects. International development institutions and development banks also play an active role (Box 2). For instance, in 2013 members of the

International Development Finance Club (IDFC), a network of 22 national, regional and international development banks from around the world, contributed USD 89 billion in funding to activities that contribute to the fight against climate change. Complementarity and synergy among funders is one of the priorities of 'climate' financial architecture. Multilateral development institutions and the IDFC have agreed, for example, on the drafting of definitions and harmonized calculation principles regarding the leverage effect of public finance on the mobilization of private and institutional investment in the area of climate change in 2015.

There are several ways in which public funds can encourage economic players to steer their capital towards low-carbon investments that help societies adapt to climate change. Strengthening the green or climate bonds mechanism seems particularly promising, since these bonds are linked to sustainable development and climate action projects. Today, supply and demand are growing. For the past two years, companies have followed in the footsteps of the international financial institutions.

In a clear sign of private-sector interest, volumes of green and climate bonds have increased rapidly. Of course, what these bonds actually cover varies. Requirements in terms of impact on climate change are not widely standardized and rating practices need to be refined. As for the Green Climate Fund adopted at the 2010 climate conference in Cancun, this is one of the main financing mechanisms created to support climate action in developing countries. The Fund is a legally independent institution based in South Korea and has USD 10 billion in budgetary resources for its first four years of operation. It is expected to become one of the main channels for distributing climate-related public funding. It will also encourage the private sector to increase its participation in funding mitigation and adaptation initiatives.

Climate funding has led to the design of a number of tools and the involvement of a range of actors. The main challenge now is to increase the scale, involve more actors, and improve some of the existing tools while creating new ones. Greater consultation and cooperation is also needed, along with major changes in public policies and budget allocation if the energy transition phase is to be a success. The Paris agreement must give clear, long-term economic and political signals so that private-sector investment choices can be consistent with the 2°C global warming target. Of course, governments alone cannot fund a low-carbon economy – all economic actors need to play their part. But governments need to formulate regulatory frameworks consistent with their climate action goals while still meeting the economic and social aspirations of a growing global population over the long term. •

*'The Paris agreement must give clear, long-term economic and political signals so that private-sector investment choices can be consistent with the 2°C global warming target.'*

## FOCUS: THE CLEAN DEVELOPMENT MECHANISM AND PRIVATE FUNDING

Igor Shishlov, Ian Cochran, Benoit Leguet (Institute for Climate Economics – I4CE)<sup>8</sup>

The Clean Development Mechanism (CDM) is the world's largest carbon offsetting instrument. Created by the Kyoto Protocol, this flexibility mechanism allows developing countries to host projects aimed at reducing emissions and to issue certified emission reduction (CER) credits which can then be used by developed countries to meet their own emissions targets. Thanks to its “bottom-up” nature, the mechanism is well suited to private funding and is currently the only environmental commodity-based market to attract several billions of dollars in capital each year. As a spearhead in the battle against climate change, the CDM has evolved through trial and error throughout its 10-plus-year history. Although the mechanism's fate remains in doubt after 2015, the experience gained to date could serve to reform the CDM as well as create new market instruments. In the past decade the CDM has approved more than 7,500 projects in developing countries, saving more than 1.5 billion tons of CO<sub>2</sub> equivalent, an amount equal to the annual emissions level of Russia. A total of USD 360 billion, mostly from private funding, has been invested into some 6,000 CDM projects, for which investment-related data have been made public, resulting in 900 million tons of CO<sub>2</sub>e abated. Taking the average CER price of USD 10/ton during the Kyoto Protocol's first commitment period, each carbon finance dollar has raised an average of almost USD 40 in investment through this mechanism. The CDM can therefore be regarded as an effective public policy tool for leveraging private investment to mitigate climate change in certain sectors.

However, the CDM has also attracted some legitimate criticism, in particular regarding the mechanism's environmental integrity, the complexity of its administrative procedures and projects' contribution to the sustainable development of host countries. For example, projects to reduce fluorinated gas emissions were so profitable that some project originators may have been tempted to produce greenhouse gases as part of the elimination process. But these ‘perverse incentives’ have

been eradicated, and compared to other types of investment, the mechanism's transparency increases the risk to an investor's reputation substantially. Generally speaking, the CDM has so far proved to be a flexible instrument capable of learning from its mistakes and improving through multiple reforms. In the meantime, demand for CERs – mainly from the European emissions trading system (EU ETS) – is waning because of quantitative limits on carbon credit use (around 1.6 billion tCO<sub>2</sub>e). This decline in demand has caused the price of the Kyoto credits to fall below one dollar per ton of CO<sub>2</sub> equivalent, with no prospect of recovery. The usefulness of the CDM as a mitigation tool is therefore seriously in doubt.

At present, carbon offsetting is increasingly regarded as one of the most viable means of achieving emission reductions in certain sectors, particularly air and sea transport. The International Civil Aviation Organization (ICAO), for example, adopted an aspirational goal in 2010 aimed at capping the sector's emissions from 2020 without allocating specific targets to states or airlines. ICAO preliminary estimates suggest that this could create demand worth between USD 2 and USD 6 billion in 2025 and up to USD 24 billion in 2035. The maritime sector could also be a source of funding for projects in developing countries. Although member countries of the International Maritime Organization have agreed to cap the sector's emissions at the 2020 level, this could produce an offsetting demand ranging from hundreds of millions of tons per year in 2030 to a billion tons per year in 2050<sup>9</sup>.

Today, developing carbon offsetting mechanisms to succeed those of Kyoto hinges on restoring confidence in the impact and environmental integrity of carbon crediting projects. But it is also necessary to reassure investors – who lost some USD 66 billion with the collapse of demand and asset price in 2012 – about the safety of their investments. Lessons must be learned from the experience gained during the operation of existing mechanisms.

<sup>8</sup> The Institute for Climate Economics – formerly CDC Climat Recherche – produces analyses and public research on climate change economics. Contact: igor.shishlov@i4ce.org or ian.cochran@i4ce.org

<sup>9</sup> Calculations of the authors based on International Maritime Organization (OMS, 2014).

# Green bonds – a promising tool for climate finance

*The green bonds market is booming – boosting the growing flows of private capital being channelled towards energy transition and with the potential, ultimately, to encourage the direct financing of green projects in the world's developing countries. This is a relatively young market, though, and standardisation measures are needed to enhance its credibility.*

## Tanguy Claquin

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**G**reen bonds are on a roll. Today this new type of loan has become a compelling tool for funding the energy transition and environmental protection, particularly in developing countries. As a debt security, the green bond has the same financial characteristics as a standard bond, i.e. the same guarantees, same seniority,<sup>1</sup> and same rating. In purchasing these bonds, investors (such as asset-management or insurance companies) lend money to the issuing company, which repays them with interest at the end of a given period. The difference between green bonds and conventional bonds lies in the investment's destination.

Green bond issuers undertake to allocate the funds raised to 'green' projects and to inform investors of how the funds will be used, for instance for renewable energy projects, energy efficiency, waste and wastewater management, public transport or safeguarding biodiversity. The issuers usually call on independent experts to validate the environmental quality of the projects they are proposing.

## ACTOR MOTIVATION AND MARKET DEVELOPMENT

The green bonds market, which three years ago was still tremulous, has grown significantly since 2013: annual amounts increased almost tenfold between

2012 and 2014, with more than USD 37 billion issued (Figure). According to some observers, the market will exceed USD 100 billion by the end of 2015 (Climate Bonds Initiative, 2015). Initially the green bonds market was dominated by international public institutions such as the European Investment Bank (EIB) and the World Bank (WB) and came in response to demand from a handful of institutional investors interested in environmental issues. Little by little the private sector arrived on the market: in November 2013, EDF raised €1.4 billion through green bonds to fund its EDF *Energies Nouvelles* subsidiary. This was followed in May 2014 by a €2.5 billion green bond issue by ENGIE (formerly GDF SUEZ). A number of municipalities have also demonstrated their interest in green bonds. For example, between 2012 and 2015, Paris Region raised more than €1.5 billion from the issuance of green and socially responsible bonds. This steady pace of green bond issuance has won over a broad array of institutional, public and private investors, from Swedish pension funds and 'responsible' US fund managers to ethical Dutch banks and socially responsible French investors. Part of the reason for this enthusiasm is growing investor interest in sustainable development issues. Green bonds do indeed offer a number of advantages in this area, such as a direct link to identifiable projects, no abandoning of yield or liquidity, zero 'project' risk,<sup>2</sup> and increasingly frequent reporting on the environmental and social impacts of the projects being funded.

Besides the financial interest, growth in the green bonds market also reflects the desire

*'The green bonds market, which three years ago was still tremulous, has grown significantly since 2013.'*



TANGUY CLAQUIN

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<sup>1</sup> Seniority defines the order of repayment in the event of bankruptcy.

<sup>2</sup> There is no risk to the project itself since funding is directed towards an issuer who in turn directs the funds towards a project grouping. The risk is therefore borne directly by the issuer and indirectly by a project grouping.

<sup>3</sup> For this reason, green bonds have often been issued by development banks, such as the European Investment Bank, World Bank, IFC, KfW and the AFD.

to develop financial tools dedicated to combating climate change.<sup>3</sup> In a bond market historically insensitive to environmental issues, this has meant first and foremost raising awareness of the climate issue and introducing it into the financial markets. And the gamble has paid off: today there is not a single bond issuer unaware of the existence and the terms of the green bond. It has also meant creating a new market, since green bonds are destined to become a full-

*'Green bonds can help boost flows of private capital originating in mature markets and used to fund green projects in developing countries.'*

fledged asset class with its own dedicated funds and specialist investors. There is still a way to go, but the prospect of a deep, liquid and diversified green bonds market worth several hundreds of billions of dollars is no longer a pipe dream. Although the development of green bonds – initially anecdotal – took many by surprise, these bonds have now become a significant market, due in no small part to the issuers, investors and bankers who took the time to work on a product which, in addition to being economically motivated, is in the general interest. A perfect example of an innovative solution emerging from the bottom up.

#### POSITIVE IMPACTS IN DEVELOPING MARKETS

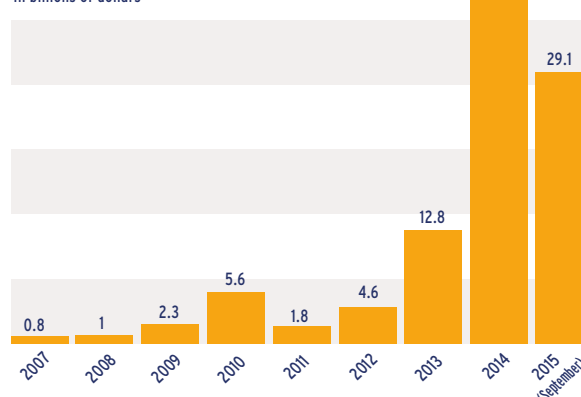
There is no doubt that the appearance of green bonds is also good news when it comes to funding projects in developing and emerging markets. In Asia, Latin America and Africa, combating climate change has particularly substantial funding requirements. The United Nations Framework Convention on Climate Change (UNFCCC) predicts that developing countries will need investment of between USD 28 and USD 67 billion per year between now and 2030. Emerging markets are also climbing on the bandwagon: green bonds have already been issued in India (for example by Yes Bank and EXIM Bank of India) and in Latin America (by Energia Eolica and BRF), and many observers expect the market in China to take off soon.

Green bonds are furthermore excellent tools for promoting sustainable development to market players. As regards issuers

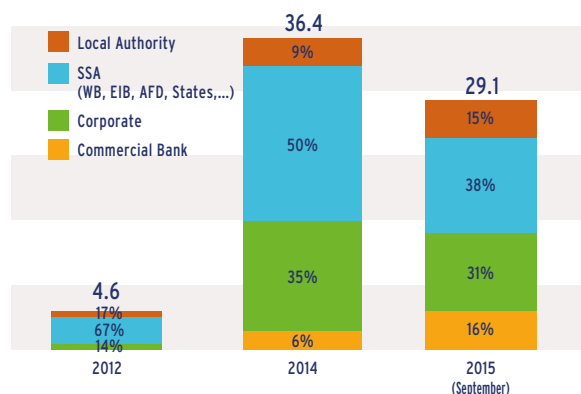
**FIGURE: CHANGES IN THE GREEN BONDS MARKET, 2015**

#### Amounts issued per year

In billions of dollars



#### Types of issuers



Source: Crédit Agricole, 2015

in developing countries, the desire to issue green bonds can lead institutions to step up their Environmental, social and governance (ESG) policies. For example, some banks in emerging markets are planning to ratify the Equator Principles<sup>4</sup> to make it easier for them to issue green bonds. On the investor side, issuing a green bond to fund infrastructure in an emerging market is one of the best ways to educate institutional investors in mature markets on the specifics of such projects. For example, anyone purchasing the AFD's Climate Bonds (issued in September 2014) will be aware of Colombia's Medellin integrated urban renewal project and know that a green corridor consisting of a light-rail train and two Metrocable lines in a disadvantaged region can be both a profitable investment and benefit the local population. In the long term, green bonds can help boost flows of private capital ►►

<sup>4</sup> The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making.

#### FOCUS

Crédit Agricole Corporate and Investment Bank (CIB) is part of the Crédit Agricole Group. It offers its customers a range of products and services in the areas of global markets, investment banking, structured finance and commercial banking. In the past four years, Crédit Agricole CIB has arranged some 60 green and sustainability bonds.

►►► originating in mature markets and used to fund green projects in developing countries.

Some international development agencies also use green bonds to fuel the local bond markets. The World Bank Group, for example, has issued several green bonds in emerging market currencies (Mexico, Peru and China) to boost the local market and raise awareness among local investors of social or environmental issues, particularly in regions where these issues still tend to be absent from investment decisions. Green bonds are also a vehicle for developing responsible finance in these markets.

### AN INCREASE IN SCALE

In addition to the above, green bonds can be a step towards the direct funding of 'green' actors and projects in developing countries. The target product in such cases would be a project bond or portfolio asset (securitization) where the project

*'There must [...] be a balance between framework and incentive, and the COP21 could be just that opportunity.'*

(or assets) risk would be borne directly by investors. Circumstances are certainly favourable: having created pockets of green bonds, today's investors are looking for long-term assets and returns, which means

focusing on both project bonds and emerging markets.

Development banks can get involved in a number of ways to facilitate this development, either in a targeted way or concomitantly. Firstly they can act as aggregator and take on projects that would normally be too small to access the bond market, and play on portfolio diversification to reduce refinancing costs. Such transactions would make it feasible to distribute a small-scale transaction in the markets. Secondly they can provide partial guarantees to make it easier to bring certain projects to the market (construction phase guarantees, political risk guarantees, etc.). OPIC<sup>5</sup> and the Inter-American Development Bank have provided such guarantees for a number of green bonds. Development banks can also increase the credit for bond transactions allowing them to reach the rating levels expected by many institutional

investors. This involves undertaking to cover first losses. Several multilateral development banks are currently working on this type of set-up in connection with green bonds. Lastly, these banks have the ability to underwrite green bonds issued by developing countries in full or partially. This allows the arranging banks to protect themselves against transactions that are too risky according to traditional analysis criteria: if the banks fail to sell a transaction, they are committed to a possible partial buy-back. The International Finance Corporation (IFC) has intervened in this way for the green bonds issued by Yes Bank, which launched the green bond market in India.

It is clear that green bonds are a compelling tool for supporting 'green' projects in developing countries. With development bank expertise, the tool could even lead to direct funding of these projects. However, the current green bonds market, which is self-regulated, is exposed to a major risk, namely what would happen if an issuer blatantly violated its 'green' commitments? Until now the market has managed this risk well, since most actors (issuers, investors and banks) have recognised the best practices<sup>6</sup> drawn up by four banks and published in early 2014 in the form of *Green Bond Principles* (GBP). Also, the market is trending towards improving these practices through more second opinions on the product's risk and higher quality reporting on social and environmental impacts. In any event, this lack of regulation will probably not last, and already a number of regulators and governments are looking with interest at this promising tool for funding the transition to a low-carbon economy. There must nevertheless be a balance between framework and incentive, and the Paris Conference COP21 in December could be just that opportunity. ●

<sup>5</sup> The Overseas Private Investment Corporation is the US government's development finance institution.

<sup>6</sup> Crédit Agricole CIB, Bank of America Merrill Lynch, Citi and J.P. Morgan.

# Towards carbon risk and climate performance recognition in the financial sector

*Despite the clear need for their involvement, finance-industry players currently remain largely disengaged from the investment needs of the low-carbon economy. 'Carbon risk' and 'climate performance' are two relevant approaches the finance industry can take to effectively address the climate challenge.*

**Fabien Hassan, Hugues Chenet and Pierre Chastroux**

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Limiting climate warming to 2°C above pre-industrial levels<sup>1</sup> will not be possible without the financial sector's involvement. Climate-aware investment occupies an increasingly central place in both international negotiations and the specialist literature. As the IPCC emphasises,<sup>2</sup> reallocating capital to the low-carbon economy is a key challenge. Unfortunately, private investments currently remain largely disengaged from the energy transition movement (Morel *et al.*, 2014), creating the risk of a disconnect between the financial markets and the real economy. And yet, through the choices it makes about how capital is allocated, the financial sector

could meet the investment needs of the low-carbon economy. As we see it, there are two ways the finance industry can take the climate challenges we currently face on board. The first approach is based on including 'climate risk' as part of standard financial decision-making processes, by incorporating the concept within the traditional risk analysis models. This approach is underpinned by a purely financial rationale – the drive to maximise returns – and yet many obstacles remain in its path and need to be removed. A second, more proactive approach involves adopting objectives which would ultimately encourage a high level of 'climate performance' – a strategy, it should be noted, that largely pertains to public-sector actors and the responsible investment sector, at least in the first instance, although it has the potential to interest the wider investment community, too.

*'Private investments currently remain largely disengaged from the energy transition movement.'*

## FABIEN HASSAN, HUGUES CHENET AND PIERRE CHASTROUX

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Pierre Chastroux is an economics student at École Normale Supérieure de Cachan and Sciences Po Paris. He is undertaking a research internship at 2° Investing Initiative, working on a number of studies and promoting the association's work.

## CARBON RISK – FROM SPECIFIC ASSETS TO THE WHOLE FINANCIAL SYSTEM

The financial risk associated with climate change can come from changes to the climate itself – the impact of changing rainfall patterns, changes in the frequency and intensity of extreme events, rising sea levels, etc. – but also from the regulations adopted to combat climate warming. 'Carbon risk' (ADEME and OTC Conseil, 2011; 2° Investing Initiative, 2015 and WRI & UNEP-Fi, 2015) encompasses all the risks associated with the transition towards a low-carbon econo- ►►►

<sup>1</sup> In order to limit global warming to 2 °C and adapt to the changes this brings, the World Bank estimates that developing countries will need USD 75-100 billion per year over the next 40 years and that the cost of mitigation measures will be between USD 140 billion and USD 175 billion per year by 2030.

<sup>2</sup> The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2014) devotes an entire section to investment issues.

Scaling-up  
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►►► my: potentially more stringent regulations governing CO<sub>2</sub> emitting technologies, changing consumer habits, reputational controversies, legal actions, etc. Carbon risk mainly materialises in relation to physical assets, but can extend throughout the investment chain. Consequently, corporations, financial institutions, governments and civil society can all find themselves exposed to it. The carbon risk concept is linked with two other concepts: stranded assets and the carbon bubble. In order to limit global climate warming to 2°C above pre-industrial levels we need to keep greenhouse gas (GHG) emissions below a certain threshold. Yet the fossil fuel reserves proven to date exceed this estimated quantity by at least a factor of three (Meinshausen *et al.*, 2009; McGlade and Ekins, 2015). Keeping climate warming under the 2°C limit means that these reserves cannot all be used: a large proportion of them will need to remain underground. These ‘stranded assets’ will become obsolete and will need to be devalued by the companies holding them. As the financial valuation of oil companies is partially based on these assets, the whole of the fossil energy sector would then be endangered – a crisis that could spread across the entire financial industry. This is what is called the ‘carbon bubble’.

*‘A study [...] identifies the significant impacts of various climate scenarios on investment portfolio profitability and risk.’*

The ‘stranded asset’ concept – relatively well documented now with respect to energy production – could also apply to any kind of industry or infrastructure dependent on fossil fuels (airports, motorways, etc.). The risks associated with fossil-based industrial assets are beginning to be studied seriously. Ratings agencies are undertaking analyses and research studies assessing carbon risk and the physical risks relating to climate change. If this trend continues, climate risk exposure will become a credit rating factor in its own right. At the level of projects or companies, therefore, the risk is significant. With respect to financial institutions the question remains open. Are the risks sufficiently concentrated to jeopardise the stability of a bank’s balance sheet, or of the financial system as a whole? A study by the Mercer consultancy group (2015)

identifies the significant impacts of various climate scenarios on investment portfolio profitability and risk. The recent mobilisation of the financial regulators in this area, and recent announcements by governments – the G7 announcing that GHG emissions from fossil fuels would be phased out by the end of the century, for example – continue to come down on the side of those financial institutions which believe that the transition to a low-carbon economy is currently getting under way and that they need to anticipate its effects.

### OBSTACLES AND OUTLOOK

Most of the carbon risks mentioned here are not as yet material enough to play a significant part in standard investment decisions. Yet other factors, too, lie behind the lack of consideration accorded to these risks (Figure). Even though they are increasingly significant and well-documented, carbon risks tend to be expressed over the medium or even the long term (10, 20, 50 years) – whereas investors, even those with long-term liabilities like pension funds and insurance companies, have a much shorter time horizon (between one and five years). Investors therefore tend to overweight short-term risks relating to market volatility and to underweight medium-term economic risks, including those arising from climate change. Expanding investors’ time horizon is therefore probably the first crucial step in order to promote investment processes aligned with the climate challenges we face. Other obstacles are also worth highlighting. Funds practise ‘passive management’, for example, which means tracking an existing index (such as the S&P 500) and therefore investing in the largest corporations. This practice gives an excessive weight to fossil fuel sector securities, oil in particular (2° Investing Initiative, 2014), compared with their importance in the real economy. Additionally, portfolio managers sometimes limit the concept of their fiduciary duty – the obligation to act in the best interests of their clients, the shareholders – to maximising the profitability of their investments. The work of organisations like ShareAction and the Asset Owner Disclosure Project, along with initiatives to promote transparency – notably from the British government – are gradually helping to overturn this perception by showing that taking climate factors into account is fully aligned with beneficiaries’ long-term interests. Finally, financial regulation, by focusing on short-term risks, can represent an obstacle in itself – or at any rate fail to encourage to take climate risk into account.

So does this mean that we should be stop-

### FOCUS

**2° Investing Initiative**, founded in Paris in 2012, is a multi-stakeholder think tank which conducts research and seeks to stimulate change, aligning financial institutions’ investment processes with 2°C climate scenarios. It develops metrics and tools to measure the climate performance of financial institutions and promotes the development of a regulatory framework to incentivise the re-focusing of investments on a low-carbon economy.

ping all investment in fossil fuel sectors? This is the argument proposed by the militant divestment movement, which originated in the United States and advocates disinvestment from fossil fuels. Supported by various groups, including the NGO 350.org, this movement is gathering momentum in continental Europe, calling on investors, especially public-sector and responsible investors (religious communities, universities, NGOs, municipal authorities, etc.), to divest their investments in the fossil fuel sector. In June 2015, the Norwegian parliament voted for its government pension fund – the world's richest sovereign wealth fund, with USD 900 billion of assets under management – to withdraw from the coal sector.<sup>3</sup>

What holds true for the energy sector can be generalised across all sectors which have a significant impact in carbon terms: corporations' production techniques involve energy technologies with higher or lower levels of GHG emissions. Energy diversification involves measuring and managing a portfolio's exposure to these technologies. A high level of exposure to oil companies, for example, can be 'offset' by exposure to post-oil technologies: electric vehicles, organic substitutes for plastic materials, etc. Finally, a diversified portfolio that anticipates the economic changes driven by climate change will also help to finance the energies of the future. In this way it also has the potential to exert a positive impact on the economy's capacity to meet the current climate challenges and leads us on to the concept of climate performance.

### TOWARDS CLIMATE PERFORMANCE

With the concept of climate performance we move beyond a strictly financial perspective and ask ourselves about the impact of investment decisions on the economy, and, via the economy, on climate change. 'Climate performance' here is defined as a contribution to financing the low-carbon economy, helping to limit GHG emissions and therefore also to limit the extent of climate warming.<sup>4</sup> There is no single measure of a company's climate performance – even less so, therefore, of an investor. Evaluating this performance depends on the specific objectives defined: financing the energy transition, helping companies reduce their emissions, withdrawing finance from the most highly polluting projects, etc. Depending on the particular strategies involved, it might be relevant to analyse – and potentially to combine – three kinds of indicators: the GHG emissions of companies or projects; exposure to green sectors or technologies

compared with exposure to polluting technologies; a climate 'rating' obtained by various methodologies incorporating elements that are otherwise difficult to quantify (such as the existence of a strategy for reducing GHG emissions, for example).

The leading strategy adopted by investors at the current time involves 'decarbonising' portfolios by reducing the total quantity of GHGs emitted by companies represented in the portfolio. This method provides an indicator that is simple and quantitative – and therefore by its nature comparable – but does not provide a way of measuring the positive impact of financing itself. In highly liquid markets (equities, bonds) it is virtually impossible to isolate the effect of any investment decision and to know what would have happened if that decision had not been taken. To complement these existing approaches, therefore, new methods propose taking the future as a starting point: what needs to happen for us to achieve a low-carbon economy? Based on these '2°C scenarios', climate performance becomes the alignment of an investment or loan portfolio with the financing needs identified in these scenarios.

### 2°C SCENARIOS AND PERFORMANCE INDICATORS

Approaches based on alignment with these scenarios reflect the transformative aspect of energy transition: the low-carbon economy will not simply be identical to our current economy with lower GHG emissions. It will be a different economy altogether, bringing with it different price equilibriums and various rebalancing effects between sectors and technologies. Two methodologies are currently under development.

The first is based on trajectories for reducing GHG emissions: in order to limit climate warming, each economic sector needs to reduce its emissions at a relatively faster or slower rate, depending on the technology barriers and changing demand patterns that apply in each case. The 'Sectoral Decarbonization Approach' (SDA)<sup>5</sup> sets targets for each company according to the carbon budget allocated to its respective economic sector. Significantly more sophisticated than ►►►

*'The low-carbon economy [...] will be a different economy altogether, bringing with it different price equilibriums and various rebalancing effects between sectors and technologies.'*

<sup>3</sup> This decision effectively means divesting around 100 investments worth an estimated total of USD 9 billion, i.e. nearly 1% of the funds under management.

<sup>4</sup> Here the concept of performance refers not to financial return but to the impact of the financial sector. Similar terms such as climate impact or climate-friendliness might also be used.

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►►► a vision which would allocate a single target to a whole portfolio, this approach invites investors to make choices within a particular sector rather than merely trading off low-emission and high-emission sectors against each other.

The second approach<sup>6</sup> involves measuring the alignment of portfolios with 2°C scenarios. Here, the issue is no longer to ascertain how much or how little CO<sub>2</sub> the companies financed are emitting, but rather whether the assets they own (power stations, raw materials, plants, technologies, innovative patents, etc.) are necessary, compatible or incompatible with the emergence of a low-carbon economy. Under this approach, 'climate performance' for the financial sector involves financing what is necessary and not financing what is incompatible. Investors cannot know exactly how far they, individually, have contributed to the financing of new activities, but they know that if everyone operated in the same way the financing of the low-carbon economy would be assured. Finally, and here we circle back to the subject of financial risk, they are removing from their portfolio any assets that could not survive over the long term if credible climate policies are adopted worldwide.

Risk and performance represent two dif-

ferent dynamics, which converge at some points and diverge at others. They both have the potential to mobilise different elements of the financial sector, according to their respective priorities. And now the growing momentum driven by twenty or so initiatives involving more than 400 investors worldwide<sup>7</sup> is being backed up by regulatory changes, too. In France, article 173 of the law on energy transition and green growth, passed in August 2015, requires institutional investors to evaluate and make public their exposure to climate risks, their carbon footprint and their contribution to furthering the international goal of limiting climate warming. Ultimately these two dynamics, risk and performance, enrich and reinforce each other. We contend that in a few years' time both will be widespread across the entire financial sector. ●

<sup>5</sup> The whole methodology is freely available on this website:

<http://sciencebasedtargets.org/methodologies/>

<sup>6</sup> This approach is explored in the SEI Metrics project supported by the European Commission and coordinated by 2° Investing Initiative (2015-2018).

<sup>7</sup> The Investors on Climate Change platform, at <http://investorsonclimatechange.org/>, lists all these initiatives.

## FIGURE: WHY CARBON RISKS MAY NOT BE FULLY CAPTURED BY FINANCIAL MARKETS?



### RISK & UNCERTAINTY

A range of decarbonization pathways and associated roadmaps may make it difficult to assess economic trends.



### DATA

There is a lack of historic data to feed models. The future will not be a replication of the past.



### DISTRIBUTION

An assessment of climate roadmaps suggest the distribution of risks may be skewed and involve 'fat tails' / black swans.



### TIME HORIZONS

Many carbon risks are likely to appear in the medium- and long-term and thus may not be captured by short-term models.



### MARKET MIS-READ

Carbon risks are primarily policy-driven and non-cyclical, making them distinct from traditional market risks. Hypothetically, this may make a collective mis-read more likely.

Source: 2°II

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# Pooling – an innovative way of releasing capital for renewable energy in India

*The Indian government's electrification plans offers major opportunities for renewable energies, with small and medium sized enterprises (SMEs) best placed to meet them. They, however, face challenges in raising sufficient capital at the right cost. Innovative mechanisms are needed, and here is presented one offering the possibility of pooling available capital and using it to finance green-energy SME expansion.*

**Inderpreet S Wadhwa**

*Founder and CEO, Azure Power*

India's overall demand for energy has increased significantly in recent years, largely due to population growth, rapid industrialisation and rising standards of living. Energy supply, however, has been unable to keep pace with the growing demand, resulting in a persistent demand/supply mismatch. The Indian power sector has traditionally been dependent on thermal power,<sup>1</sup> but is now shifting towards renewable sources of energy. The government, faced with a persistent energy deficit and limited access to

fossil fuels, is encouraging the renewable energy sector,<sup>2</sup> and, because of a progressive regulatory framework, renewable generation pricing is approaching grid parity.

Despite these promising conditions, the vigorous Indian renewables sector still faces challenges, the main one of which is a lack of adequate financing. Some innovative mechanisms have recently been introduced but if renewable energy projects are to be encouraged, others need to be developed.

## ACCESS TO FINANCE IS VITAL

It is estimated that India will need more than USD 200 billion in clean energy financing over the next 10 years if the coun-

try is to meet its targets for electrification and economic growth. In the solar sector, which offers the most promising opportunity for rapid electrification, raising finance, and especially equity capital, has been difficult.

It is worth noting that although a renewable energy plant costs less to operate once it is up and running, it is more capital intensive to develop than a conventional (thermal) one. It is, therefore, crucial to ensure access to finance if renewable-energy projects are to be encouraged.

There are several reasons for the difficulty in accessing equity funding, some linked to Indian financial markets, others to the nature and small size of solar projects. To date, banks have preferred to finance projects with debt rather than equity, primarily because of the variable reliability of Indian off-takers. Despite the energy focus shifting from coal to solar and wind, most banks are over exposed to coal projects.

Although specialised government financial institutions<sup>3</sup> as well as bilateral and multilateral development banks<sup>4</sup> financially support government policies, a deeper pool of funding is needed to sustain the enthusiasm of the Indian renewables industry, which requires a lot of small investments.

For a number of reasons, however, the financial markets do not favour investment ►►►

*'A renewable energy plant costs less to operate once it is up and running than a conventional one.'*



**INDERPREET S WADHWA**

**Inderpreet Wadhwa** is the founder and chief executive officer of Azure Power, a leading Indian solar service corporation providing energy to communities and governments. Prior to founding Azure Power India (AZI) in 2007, Inderpreet served as a vice president of Loyalty Lab and as a senior director of Oracle Corporation. Additionally, he has been a member of the Private Sector Advisory Group (PSAG) to the Green Climate Fund (GCF).

<sup>1</sup> 69% of the installed power capacity is generated from conventional sources of energy (coal, oil and natural gas) as of fiscal year 2014.

<sup>2</sup> In 2010, the Indian government announced the National Solar Mission, which is a federal scheme to promote the renewable energy sector. The scheme announced a target of 20 GW by 2022, which has been recently updated to 100 GW by 2022 by the new government. At present, about 3.1 GW has been installed and new tenders for almost 2.7 GW were rolled out in the recent months.

<sup>3</sup> Such as the Indian Renewable Energy Development Agency (IREDA) and PTC India Financial Services Ltd (PFS).

<sup>4</sup> Including the International Finance Corporation (IFC) and the Agence Française de Développement group (AFD) including Proparco.

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►►► in small and medium-sized enterprises (SMEs), which largely make up the renewables sector. Most investors prefer businesses that show considerable growth potential in a large market, whereas SMEs more often focus on providing grass-roots solutions to a small number of consumers. Additionally, SMEs often sell into markets with weak or no credit ratings and are unable to insure the payment default risk as this is generally too expensive at small transaction levels as well as being too complex for SMEs implement. Furthermore, SMEs, by definition, have limited balance sheets and are thus often unable to attract low-cost capital. Similarly their limited liquidity and relative lack of formal systems and processes required by institutional investors hamper their access to commercial financing, increasing costs, constraining growth and limiting their ability to develop green energy projects.

Around the world, and especially in India and Africa, there are opportunities for SMEs to contribute to the growth of renewable energy, and particularly solar power. But because of a high perception of risk and limited scale, a large number of these opportunities have limited growth potential as capital is only available at prohibitive rates, if at all.

#### YIELDCO, AN INSPIRING FUNDING MECHANISM

It has already been proven in the grid-connected solar power market globally that companies that can aggregate small projects have not only been successful in meeting the challenge of prohibitive financing costs by scaling, but have also been able to mitigate the risks inherent in a diversified portfolio using the yieldco mechanism. A yieldco is usually created by a parent company, typically a large player with the necessary capital to purchase third-party assets or build projects themselves, that bundles long-term operating assets to generate predictable cash flows. Because they are composed of assets that are up and running, yieldcos present a lower risk profile than new projects typically exposed to construction risks. Investor returns are di-

*'The financial markets do not favour investment in small and medium-sized enterprises (SMEs), which largely make up the renewables sector.'*

rectly linked to the operating performance of the underlying assets with the resulting cash available for distribution, passed on as dividends.

From a developer's perspective, the mechanism has proved successful in lowering the financing cost for the solar industry. The transfer of projects to a yieldco subsidiary enables companies to maximize project value by lowering the cost of capital, most of which in solar projects is required upfront, making that an extremely important metric for solar developers. Given a lifetime of 20–25 years for solar projects, yieldcos provide sustainable and reliable cash flows and help monetise projects – the capital raised can then be used to finance new projects at lower rates than those available through expensive equity finance or to pay off expensive long-term debt. Yieldcos serve as a valuable funding mechanism, and are being used by such renewable energy giants as Abengoa, ACS, NextEra Energy, NRG Energy, and SunEdison. All have set up yieldcos to raise millions of dollars through initial public offerings; indeed, since 2013, yieldcos have raised a total of USD 3.8 billion and acquired more than 8 GW of assets of which 78% are renewables.

#### A NEW MECHANISM FOR THE OFF-GRID MARKET

Azure Power has designed an innovative mechanism on green energy finance, denominated Azure Life™, mimicking diversified portfolio ownership. It has the potential to do for the off-grid market what yieldcos have done for grid-connected solar.

And the potential is great. In India around 880 million people live in villages (Indian census, 2011), an estimated 20,000 of which are unelectrified (ICEA, 2013). These rural people and more than 50% of the urban population use wood and coal as fuel for cooking. Given the supply and demand mismatch, the off-grid market has huge potential for growth and development.

In 2014 the World Resources Institute estimated that, in India, the off-grid energy access market included 114 million households with an income of less than USD 2 a day (Bridge to India, 2014). Further, the International Energy Agency estimated that around half of those without access to electricity spend more than USD 60 billion annually on energy (IEA, 2010), primarily using inefficient fuels such as kerosene. This suggests that even in the base of the pyramid market, people are willing to pay for services and solutions such as solar lanterns, home lights, street lamps, solar water pumping systems and heating systems. Overall, decentralized renewable energy enterprises offer

## FOCUS

**Azure Power** developed India's first utility scale solar project in 2009 and installed India's first megawatt scale solar rooftop project that was recognised in 2013 as a Top 10 Public Private Partnership by the International Finance Corporation (IFC). Today, Azure Power is a leading developer, constructor and operator of utility scale, micro-grid and rooftop solar projects, and the single largest owner and operator of projects under the National Solar Mission, India's federal renewable policy.

a market opportunity valued at more than USD 2.04 billion annually.

Although there are several SME initiatives around the country to provide micro-solar solutions to the underserved population, each has limited access to capital, and therefore limited growth potential. A facility along the lines of a yieldco, however, could be extremely efficient in providing a larger pool of efficient capital for such projects.

With such a facility as Azure Life™ that provides a constant pool of capital based on their potential to scale, SMEs could recycle cash by dropping their assets into Azure Life™, continuing both their own and the facility's growth. Azure Life™ would pool capital from individuals, multilateral development banks, pension funds and commercial financial

*'In welcoming SMEs into a family with a proven track record and assets, Azure Life™ could set technology and financing standards as well as manage assets.'*

institutions that are interested in climate-change mitigation and socio-economic development and have return expectations of 3–5% in emerging markets, while monitoring portfolio risk and performance over the term of the investment. At the same time, in welcoming SMEs into a family with a proven track record and assets, Azure Life™ could set technology and financing standards as well as manage assets, including legal and currency risks, across defined jurisdictions.

<sup>5</sup> SIDBI is an independent financial institution aimed to support the growth and the development of micro, small and medium-scale enterprises in India.

<sup>6</sup> The accreditation process entails working with accreditation experts that help prepare and process applications with information required by banks and Reserve Bank of India (RBI) approved rating agencies, thus handholding the Micro, Small and Medium Enterprises (MSME) through the process seamlessly.

With a standardised and efficient accreditation process, such as that established within agencies including the Small Industries Development Bank of India<sup>5</sup> for managing World Bank and Global Environment Facility grants, a facility similar to Azure Life™ could enable credible SME participation.<sup>6</sup>

Once accredited, the SME's assets passed to the facility could act as a guarantee against a predefined, standard set of technical and financial parameters. With the payout from the drop down, the SMEs could then expand their activities, moving resulting new assets to the facility – with it paying a premium for the right of first offer on such assets.

Regular monitoring by the facility of the technical and financial parameters would ensure proper yield cover to the investors – the yield available, typically 85% of free cash from such assets set after taking into account all risks pertaining to distribution tax/costs and currency depreciation, would take all necessary provisions and safeguards into account.

The new Indian government's electrification plan to electrify every household by 2019 offers a major social and economic opportunity, implying almost 400 million new power consumers. In many ways, SME's are best suited to meeting the needs of electrification for widespread rural communities – key to meeting India's ambitious energy targets. This type of innovative facility could allow the private sector to involve itself in the development of climate-change friendly energy sources, provide SMEs with much needed but difficult to raise finance, and facilitate and speed up the provision of electricity to hundreds of millions of people. •

# Chile, a case of market-driven transition to renewables

*Chile has seen an astonishing surge in renewable energy production. Key factors underlying this success: an abundance of natural resources, an open energy market and a robust regulatory framework, combined with a proactive state policy programme. The Chilean experience is a highly instructive one – showing that subsidies are not always the right solution.*

**Carlos Eugenio Finat Díaz**

*Executive Director, ACERA*

Chile's capacity of non-conventional renewable energy (NCRE)<sup>1</sup> has developed very rapidly in the past few years: total installed capacity at the end of 2013 was 980 MW, 1,000 MW were added during 2014, and at least further 1,000 MW are expected to come on line in 2015 (CIFES, Ministry of Energy, 2015). This has happened in the context of a fully liberalized market, and one in which NCRE receive no subsidies.

Chile enjoys an energy context favorable to such development: a combination of world-class renewable energy sources, high power prices, an open market and a simple but effective regulatory framework. These fundamentals are not new, so the recent increase in the competitiveness of NCRE is the most likely reason for the boom. Nonetheless, a few simple, market-driven regulations focused on NCRE have helped.

As Chile could be an inspiration to others, exploring the reasons for this development and its implications is worthwhile. Furthermore, the continuation of the transition to NCRE raises a number of issues – its burden on the transmission network being the

most immediate, while further thinking is needed to fully integrate the consequences of this change in the energy system.

## CHILE'S ENERGY LANDSCAPE

Chile's diverse climatic and geographical conditions pose energy-supply challenges, exacerbated by the country's lack of fossil fuel reserves. Chile relies on fossil-fuel imports – 60% of its power comes from thermal plants – leading to high and volatile prices. Furthermore, limited investment in transmission infrastructure and a lack of competition in the power-generation market affect energy prices, and Chile's competitiveness – an average energy price of USD 150/MWh for industry is twice that of Peru, a close competitor of Chile's mining industry (Climatescope, 2014).

Renewable energy is, however, readily available, with a Energy Ministry report (2015) identifying the availability of 1,864,809 MW of solar thermal, solar photovoltaic (PV), wind and hydro potential – more than 100 times Chile's current installed generation capacity, and there is more potential from geothermal generation.

Chile's electricity framework was laid down in the 1980's. The system is fully liberalised, with regulation limited to a few specific aspects. Private companies own all generation, transmission and distribution installations, with regulation affecting expansion and tariffs for core segments of the transmission and distribution system. On the generation side, the private sector is free to investment in capacity, while

*'Chile relies on fossil-fuel imports – 60% of its power comes from thermal plants – leading to high and volatile prices.'*



CARLOS EUGENIO FINAT DÍAZ

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<sup>1</sup> Sources of NCRE are geothermal, wind, solar, biomass/biogas, wave/tidal and run-of-river hydro generating less than 20 MW.

connection to the transmission network is governed by the principle of open access. Regarding users, consumers with less than 0.5 MW installed capacity must buy from a distribution company at regulated prices; those with 0.5–5 MW may either buy at the regulated price or negotiate a contract with a generator; while those with more than 5 MW buy power at prices set by bilateral negotiation or private tender.

The Chilean Congress approved the first law promoting NCRE in 2008 with a target of 10% of energy to be generated by

*‘Today, any new coal-fired plant [...] is likely to face local and legal opposition.’*

NCRE by 2024, and requiring generators to increase the percentage of NCRE in supply contracts each year from 2015 to 2024.

It also allows generators to buy NCRE credits from others, if their own production is insufficient to meet their legal obligations. In 2013, with strong congressional support, a new law raised the target to 20% but delayed the date to 2025. To put this in context, total power generation for 2014 was 70,000 GWh, of which 8.7% came from NCRE plants (Figure).

### THE RENEWABLES’ SUCCESS

The rapid expansion can be explained by such factors as the high availability, high quality and low cost of renewable energy production; the fact that conventional energy projects face strong public opposition; and the pivotal role of a stable and efficient regulatory framework.

With a seemingly ever-decreasing levelized cost of energy (LCOE)<sup>2</sup> from renewable sources, it was only a matter of time before NCRE would reach grid parity. The most striking example of this is the cost of PV plants: the capital expenditure of fixed-tilt PV plants has fallen from USD 3.42/W in 2010 to USD 1.61/W in 2012 – a reduction of more than 50 % in just two years could be seen as a sufficient reason for expansion (Bloomberg, 2015). This fall, plus improvements in efficiency that have been experienced in both PV panels and wind turbines, has been passed on, making the

NCRE competitive in the Chilean market. Recently, national public opinion has become a force. Communities are especially active, as they often believe they will suffer the environmental costs of new generation or transmission infrastructure, while others, elsewhere, benefit. Indeed, in the past few years, three projects, a large hydro project and two coal-fired power plants, facing strong public opposition, have been cancelled or had their approval rejected by the environmental authorities.

Today, any new coal-fired plant, still the most competitive way of producing electricity in Chile, is likely to face local and legal opposition, with resolution taking several years. This clearly affects the appetite of the private sector for such investment; in contrast, no utility-sized NCRE project has met opposition, let alone had its approval been rejected or cancelled.

But competitive costs and the availability and quality of the resources are not enough. Given the high capital intensity of NCRE, securing investments is key. Chile, however, is internationally recognized as having an attractive investment system for clean energy companies and projects. The 2014 Climatescope report<sup>3</sup> that rates countries on their ability to attract clean-energy investment<sup>4</sup> ranked Chile 5<sup>th</sup> among the 55 countries, after China, Brazil, South Africa and India, while the latest edition Ernst & Young’s renewable energy country attractiveness index (Ernst & Young, 2015) confirms Chile’s favourable investment environment, ranking the country 11<sup>th</sup> out of 40 countries analyzed.

Alongside Chile’s growth and stability, the 2014 Energy Agenda, introduced by Minister Energy Maximo Pacheco and currently being implemented, has helped as it recognizes renewables as a means of improving competition, reducing prices and moving to a sustainable energy matrix. This support for NCRE has been key in unleashing Chile’s potential and, in particular, it means that investors can expect the authorities to work on the few hurdles that hamper the development of NCRE, such as weaknesses in the transmission system.

Finally, the speed of the NCRE development can be explained by the unre- ►►►

### FOCUS

The Chilean Association for Renewable Energies, ACERA AG, seeks to protect the environment and enable sustainable development through the promotion of non-conventional renewable energy (NCRE). To this end, it promotes the use of NCRE, works to develop a regulatory framework to encourage NCRE, and promotes the installation of NCRE plants that exceed the goals established in national legislation. ACERA AG consists of 120 local and foreign members from the entire NCRE value chain.

<sup>2</sup> The LCOE is an economic assessment of the average total cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime.

<sup>3</sup> The Climatescope is a joint initiative by the Multilateral Investment Fund (MIF), a member of the Inter-American Development Bank, the UK Department for International Development, Power Africa and Bloomberg New Energy Finance.

<sup>4</sup> The index is made as a composition of four factors that include Enabling Framework, Financing & Investment, Value Chains and GHG Management.

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►►► regulated nature of Chile's electricity system: as new generators do not need the blessing of a central planner to build and connect their plants, they can react to rapidly changing market conditions. This might become a weakness as the fast integration of NCRE is starting to saturate some parts of the transmission system, the expansion of which, although planned, has been delayed.

The flexibility of the Chilean system was tested in a public tender launched by distribution companies for up to 13,000 GWh/year conducted in the second half of 2014. It was the first to include sub-blocks suited to variable renewable sources as they allowed bids for three hourly blocks, so wind and solar producers would not be exposed to spot-price risks at times when naturally they could not generate.

The tender was a success – it was the first to break the trend of increasing prices, a result of the competition created by the participation of NCRE generators and new conventional-energy players – renewable generators won almost a quarter of the supply. Additionally, the average weighted price from

*'Feed-in tariffs or subsidies are not always the best solution: in the case of Chile [...] the mere adaptation of a public tender was enough.'*

the successful renewable generators was USD 8/MWh below offers from conventional generators, and prices as low as USD 79.9/MWh from solar-PV generators were seen, USD 30/MWh below those from liquefied-natural-gas-based conventional generators. An analysis conducted by the Chilean Association of Renewable Energies (ACERA) estimated that this will save regulated customers about USD 360 million over the 15 years period of the contracts (ACERA, 2014).

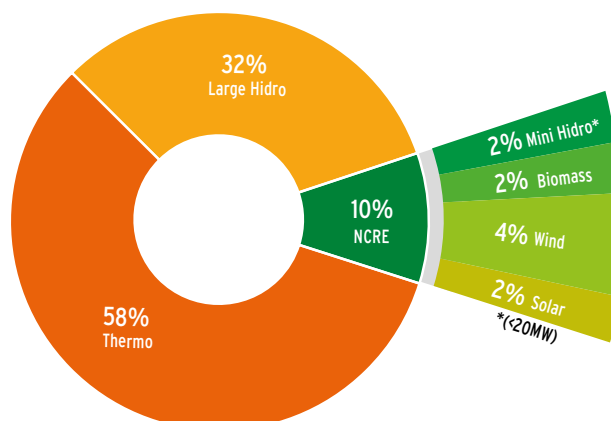
This clearly demonstrates that feed-in tariffs or subsidies are not always the best solution: in the case of Chile where NCRE was ready to compete effectively, the mere adaptation of a public tender was enough.

### CHALLENGES AND PROSPECTS

There are, however, challenges, with the bottlenecks that occur in the transmission system probably the most important. Even though new infrastructure and the connection between the north and the central systems are planned, the next few years, before they become operational, will be critical.

Then there is the uncertainty about the ability of conventional generators to inter-operate with solar-PV and wind-power plants

FIGURE: TOTAL INSTALLED CAPACITY IN CHILE BY ENERGY SOURCE, 2015



Source: CNE, 2015

whose generation can vary sharply.

Furthermore, it is important to consider the spot-price risk for those that decide to sell their energy on the wholesale market. This comes from both the variability and the lack of predictability of the spot price, and is increased when cheaper NCRE is injected into the grid. The rapid development of NCRE is thus raising concerns about the medium-term evolution of spot prices, and it is increasingly difficult for NCRE projects without fixed-price power purchase agreements (PPAs) to access funding.

The first two issues have been identified in the discussion about new regulations and should soon be solved or mitigated. The spot price issue should be improved by 2018, once the interconnection between the north and the central systems is operational, while the fact that NCRE now has access to PPAs with the distribution companies will also make many projects bankable.

Future tenders for energy for the distribution companies (regulated customers) are expected to include sub-blocks suited to variable renewables sources, which should allow the steady development of NCRE. Furthermore, the demand from non-regulated customers is likely to grow at about 4% a year, driven by new mining and industrial projects.

Grid parity has already been reached and the market is open to all renewable-energy technologies. Their installed base is growing, creating a demand for services to support them. While the construction and commissioning of most of Chile's initial

NCRE projects relied on qualified foreign personnel, the development of local capabilities is seen by the industry as a way of obtaining further cost reductions. This has also attracted the attention of the authorities who are sponsoring public-private development programmes, such as the National Strategic Programme on Solar Energy, the main objective of which is to reduce the cost of solar energy.

In addition, for many companies, including global players such as ENEL Green Power or SunEdison, Chile has proved to

*'The equivalents to Chile's open market [...] can be successfully exported to countries that want to transition to a sustainable power generation market.'*

be a good regional base to access the power markets of most of the southern cone of South America.

In the long term, studies show that the target of 20% of NCRE could be met by 2020, four years ahead of the deadline – meaning that there will be an excess of NCRE credits, and that NCRE projects will be competitive without them. In a longer term, studies suggest that Chile could generate up to 40% of its energy from NCRE sources by 2030. A comparison of least-cost

development scenario of the power system until 2035 with a scenario with no new coal based capacity showed that there was no material difference between the two (Carvallo *et al.*, 2014).

A real renewable energy boom operated in Chile the last years. Key success factors for the fast development of NCRE in Chile are: high quality and diversity of renewable energy resources, an open market that allows power generation companies with different technologies to enter and compete and market rules that have been adapted in order to avoid barriers and level the market risk for the different sources of energy for power generation.

But which factors that have enabled the recent boom in NCRE in Chile are relevant to other countries? The high quality and diversity of Chile's resources is structural and thus independent to policy. However, NCRE-technology R&D being conducted worldwide is bringing an increasing number of countries to "grid parity" with renewable technologies.

The equivalents to Chile's open market, with rules that avoid barriers and level market risk, can be successfully exported to countries that want to transition to a sustainable power generation market, with a progressive ability to diminish or abolish subsidies or feed-in tariffs.

For Chile itself, the challenge is to enable investors, developers, power producers, consultants, equipment and services suppliers, etc. to gain market share. •

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# Encouraging banking sector participation in climate finance, the case of Kenya

*The development of energy resources and energy efficiency in Kenya is a current necessity as well as a big challenge. To meet that challenge, Kenya's Association of Manufacturers (KAM) has partnered with the Agence Française de Développement (AFD) to provide technical assistance and to promote energy efficiency and the use of the country's plentiful renewable energy resources, encouraging growth while reducing the Kenya's greenhouse gas emissions.*

**Betty Maina**

*Former CEO, KAM*

**M**anufacturing growth has slowed in the last eight years<sup>1</sup> in Kenya, partly because of an increase in energy costs and inefficiencies in its generation and delivery – up to 40% of manufacturers' costs are for energy due to a need for self-generation and a reliance on petroleum products. Indeed, the cost of power in Kenya is one of the highest in the region (Figure), blunting its competitive edge. To meet that challenge, Kenya is encouraging the development of its considerable renewable energy resources<sup>2</sup>

(RE) and an improvement in energy efficiency (EE), but there are significant uncertainties that deter industrial investors and inhibit long-term investment in that sector. The Kenya Association of Manufacturers's (KAM) involvement is helping to find solutions both to foster energy efficiency in the manufacturing sector and build the capacity and confidence of local financial institutions.

This is especially important in view of the important role manufacturing has to play in helping Kenya attain higher growth through its ability to create productive employment and its close links with all other sectors of the economy.

## PROMOTING ENERGY EFFICIENCY

KAM has sought likeminded actors to develop RE and EE solutions, initially forming a partnership with the Global Environment Facility<sup>3</sup> to train energy auditors, promote energy optimisation among industries and train technical industrial personnel to track energy use. Proposed measures, however, were rarely implemented, especially high cost measures often associated with significant energy savings, and most of the audited companies reverted to business as usual once the auditors left.

The Danish International Development Agency joined KAM's initiative in 2011 to expand its scope and complement its work. In soon became clear, however, that a financing component was missing, and should be provided alongside technical assistance to project developers and banks. This presented a challenge since, at the time, no commercial banks were financing RE or EE projects. Furthermore, RE regulation was still under development. Investors were unaware of the benefits of these projects while over-estimating risks – despite their dynamism and potential profitability.

*'At the time, no commercial banks were financing renewable energy or energy efficiency projects.'*

## COMBINING TECHNICAL ASSISTANCE WITH FINANCE

To meet this challenge, KAM developed a partnership with the Agence Française de Développement (AFD) to provide project developers and banks with technical assistance alongside a credit line for financing EE and RE projects. They launched the Sustainable

<sup>1</sup> It is growing at 3.1% compared to overall GDP growth of 5% (World Bank, 2014).

<sup>2</sup> Solar, wind and geothermal generation.

<sup>3</sup> The Global Environment Facility is a partnership bringing together 183 countries with international institutions, civil society organisations and the private sector, to address global environmental issues.



BETTY MAINA

Betty Maina is the former Chief Executive of Kenya's Association of Manufacturers (KAM). She worked previously at the Institute of Economic Affairs, the Center for International Private Enterprise and the Kenya Leadership Institute, among others. Ms. Maina has also served on Denmark's Africa Commission and currently sits on various public sector boards.

## BOX 1: HOW SUNREF SELECTS AND ASSISTS ITS BANKING PARTNERS

Céline Bernadat, project officer of AFD's financial institutions and private sector division

The selection of financial institutions depends on multiple criteria including the institution's credit risk policy. Larger ones are considered, but so too are smaller institutions that are often dynamic and less risk-averse to innovation. Other criteria include the institution's climate finance strategy, its appetite for such activities and the availability of staff to focus on it; whether the client portfolio is concentrated on energy or a related strategic sector and/or is focused on appropriate

loans to small- and medium-sized enterprises; as well as its processes from the identification of projects to its credit risk appraisal system. The dialogue with in-country banks is based on an analysis of the local context, including a study of investments that show strong potential for the future, and the barriers that prevent such investment materializing. The technical assistance aims to remove technical barriers both for project developers and local financial institutions, helping them

identify a portfolio of bankable projects. It also aims improve the banks' understanding of climate finance and its ability to analyze risks related to such investment. The objective is to support the institutions in adopting an opportunity-based outlook instead of a risk oriented one. Lastly, the support aims to develop or consolidate a green strategy around climate investments, including the setting up of dedicated procedures and the structuring of a sustainable green offer.

Use of Natural Resources and Energy Financing programme (SUNREF) includes technical assistance (capacity building, institutional support, training, etc.) and financial tools (loans, grants, guarantees, etc.) to address the various barriers that small and medium sized green investment developers face.

The technical assistance<sup>4</sup> component, which is mainly focused on conducting due diligence for EE projects to mitigate the technical risks and at the same time reduce the financial risks

*'Project developers needed help in packaging projects to a level that would pass banks' credit-evaluation processes.'*

for the banks, unlocked the market. On the one hand, local banks that needed capacity building and a lot of hand holding to master structuring projects were, therefore, provided with training in project finance and credit appraisal. On the other hand, project developers that needed help in packaging projects to a level that would pass banks' credit-evaluation processes, were helped to improve the quality of their proposals through pre-investment finance support, pre- and post-feasibility screening and financial modeling.

KAM proposed that the financial component should be led by the private sector with local commercial banks acting as lending agencies and AFD providing them with low-rate, long-term finance for refinancing purposes. The SUNREF framework provides local financial institutions with special partnership conditions, allowing them to seize the opportunity

of financing climate-change mitigation, and scale on-lending to small-scale developers for small- and medium-sized climate-related projects.

The AFD ran the process of identifying partners (Box 1), launching a national tender inviting local interest, and taking the lead in choosing the banks. Initially two banks were selected but only one, the Cooperative Bank<sup>5</sup>, finally succeeded in becoming a partner; negotiations to identify a partner bank are also ongoing in Uganda.

While no formal marketing efforts were made in Kenya, 50 projects were identified in the first three months, mostly by word of mouth, which demonstrated the huge potential and was greatly motivating. In addition, the initiative had a clear role in supporting advocacy and lobbying for RE and EE – the adoption of Kenya's feed in tariff in December 2013 was one of its major achievements.

### FROM OBSTACLES TO ACHIEVEMENT

Of course there have been challenges, especially during the first year. Apart from credit officers being very protective of their credit appraisal processes and procedures, inadequate project finance skills and the risk averseness of bankers proved to be a huge obstacle. Then, project developers and especially process-industry owners are yet to fully appreciate the importance of and opportunities offered by EE. Additionally, although a number of banks were initially interested, only one was used in the programme's first phase. The SUNREF team believe that while its interest ►►►

## FOCUS

The Kenya's Association of Manufacturers (KAM) is one of the country's leading business associations. It represents more than 850 sector members who together contribute to 11.3% of the country's gross domestic product. It promotes trade and investment, upholds standards, and by providing a link for co-operation and dialogue with the government, encourages the development of policies that facilitate a competitive business environment and reduce the cost of doing business.

<sup>4</sup> The technical assistance is carried out by KAM via its regional technical assistance team and is supported by AFD and the EU-Africa Infrastructure Trust Fund (EU-ITF).

<sup>5</sup> The Cooperative Bank is modeled along the cooperative movement model – small likeminded businesses pool resources and lend these at minimal interest rates. The bank mainly targets the small- and medium-scale businesses and has been recognized as the Most Green Bank at the 2013 Energy Management Awards for achieving the fastest turnaround time for renewable energy and energy efficiency financing for SMEs and Large Enterprises, actively promoting green financing among clients and for being the bank with the largest number of projects seeking green energy financing.

**BOX 2: SUNREF'S PROJECT SUPPORT FOR SOLAR ROOF PANEL**

SUNREF provided a photovoltaic specialist to review Strathmore University's 0.9 MW solar roof panel project's bankability, help draft technical terms of reference for feasibility studies including a comparative analysis of available technologies and network connections; review specifications and issue a certificate of technical and financial eligibility, all the while keeping the bank informed of progress.

Once the certificate had been obtained, the university could request its loan and the bank pre-reserve funds from AFD financing. This was not a disbursement, but a guarantee that the bank, if it requested a disbursement, could have AFD funds. That assured the bank's credit committee that the AFD funds would be available to meet the project's long maturities and lower rates to ensure its feasibility.

The technical assistance can also help prepare the bank's credit committee and help the initiator anticipate questions. Once the credit committee accepts the proposal, the bank can request a disbursement from AFD. Once that has been made by AFD and the project launched, the technical assistance monitors the project's implementation and its impacts – Kwhs actually generated, etc.

*'The SUNREF team has been instrumental in changing manufacturers' thinking, creating an awareness of the importance of EE.'*

►►► was in small and medium scale projects, the banks were interested in targeting much larger ones: this has been an important lesson and has helped shape SUNREF's approach to other banks.

Green energy financing has also faced challenges as developers often have limited project development skills and cannot afford to pay for professional services – effectively, partner banks have had to train their clients on RE and the importance of EE management in their organizations. Partner banks' growing confidence and knowledge, including how renewable energy could benefit customers, have been important in creating a sustainable model to support a financing programme.

Despite these challenges, the SUNREF team has helped develop 80 projects that together have the potential to have a significant effect. Between 2012 and 2014, the team evaluated and certified 20 projects as being eligible for financial consideration, eight of which have received loans totaling USD 37 million, and are ongoing or have been completed. And four of these projects have benefited KAM members.

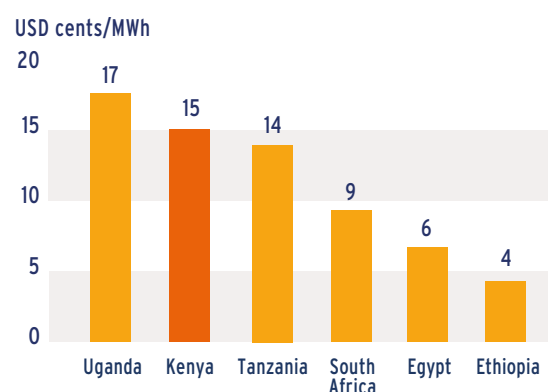
Prior to this manufacturers would more often than not opt to increase their production without doing an in-depth evaluation of the efficiency of their energy use – increased production with inefficient energy use frequently resulted in less than expected returns. The SUNREF team has, however, been instrumental in changing manufacturers' thinking, creating an awareness of the importance of EE and the effects this has on companies' competitiveness and bottom lines.

To date, the programme has helped reduce Kenya's annual carbon dioxide emissions by

65 kilotonnes through the installation of 22 MW of RE capacity, expected to produce 120 GWh/year. An example of how the funds have been used is the solar photovoltaic project at Strathmore University (Box 2). By harnessing RE through a roof-top photovoltaic system, generating 600kW at peak output, installed with the assistance of SUNREF, power outages are a thing of the past and the university stands to save USD 93,000 a year on its energy costs.

To date, the SUNREF programme has seen more than USD 55 million invested in RE and EE, Phase 2 of the project has received funding of Euros 60 million from AFD, and, due to the success of the first phase, has attracted interest from three more banks. Ultimately it is KAM's hope that the local financial sector will be able to develop and propose tailor-made EE and RE products from its own resources. But is important to reiterate that the success of the programme has been underpinned by the availability of appropriate financing and support from an able technical assistance team. ●

**FIGURE: ELECTRICITY TARIFFS IN AFRICA, 2014**



# Adapting to climate-change: the private sector can contribute

*Adapting to climate change is one of the greatest challenges of this century – its effects are already evident and widespread, and the developing world is particularly vulnerable. Multilateral development banks have a significant role to play in supporting climate resilience as they can offer dedicated financial and technical solutions to their clients. Their experience shows that private sector can play a key role in scaling up adaptation finance.*

**Craig Davies and Franka Klingel**

Senior Manager for Climate Change Adaptation  
Knowledge and Policy Manager  
EBRD's Energy Efficiency & Climate Change unit

**S**tabilising the global climate is the most important challenge of this century. For 38 consecutive years now the annual global temperature has been above average, and 2014 was the warmest year since recording began in 1880. The effects are already evident – the frequency of extreme weather events, such as heat waves and droughts, has increased damaging agriculture and endangering lives, while sea levels are rising, threatening coastal communities and infrastructure.

The developing world is particularly vulnerable – a risk that has the potential to further widen the North-South gap. Current financial flows of USD 4.4 billion per year (Buchner et al., 2011) dedicated to improving the climate resilience of the developing world are hardly enough to cover current and future climate adaptation needs. The World Bank estimates that USD 70–100 billion will be required to make developing countries' assets more climate resilient.

*'Climate-change adaptation is also about taking advantage of opportunities that may arise, as well as responding to threats.'*

Climate-change adaptation means anticipating adverse effects and taking appropriate action to prevent or minimise damage. This has sometimes led to a perception that climate resilience is a public good that is primarily the responsibility of governments, through for example, the provision of basic weather information, risk management policies and disaster planning (Deloitte, 2013). But the private sector is also exposed to the impacts of climate change, and is already developing a range of responses. From a business perspective, climate-change adaptation is also about taking advantage of opportunities that may arise, as well as responding to threats.

## GROWING PRIVATE-SECTOR ENGAGEMENT

The private sector has recognised that a changing climate poses risks, including disruptions to operations due to extreme weather events, damage to essential infrastructure and transport routes, and variations in water quality and availability as a result of extreme weather events. Physical risks, as well as supply chain and raw material risks, are particularly important for the agricultural and manufacturing sectors. Other risks include financial and regulatory risks.



**CRAIG DAVIES AND FRANKA KLINGEL**

**Craig Davies** leads EBRD's work on mainstreaming climate resilience in investment operations in such sectors as infrastructure, water, energy, manufacturing and financial services; and is involved in international climate finance mechanisms such as the Climate Investment Funds, the Global Environment Facility and the Green Climate Fund. He holds a PhD in Environmental Technology from Imperial College London.

**Franka Klingel** leads EBRD's work on communicating results and policy priorities on climate change and sustainable resources. She is involved in outreach and knowledge sharing activities including extensive collaboration with international climate finance mechanisms such as the Climate Investment Funds. She holds a PhD in Finance and Management from the School of Oriental and African Studies, University of London.

**BOX 1: PRIVATE SECTOR ADDRESSING WATER SCARCITY**

Water scarcity is a growing concern in Morocco, where the frequency of droughts has increased more than fourfold over the last century and a further decline in annual precipitation is projected. An EBRD client, a juice producer, invested in more water-efficient processing and water reuse in its production facilities, reducing water consumption, thus decreasing its exposure to the risk of water scarcity. Climate models project an increase in

temperature by more than 3.5 °C and more frequent heat waves in Jordan, where growing demand for space cooling is stressing already scarce energy resources. A local developer, planning heating and cooling systems for the regeneration of an urban neighbourhood, has with EBRD support invested in air chillers, a new technology that provides more efficient cooling and significantly reduces water consumption.

In central and southern Kazakhstan an occurrence of increasing water scarcity is projected, which would further intensify the existing pressure on water resources by the country's thriving extractive industry. With EBRD's support, a Kazakh company in the natural resource sector invested in water treatment facilities, enabling it to cover most of its water demand by recycling otherwise discharged water.

►►► Over recent years, the European Bank for Reconstruction and Development (EBRD) has experienced rising interest in projects aimed at making assets more climate resilient – largely from the private sector.

*'The most frequently stated risks that private sector clients want to address is increased water scarcity.'*

In 2013 and 2014 alone the EBRD provided 18 private sector projects with designated adaptation finance of USD 162 million. A study commissioned by the EBRD on behalf of the Multilateral Development Banks (MDB)<sup>1</sup> found that MDB private sector adaptation finance equalled USD 270 million in 2013 and 2014, making USD 1.5 billion of MDB investment more climate-resilient (Vivid Economics, 2015). The total value of MDB private sector projects with an adaptation component amounted to USD 5.5 billion, which shows that roughly USD 4.1 billion of additional finance was mobilised from private sources (Figure). This illustrates the significant role that private sector can play in scaling up adaptation finance. Around 80% of MDB private-sector adaptation finance flowed to middle-income countries, with the bulk going to upper-middle-income countries in Eastern and Central Europe, the former USSR and Turkey. This could be partly due to the fact that these economies are highly vulnerable to climate change and, in addition, have a relatively more developed private sector with a stronger enabling environment – arguably a determining factor in the absorptive capacity for private-sector adaptation finance.

**WIN-WIN OPPORTUNITIES**

MDBs adaptation finance flows mainly to agriculture<sup>2</sup>, followed by the industry, extractive

industries, manufacturing and trade sector. According to EBRD commissioned study, the most frequently stated risks that private sector clients want to address is increased water scarcity – a risk that is very tangible. Unsurprisingly, those risks that are less tangible and likely to occur over the medium-long term – such as hydrologic variability for example – are less often stated as the main motivator to take action. The MDB portfolio is dominated by investment in technologies that aim to improve clients' operations, such as technologies that increase resilience to drought and enhance water-use efficiency. These are predominantly measures that both optimise business operations and make it more resilient to climate change – as such they can be classified as win-win.

The predominance of no-regret activities is unsurprising given the competitive force that determines the private sector's investment decisions – firms and their owners are often primarily concerned with maximising returns in the short- to medium-term. Then, amongst EBRD clients, agri- and manufacturing businesses are the most advanced in adapting to climate change. For instance, many food processing companies that require large quantities of water are now seeking innovative solutions to make their operations more climate resilient – a phenomenon that is especially evident in countries that show a high vulnerability to climate change and in particular water scarcity (Box 1).

Barriers, nonetheless, still remain and in some cases it is not possible to turn potential opportunities into bankable adaptation projects. Especially when climate change impacts are highly uncertain and expected to occur in the medium to long-term, private clients are less likely to take action even if the investment has a long life cycle. Furthermore, many clients have limited know-how about how to incorporate climate change consideration into

<sup>1</sup> MDBs including the African Development Bank, the Asian Development Bank, the European Investment Bank and the World Bank Group

<sup>2</sup> In this sector, adaptation finance is for example extended for improved irrigation machinery, greater seedling production, new drip irrigation systems or technologies for improved crop management.

**FOCUS**

The European Bank for Reconstruction and Development (EBRD) promotes entrepreneurship through financial investment, business services and involvement in high-level policy dialogue. In 2006, the bank launched its Sustainable Energy Initiative (SEI) to promote investment in energy efficiency, renewable energy and climate change adaptation, which now encompasses 993 projects and investments of €7.7 billion.

the investment design – and regrettably, there is no fit-for-all solution. Limited availability of expert support, for instance through specialised consultants, is another barrier that prevents adaptation projects from being realised, as too is a lack of climate data. These barriers are frequent in developing economies although these countries are the ones that are most vulnerable to the impact of climate change.

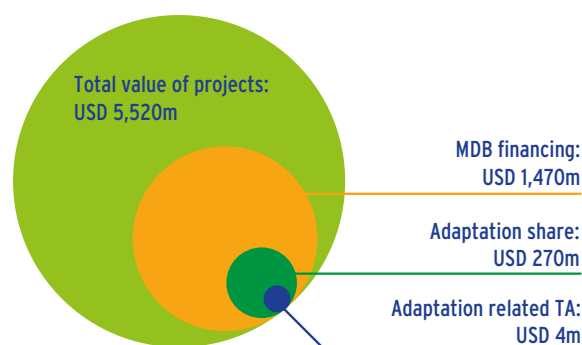
### FOSTERING CLIMATE ADAPTATION PROJECTS

However, to overcome these barriers, the range of technical and financial solutions is growing. Technical assistance targeted at clients is an important facilitator of private-sector adaptation finance: many had to be convinced of the relevance of adaptation. Feasibility studies and resource efficiency audits have proved to be useful tools. They help clients identify climate risks, derive technical solutions and turn them into bankable projects. The methodology includes benchmark analysis, risk assessment, capital investment appraisal and an implementation plan. Specialised consultants are commissioned to carry out the audit, which includes visits to a client's premises and an analysis of resource-management practices, and sometimes the creation of corporate social responsibility strategies. And if a project has been identified as climate-sensitive, projected climate conditions over the lifespan of the project's assets are taken into account. Many MDBs now offer technical support to their clients on their path to improving climate resilience (Box 2).

*'Many clients have limited know-how about how to incorporate climate change consideration into the investment design.'*

The MDBs can also offer dedicated financial solutions even if barriers are considerable, for

FIGURE: MDB PRIVATE SECTOR ADAPTATION FLOWS



Note: TPV = Total Project Value, MDB = Multilateral Development Bank, TA = Technical Assistance  
Source: Vivid Economics, 2015

instance when climate data is limited or when the approach to incorporating climate-change considerations is new. In addition to funding feasibility studies or resource efficiency audits, concessional finance through such partners as the Climate Investment Funds (CIF) can be provided.

Adapting to the impact of climate change is one of the most important challenges of the century. If left unmanaged, large parts of the world will suffer as their assets and infrastructure are not designed to operate under the changing circumstances. There is reason, however, to believe that things are moving forward. Whilst the private sector is increasingly engaging in finding solutions to adapt to climate change, other market players such as the MDBs are starting to mainstream climate change adaptation into their business operations. •

### BOX 2: IMPROVING THE CLIMATE RESILIENCE OF HYDROPOWER OPERATIONS

In 2014, the EBRD agreed a USD 50 million loan with Tajikistan's power company to finance the first phase of the rehabilitation and modernisation of the 126 MW Qairokkum hydropower plant, which supplies electricity to 500,000 people. The project is jointly financed with the Climate Investment Funds' Pilot Programme for Climate Resilience (PPCR). Tajikistan is experiencing climate change; average temperatures

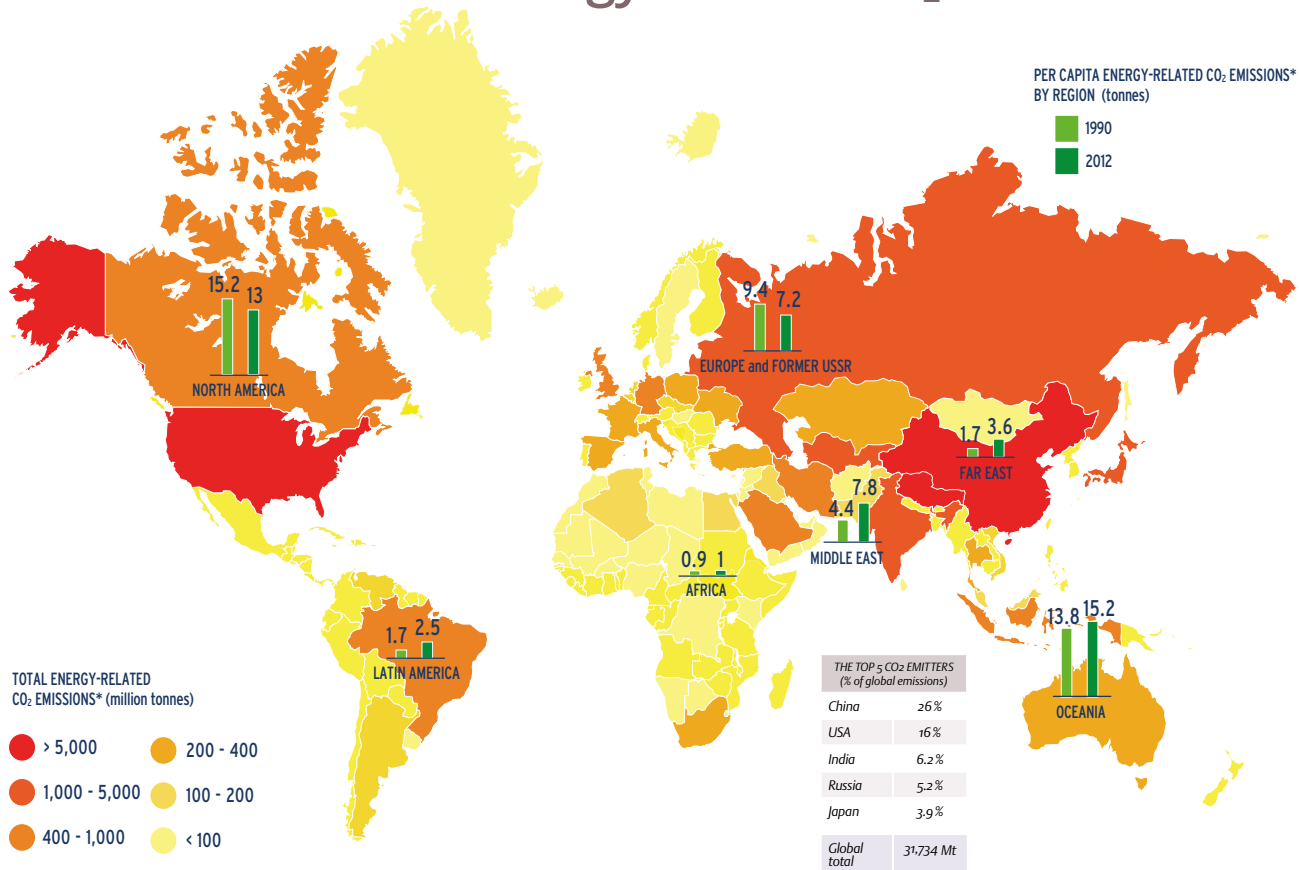
are rising, precipitation patterns changing and glaciers retreating, all of which could impact the hydropower sector. Water flows into the reservoirs may alter, affecting the sector's ability to generate electricity. Given that 98% of Tajikistan's electricity is generated by hydropower, this could have a serious effect on the economy as a whole. The EBRD supported the Tajik company through feasibility studies on integrating climate-

change considerations into the investment design and expert modelling of future hydrology – in other words, the water inflow into Qairokkum's reservoir – under different climate scenarios. This formed a basis for selecting the most suitable rehabilitation design. In addition a dedicated technical assistance package will assist the company as it mainstreams climate change in the operational management of hydropower assets.

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Whether the impacts of climate change are already upon us, or heading our way in the future, they will affect the entire planet. Controlling GHG (greenhouse gas) emissions is therefore a major global challenge. Latest international negotiations have set a target of limiting climate warming to an increase of 2°C. Yet substantial investments will be required to meet this challenge – that cannot be achieved without a massive mobilisation of private capital on behalf of sustainable projects.

## Global overview of energy-related CO<sub>2</sub> emissions

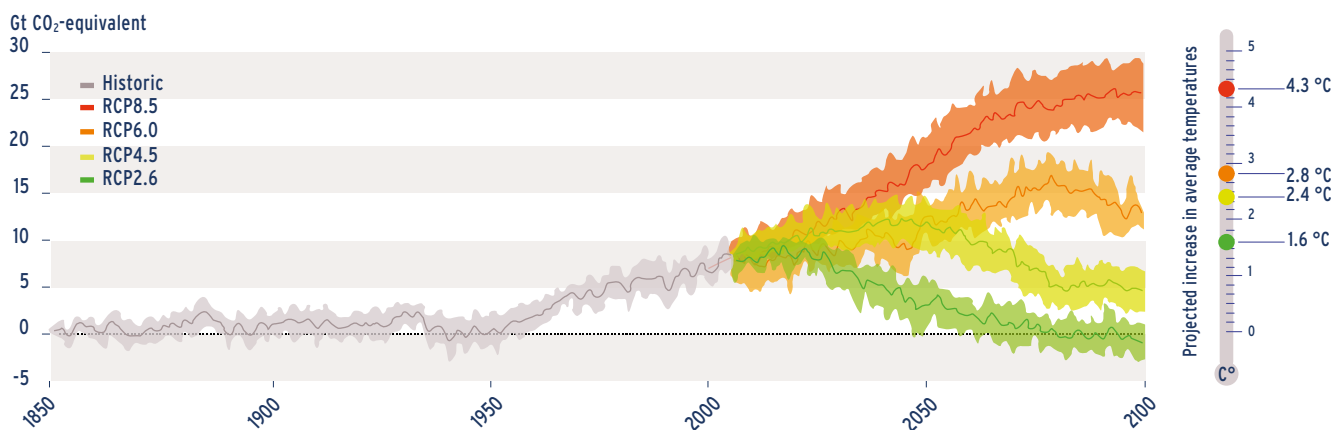


\*Energy-related emissions account for the vast majority of the total.

These figures do not include non-energy-related emissions, which affect only a small number of countries and where the figures are less reliable.

Source: IEA, 2014

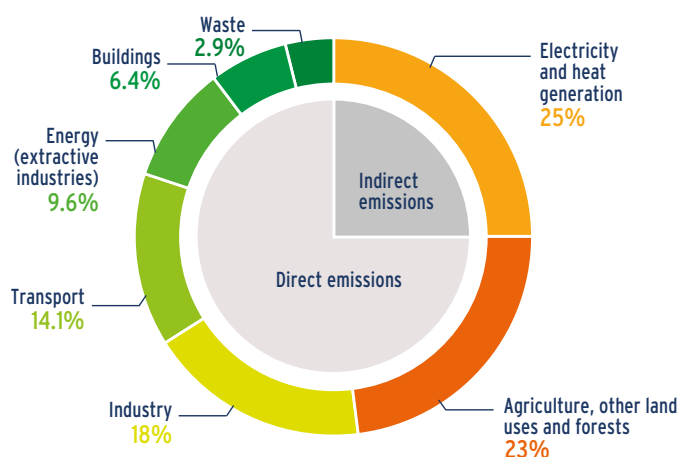
## IPCC scenarios for global emissions from fossil fuels, 1850–2100



Note: This graph represents projected fossil-fuel-related emissions following the four greenhouse gas (GHG) concentration pathways mapped out by the IPCC and their associated temperature changes (expressed as an average covering the period 2081 – 2100 compared with the pre-industrial era). Only the RCP 2.6 scenario remains within the target under limit of a 2°C temperature increase compared with the pre-industrial era. The RCPs (Radiative Concentration Pathways) are reference scenarios for trends in the radiation balance (downward radiation minus upward radiation) in the upper troposphere (altitude 10 to 16 km), reflecting climate change factors effective over the period 2006 – 2300.

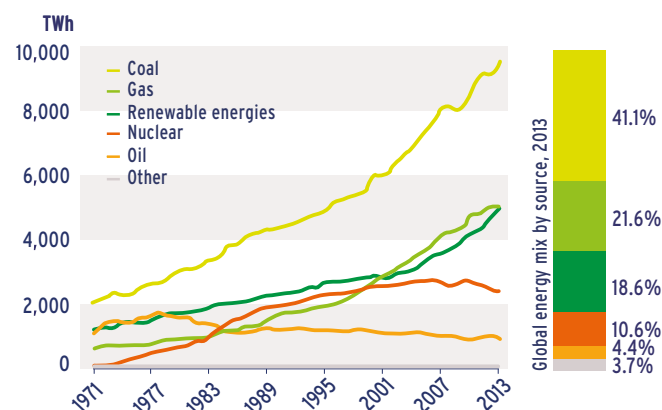
Source: IPCC, 2013 and our calculations based on IPCC and HadCRUT data.

## Global GHG emissions by sector, 2010



Source: CDC Climat, 2015

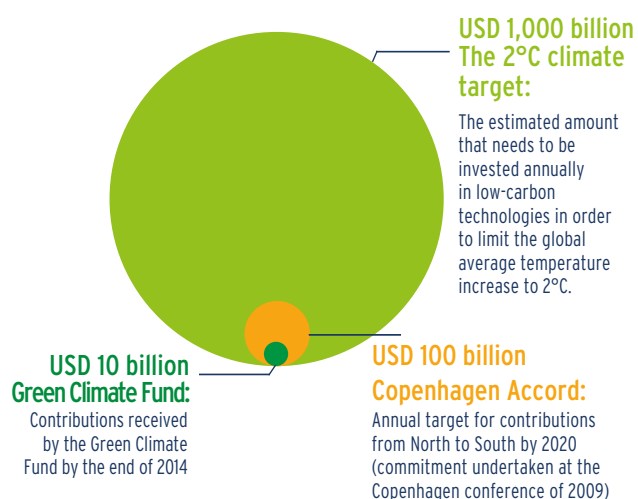
## Global electricity production by source, 1971-2013



Source: IEA, 2015

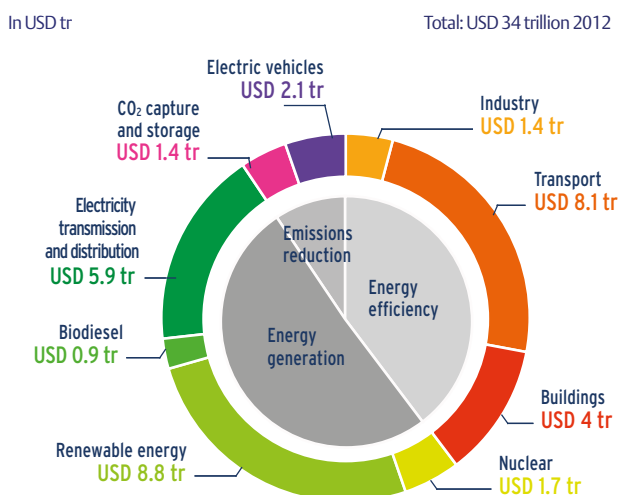
Note: The generation of energy and heat is the main source of emissions, accounting for 25% of total GHG emissions worldwide. Although most of the world's power supply is still thermally generated, renewable energies (including hydroelectric power) have for the first time overtaken gas in the global energy mix and now represent the second source of energy worldwide.

## Climate finance: what's needed



Note: the Green Climate Fund is a United Nations financial mechanism which aims to channel funding from the developed world to the most vulnerable countries in order to combat the effects of climate change.

## Low-carbon technology global investment needs, 2014-2035



Note: The figures represent investments in low-carbon technologies needed between 2014 and 2035 according to the IEA's 2° scenario – in order to limit the average global temperature increase to 2°C.  
Source: IEA, 2014

## Key impacts of climate change



Source: French Ministry of Ecology, 2015

# Lessons learned from this issue

BY FANETTE BARDIN, EDITOR IN CHIEF  
ALICE LUCAS, SENIOR INVESTMENT OFFICER  
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The international community has set itself the goal of keeping the average global temperature increase within 2°C above pre-industrial levels. In order to achieve this, global greenhouse gas emissions will need to fall by 40% to 70% between 2010 and 2050, involving a massive roll-out of renewable energies, energy efficiency improvements in industry, buildings and transport, better land management, protecting forests – and other measures besides. Recent technology advances have led to the development of effective, reliable and more competitive solutions for reducing our economies' carbon footprint. Yet their widespread deployment in the countries of the global south is impeded by a lack of local expertise, inadequate regulatory frameworks and insufficient local and international financing – an absolutely critical challenge. Transitioning to low-carbon societies requires sustained investments – estimated at more than USD 1 trillion annually between now and 2035. Yet to date such sums are far from being achieved, despite a surge in private investments – accounting for more than two thirds of all financing provided – and the establishment of the Green Fund.

Given the challenges involved and the levels of funding required, the climate finance architecture should count on both traditional development aid players and those from the world of “traditional” finance. In particular it is important that the financial industry has a higher level of involvement – even if some obstacles still remain in place. After all, the commercial banks in the global south have little experience of financing “green” projects, and underperforming capital markets limit their capacity to support initiatives of this kind – initiatives which are highly capital-intensive by their nature. Investors' involvement is still relatively low in the upstream phase of project development and they demand a very high rate of return in developing countries. Moreover, small and medium-sized businesses find it difficult to access the financial markets – even though they are well placed to make an active contribution to “decarbonising” the economy. Nonetheless the financial sector is gradually opening up to the opportunities presented by the fight against climate change. This is apparent, for example,

in the rapid growth of the green bonds market and the incorporation – still in its early stages – of carbon risk and climate risk within traditional financial models in the global north. Finally, innovative financing mechanisms are emerging – yieldcos, for example, which enable businesses to transfer operational assets to the financial markets, driving down the cost of capital.

Public authorities can play a key role in reinforcing this dynamic, encouraging the redirection of private investment flows. Governments can develop strong public policy incentives – carbon tax, fiscal incentives, introducing energy efficiency and renewables portfolio standards, etc. – along with a stable regulatory framework that can provide security for investors, including incentives such as fixed tariff schemes. It is also their responsibility to reconfigure the allocation of public budgets, which still massively over-subsidise fossil energies. The other major challenge that must not be overlooked is financing adaptation – a crucial aspect of the response to climate change to which developing countries will be especially vulnerable. Scaling up climate finance also involves building multi-stakeholder dialogue – a role currently undertaken by development finance institutions (DFIs) besides their financing activities. In countries where initiatives are still few and far between, DFIs provide the vital long-term financial resources. They also have a range of other strategies at their disposal: deploying instruments such as subordinated loans or guarantees as a means to reduce risk for other financiers; incentivising banks to develop their own “green” finance initiatives by offering dedicated credit lines; and providing technical support to project developers, investment funds and governments.

Investing in a low-carbon economy is crucial to ensure the long-term security and wellbeing of the world's populations, but the process of doing so also opens up new investment opportunities for the private sector. COP21 will need to send a clear signal to the world's economic and financial actors, engaging them to seize this opportunity and invest massively and sustainably in the transition to low-carbon economies.

*In our next issue*

**Social business – a private-sector alternative for development**

Issue coordinated by Alice Lucas (Proparco), Loïc Perret (Proparco) and Caroline Edant (AFD) with the participation of Jérôme Bertrand-Hardy and Julie Gonnet (Proparco). To comment on the articles, go to our blog at: <http://blog-private-sector-and-development.com>



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