



# TRENDS IN PRIVATE SECTOR CLIMATE FINANCE

REPORT PREPARED BY THE CLIMATE CHANGE  
SUPPORT TEAM OF THE UNITED NATIONS  
SECRETARY-GENERAL ON THE PROGRESS  
MADE SINCE THE 2014 CLIMATE SUMMIT

9 OCTOBER 2015

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# EXECUTIVE SUMMARY

**The finance community is emerging as a partner in the challenge of responding to climate change – policy makers have an opportunity to both deepen and broaden this partnership.** Actors from across the sector and in all geographies are recognizing both the threats that climate change poses, but also the commercial opportunities it provides. They are responding with action, as illustrated by five key ‘inflection points’, described below. The resulting momentum is in distinct contrast to the situation in the run up to COP 15 in Copenhagen. But gaps in private sector climate finance<sup>1</sup> remain: investment levels remain too low; not all countries are seeing benefits; and leadership by some in the sector is matched by inertia from others. Filling these gaps will, in turn, necessitate governments to address weaknesses in their own policy responses, requiring both national action and international cooperation.

**The momentum in the sector was given a substantial boost at the 2014 Climate Summit hosted by the UN Secretary-General in New York.** This prompted a series of specific, quantified commitments and targets from across the sector, involving both individual companies as well as organizations acting in partnership. As shown for the first time in this report, the majority of these commitments and targets have been met or are on track to being delivered.

**The five ‘inflection points’ demonstrating the early signs of a deep shift cover all the key aspects of the sector:**

- 1. Building on the targets and commitments announced at the 2014 Climate Summit, a range of financial institutions from developed and developing countries have recently committed hundreds of billions of dollars in additional finance to support low-carbon and climate-resilient investments in all parts of the world.** This capital will finance investment in both developed and developing countries to reduce emissions and improve climate resilience while providing energy, reducing air pollution and delivering a host of other benefits. In addition to mobilizing traditional investment instruments, investors have experimented with a range of new and innovative financing approaches. Crucially, many of the organizations taking these actions are not just identifying changes they will make to their business practices in the near term. Rather, they are altering their long-term business
- 2. A new green bond market has been created and is expanding at a rapid pace.** Six years ago, green bonds were a concept. In 2015, it is expected that issuance will be between \$50 and \$70 billion. This will support new low-carbon or climate-resilient investment in the energy, buildings, transport and water sectors. Originally spurred by development banks, green bonds are now issued by utilities, car manufacturers and a host of other corporates. In 2015, many of the most significant positive developments spurring the green bond market have arisen in emerging economies.
- 3. A rapidly increasing number of companies are adopting internal carbon prices.** The vast majority of private sector investment is made by companies re-investing free cash flows. It is therefore hugely significant that, according to one estimate, the number of firms using internal carbon prices has trebled in just the last year to almost 450 (CDP, 2015). By market capitalization, around 15 per cent of the S&P 500 factor in a price on carbon when undertaking investment appraisal. A further 580 companies anticipate introducing an internal carbon price within the next two years.
- 4. Investors are expressing increasing concern around the activities of carbon-intensive assets and companies.** Driven by initiatives such as the Portfolio Decarbonisation Coalition launched last year, investors have made commitments to decarbonize broader market portfolios worth hundreds of billions of dollars, and they have developed the investment strategies and instruments necessary to do so. Furthermore, in the last year alone, investors have also committed to tracking the carbon performance of assets under management (AuM) worth trillions of dollars, and have increased engagement with carbon-intensive companies to encourage more sustainable business strategies. In the extreme, a number of investors are turning to divestment. Collectively, these actions are sending powerful long-term signals to companies about the desire from the investor community to accelerate the low-carbon transition.

5. **The insurance sector is scaling up its efforts to respond to the climate impacts that are already locked in.** There has been a steady rise across both developed and developing countries in the number of lives and value of assets insured, and an improvement in risk reduction and disaster response measures. Over the past three decades, the proportion of weather-related losses insured in developed countries has risen from roughly 30% to 50%. In developing countries, the proportion of weather-related losses insured has risen significantly from roughly 1-3% on average in the 1980s and 1990s to roughly 4-10% on average since 2005. This has been enabled by more sophisticated tools for understanding the causes of risk and vulnerability, and by a range of expanding products and approaches, such as sovereign risk pooling, microinsurance, catastrophe bonds and index-based insurance. Many of these seem to have reached an inflection point, demonstrating the potential for rapid scale-up and expansion of geographic scope.

These developments come at a time when renewable power investment has already passed through an inflection point, with renewable energy investment increasing by 55 per cent since 2009,<sup>2</sup> primarily in non-OECD countries, and with annual new investment in renewable power almost 90 per cent higher than annual net investment in fossil fuel power.

**Yet despite reaching these inflection points, there are challenges, gaps and fragilities that need to be addressed, especially to ensure geographic breadth.** Overall low-carbon investment levels are currently below those needed to avoid breaching the 2°C threshold this century, and adaptation funding gaps are anticipated. While there is leadership by some in the finance community, others remain wedded to the status quo. Geographically, performance varies. The bulk of financing commitments made by financial institutions appears likely to be met by making investments in developed country markets, and the extent of insurance cover for weather-related losses is five times higher in developed countries compared with developing countries. Internal carbon pricing is more prevalent in European and North American companies than in their African, Latin American or Asian counterparts. But, in other cases, such as renewables investment, it is a selection of developing and emerging countries that is leading the way, while investment in many OECD countries has tailed off significantly.

**Building on the positive momentum in the finance sector, as well as recent policy action often in non-OECD countries, governments now have a unique opportunity to change rules so as to address the current gaps and weaknesses in private sector climate finance.** Important changes to foster private sector low carbon and climate resilient investment have been made in recent years. Many of these have been pioneered in non-OECD countries. But further action is required by policymakers from around the world; action that will be supported by investors who are concerned that delays will only increase economic costs and put at risk tens of trillions of dollars of financial assets.

**Policymakers need to increase the demand for low-carbon, climate resilient investment.** Reforms to energy pricing, as well as carbon pricing, are essential to level the playing field between low and high carbon alternatives. This may need to be supported by public climate finance to manage policy and political risk. Governments should adjust their infrastructure needs assessments to prioritise low-carbon, climate-resilient infrastructure and explicitly publicise the results. To enhance demand for risk management, governments have a host of tools available to them including building awareness, appropriately subsidizing or mandating coverage, and facilitating the development of sovereign risk pools.

**More policy attention is needed to allow low-cost capital to flow towards these opportunities.** Enhanced disclosure rules, as well as stress testing, will provide more and better quality information that can improve decision making by companies, investors and regulators. This will require international coordination. Depending on national circumstances, capital flows to the low-carbon climate resilient economy can be further supported by tax incentives, interest rate subsidies, credit enhancement, and dedicated financial institutions for green financing; while there may be an opportunity for recalibration of prudential governance rules to better reflect long-term economic and environmental realities.

# I. INTRODUCTION

## UNDERSTANDING THE ROLE OF PRIVATE SECTOR FINANCE IN PROMOTING THE LOW-CARBON, CLIMATE RESILIENT TRANSITION

### AN ECONOMIC TRANSITION, A FINANCING TRANSITION

**The world has started to reorient itself to a low-carbon, climate-resilient future.** In recognition of the profound threats that climate change poses, the world has committed to ensuring that average global temperatures increase by less than 2°C above pre-industrial levels. It has also recognized that even these temperature increases will have a significant destabilizing impact on many people and communities, and that there is an urgent need to enhance climate resilience, especially of the most vulnerable.

**The successful and rapid transition to a low-carbon, climate-resilient economy relies, to a significant extent, on a transition in the finance ecosystem.** A low-carbon, climate-resilient economy requires large amounts of capital investment<sup>3</sup> and risk management across different sectors, including renewable energy, transport, building energy efficiency, water and agriculture. This will take place around the world in a wide variety of market circumstances. This major reorientation of investment can be achieved only through a parallel shift in the way the financial ecosystem mobilizes and allocates capital. Similarly, the economic damage from emerging climate risks can be managed only if the ecosystem improves the way it pools and transfers risks.

**While the public sector has a vital role to play, the private sector will provide the bulk of the financing and insurance driving the transition.** Underlying this low-carbon, climate-resilient shift in the finance ecosystem will be fundamental changes to the determinants of profitability and asset values, and the resulting price signals to the market. These will arise from a combination of government action, technological disruptions and other factors. However, the finance and investment sector does not simply respond passively to these developments, but plays an active role in response to competitive incentives, anticipating market changes, reducing the cost of capital and insurance, and

increasing access to, and aggregate levels of, investment and risk protection.

#### The shape of a robust financial ecosystem

**A robust financial ecosystem involves a host of entities taking action in different but complementary roles (see Figure 1).** Institutional investors, responsible for investing savings of households, will need to specify investor needs and preferences for low-carbon and climate-resilient opportunities in different asset classes within their investment strategies. These strategies will often be implemented by **asset managers** who may need to develop innovative products to fulfil these mandates. **Banks** will also play an important intermediary role in discovering investments, assessing risks and returns, and lending to both corporates and households. Crucially, **investment recipients** themselves will need to share information effectively with the financial sector and use capital at their disposal (either provided by capital markets or from free cash flows) to finance low-carbon, climate-resilient investments. **Insurance** companies, through underwriting economic activity and insurable interests, will help manage climate risks and the risks associated with the transition to a low-carbon economy (as well as playing a separate role as institutional investors). These changes in behaviour will need to be seen in both primary markets (the point at which capital is first allocated) and secondary markets (subsequent transactions in any associated financial products).

**To fulfil their roles in the transition, actors in the financial community need to expand their experience and capabilities.** This will include developing new networks and sources of information, increasing knowledge about new low-carbon technologies and markets, and better understanding correlations between the risks and returns of the associated assets. Those seeking capital and risk protection also need to correctly

gauge the market opportunity and efficiently structure their financing and investment strategies.

**The distinct nature of some low-carbon, climate-resilient investments and risks also necessitates innovative new instruments.** These include instruments that securitise new types of infrastructure assets with novel risk–return profiles; that allow access

### **Moving towards a shift in financial markets**

**Since the UNFCCC 15th Conference of the Parties in Copenhagen in 2009, the finance sector has emerged more fully as a partner.** It increasingly recognizes both the opportunities provided by the transition, as well as the economic, financial and human risks posed by unchecked climate change. The capital committed by the private sector has grown overall, across renewables and other sectors, and in both developed and developing countries. The financial sector has also matured in terms of its understanding of the transition, its capacity to identify opportunities, and its development of a robust set of products and approaches to take advantage of those opportunities. Some of this has been prompted by rule changes around, for example, carbon pricing and disclosure. In other cases, the impetus has been voluntary or in commercial anticipation of the needs of a low-carbon, climate-resilient economy.

**Action in the finance sector coalesced, and received a substantial boost, at the 2014 Climate Summit hosted by the UN Secretary-General.** The 2014 Climate Summit, born of a recognition that the UN itself needed to change in order to facilitate the economic transition, aimed to bring together all actors with a role in addressing climate change to catalyse creative ideas and engender new partnerships. One of the key results was that, for the first time, a broad coalition of private sector financial institutions made concrete commitments or set quantified targets towards achieving this transition. This coalition encompassed asset managers, pension funds, insurance companies and large banks from across the globe, and their announcements spanned a variety of investment instruments, incorporating a couple of hundred billion dollars of assets. Moreover, the 2014 Climate Summit proved to be a focal point for, and catalyser of, a broader set of actions by financial institutions. In turn, these have prompted important, but early, signs of broader shifts in the financial markets. This report provides further

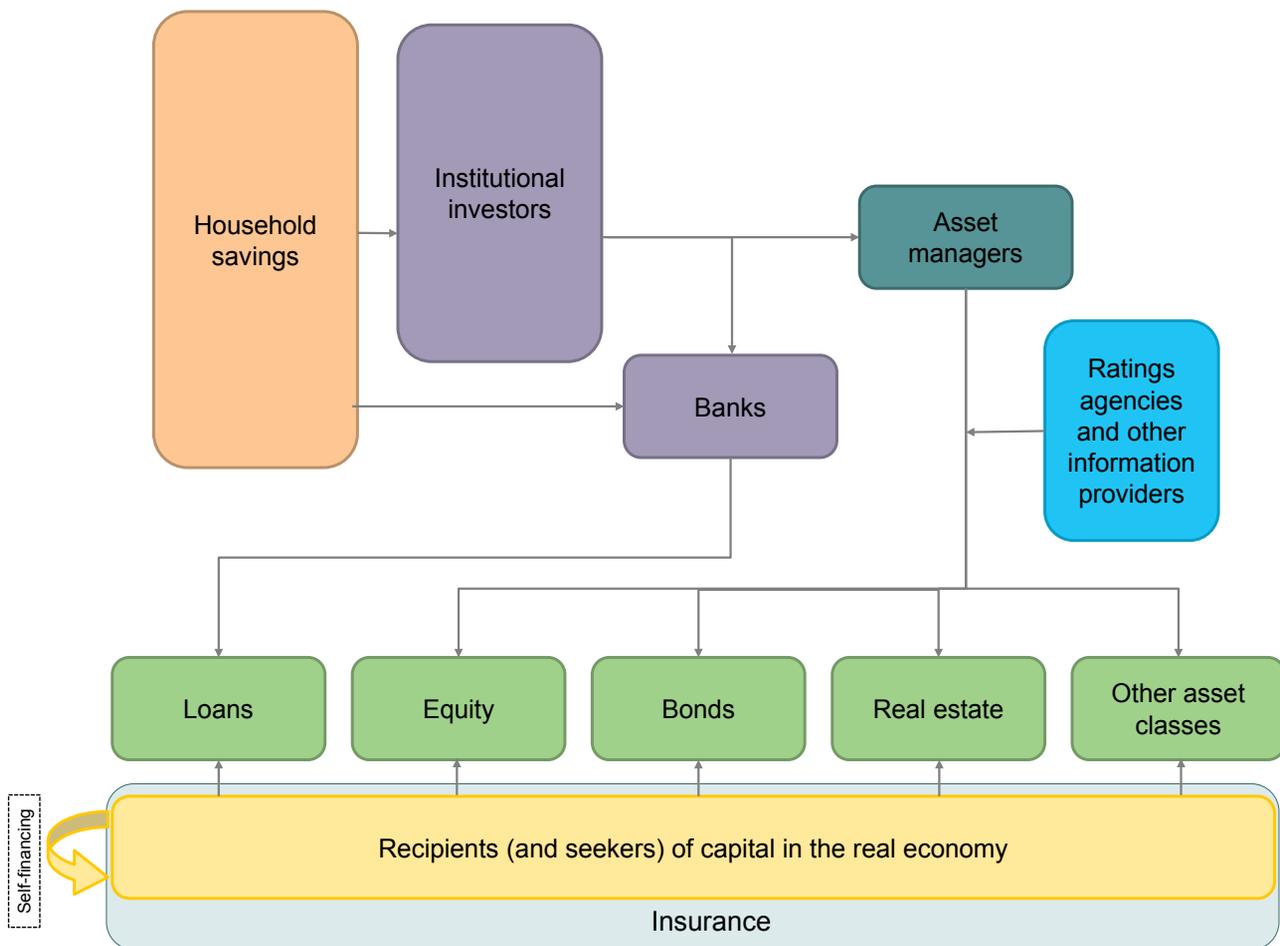
to climate change-related investment opportunities to enable active investment strategies; and that hedge carbon pricing and climate damage risk. In relation to risk management, increasing climate damages will require instruments that increase risk pooling, incentivise risk-reduction measures, and enable a more rapid disaster response.

detail on the progress against these commitments and targets and the changes in the financial markets that are emerging. It does so without prejudice to the ongoing negotiations within the UNFCCC as to what constitutes climate finance or on what should be counted towards the Copenhagen Accord commitment by developed countries to a goal of mobilizing \$100 billion dollars a year by 2020 to address the needs of developing countries.

**But in some cases these shifts are fragile or have a narrow geographic focus.** The scale of the challenge requires a global transition which, despite promising signs, currently remains out of reach. In developed countries we are seeing a plateauing of some types of low-carbon investment, and while investment and climate risk management have expanded rapidly in a number of developing and emerging countries, many others have yet to see significant private sector activity take hold. Despite significant advances, and what appear to be a number of critical inflection points, we are still very much at the beginning of the anticipated transition. Much more needs to be done.

**Changes in rules can help cement the momentum and broaden its reach.** While parts of the finance community demonstrate real leadership on climate issues, others remain wedded to the status quo. Much more can and must be done to capitalize on the leadership that has already been shown within the sector so as to fully exploit its latent potential and broaden its geographic reach. There are encouraging signs of pioneering efforts across both developed and developing country governments in creating rules that encourage private sector engagement in the climate challenge. While rule changes need to be grounded in national circumstances, this report highlights some of the key rule changes and public–private partnership initiatives that could be explored further, as well as critical opportunities for cooperation at the international level.

FIGURE I - All aspects of the investment and financing ecosystem will require change to support the low-carbon climate-resilient transition



Source: Vivid Economics

## 2. COMMITMENT IS GROWING

### INDIVIDUAL ORGANIZATIONS, AND COALITIONS OF ACTORS, ARE TAKING ACTION

#### Sectoral Policies

- The 2014 Climate Summit in September 2014 represented a step-change in the focus placed on climate change by major financial institutions from across the world.
- It prompted a series of specific, quantified commitments and targets across the sector from both individual companies and organizations acting in partnership.
- These commitments and targets have been met or are on track to being delivered.
- Following the 2014 Climate Summit there has been an acceleration in activity by financial institutions in all geographies. This illustrates growing appreciation of climate change as a commercial and strategic driver of business decisions.
- There are now forward-looking commitments and targets amounting to hundreds of billions of dollars that will be allocated to the low-carbon, climate-resilient economy over the next 5–10 years. This represents a significant scale-up.
- We have also seen commitments by institutional investors to decarbonize market portfolios worth hundreds of billions of dollars and to measure the carbon footprint of portfolios worth trillions of dollars.
- At the same time, a broad array of investors is now calling for policy action, based on a conviction that delaying the transition will increase the economic cost, and reduce overall financial returns.
- Focus will be needed to ensure that these positive developments support investment around the world, and serves as a catalyst for the rest of the finance community.

**Political leaders will meet later this year in Paris to cement a global climate change deal.** They have a historic opportunity; the outcome of these deliberations will have enormous consequences both for this and future generations. Using Intended Nationally Determined Contributions (INDCs)— which express how governments intend to reduce the carbon intensity of their economies and, in some cases, also articulate how they intend to build their resilience to the impacts of climate change through adaptation – the conference will establish a global downward trajectory for emissions. It will clarify progress towards the objective of staying under the threshold of 2°C warming this century,

which will be possible only through peaking and then steady decline of global emissions, eventually reaching a balance with the capacity of the Earth’s system for absorbing all annual emissions. The Paris Agreement will receive its momentum from the growing realization that an economic transition is necessary, possible and beneficial.

**When political leaders last met to agree a global response to climate change (COP15), the attention of the finance sector was largely elsewhere.** It was still reeling from the financial crisis and, with a few notable exceptions, climate change was given little

attention. In 2009, global renewable energy investment, largely financed by the private sector, actually fell by 3 per cent.

**Over the last few years, early signs of a fundamental shift in the finance sector have emerged.** Both individual investor organizations and coalitions of actors are increasingly seeking to allocate capital towards low-carbon, green and sustainable opportunities, while managing their exposure to both high-carbon assets and climate impact risks. For instance, in the banking sector, Wells Fargo and Goldman Sachs made financing and investment commitments to the low-carbon economy in 2012: of \$30 billion by 2020, and \$40 billion by 2022 respectively. Under the Power Africa initiative, Standard Chartered and Barclays Africa Group committed a minimum of \$2 billion and \$500m, respectively, to a pipeline of proposed clean power projects across

Sub-Saharan Africa. Similarly, the Soft Commodities Compact of the Banking Environment Initiative and the Consumer Goods Forum, signed in December 2013, mobilized members of the banking industry to support the goal of achieving zero net deforestation in their supply chains by 2020. Outside of the banking sector, initiatives such as the Danish Climate Investment Fund – a public–private partnership between the Danish state and IFU (as public entities) and PensionDanmark, PKA, PBU and Dansk Vækstkapital (as private parties) – provided a route for institutional investment in renewable energy and adaptation projects in developed and developing economies. These forerunners created long-term signals to investors; began to generate a track record upon which others can build; and started the development of investment products and services able to meet emerging demand.

## 2.1 COMMITMENTS MADE AND TARGETS SET AT THE UNITED NATIONS SECRETARY-GENERAL'S CLIMATE SUMMIT 2014

**This fundamental shift and the role of leading players coalesced strongly when a series of high-profile commitments and targets was set by leaders of the finance sector at the 2014 Climate Summit in September 2014.** The specific commitments and targets made were:

- **The International Cooperative and Mutual Insurance Federation (ICMIF) and the International Insurance Society (IIS) targeted, on behalf of its members, to double the amount invested in Smart Risk Investing (SRI) by the global insurance industry from \$42 billion to \$84 billion by December 2015, and to \$420 billion by 2020.**<sup>4</sup>
- The 2014 Climate Summit launched the **Portfolio Decarbonisation Coalition** with the aim of assembling a coalition of investors who, before the 2015 Paris Conference (COP21), would commit to **decarbonizing<sup>5</sup> at least \$100 billion** in institutional investment across asset classes and to **measure and disclose the carbon footprint of at least \$500 billion** in investments. It was launched with the backing of one asset owner (AP4) and one asset manager (Amundi), as well as the Carbon Disclosure Project and UNEP FI.
- **Credit Agricole** committed to **underwriting \$20 billion** of climate bonds in 2015.
- A coalition of **CalSTRS, APG, Pension Danmark** committed to **allocate more than \$31 billion** to low-carbon investments by 2020.
- **Swiss Re** committed to advising 50 sovereigns and sub-sovereigns on climate risk resilience and to have

**offered them protection of \$10 billion** against this risk by 2020.

- **Bank of America Merrill Lynch** announced the **Catalytic Finance Initiative**, a targeted \$10 billion total capital commitment across global financial institutions, investors, development financial institutions, and foundations/philanthropies to stimulate new investment into high-impact, clean energy projects around the globe by 2022. Bank of America Merrill Lynch committed \$1 billion to the initiative.

There are ongoing negotiations within the UNFCCC as to what should constitute mobilised private climate finance for the purposes of the Copenhagen Accord commitment of a goal of \$100 billion around which there are differing views. The subsequent discussion is provided without prejudice to these negotiations.

**The significance of these commitments and targets lay not only in the sums of capital involved, but also in the breadth of institutions that came together, and the evidence of partnership.** Banks, pension funds, insurers and asset managers all specified actions. Notably, a number of commitments and targets involved partnerships and coalitions; for instance, there are over 20 companies actively involved in the insurance industry SRI initiative. The activities cover injections of new capital into low-carbon opportunities through primary markets, initiatives to decarbonize existing asset portfolios, and recognition that the sector has an important role to play in managing climate risks that have already been locked in. As a whole, they provide a clear signal of the direction in which markets are shifting.

In the vast majority of cases,<sup>6</sup> organizations are on track to meet, or have already met, these commitments or targets.

**The amount of SRI by the global insurance industry is estimated to already have reached \$109 billion by July 2015 – well in excess of the end-of-2015 \$84 billion target.** The industry suggests that it could reach \$130 billion by October. The insurers responsible for this progress are based in a diverse range of countries, with between one quarter and one third of insurers who report SRI activity being located in non-OECD countries. The industry anticipates further progress in 2016 including the establishment of an independent SRI monitoring and promotion association with accreditation abilities for insurance organizations.

**The Portfolio Decarbonisation Coalition (PDC) has succeeded in gaining decarbonisation commitments in relation to more than \$60 billion of assets under management (AuM), and expects to reach \$75 billion of commitments by October.** It is confident of reaching its \$100 billion target by COP21.<sup>7</sup> Consistent with this growth, the number of coalition members has expanded from two to 16, of which nine have set formal portfolio decarbonisation targets, with the remaining seven working on the development of performance metrics while also already taking action to decarbonize their portfolios. PDC's members span North America, Europe and Australia, with some of largest (by AuM) that have made explicit decarbonisation commitments including AP4, ERAFP and FRR. Members are using a variety of strategies to promote decarbonisation including engagement with the corporate sector, preferential investments in low-carbon opportunities, and reduced investments in carbon-intensive companies. Membership of the PDC already appears to be translating into changes in portfolio composition, with members reporting that the carbon intensities of their portfolios are between 12 and 50 per cent lower than the representative benchmark index.

**The carbon footprinting element of the PDC has been taken forward through the Montréal Carbon Pledge organized by the Principles for Responsible**

**Investment; this reports commitments in relation to more than \$3 trillion of AuM.** This is more than six times the originally identified target of \$500 billion. Among the signatories are Mustard Capital Partners (a private equity fund management company incorporated in Ghana); Investisseurs & Partenaires (a company managing two investment vehicles focused on investing in small and medium-sized enterprises in Sub-Saharan Africa), and the Ignite Fund managed by Spark, which invests in small and growing businesses in conflict-affected states.

**Bank of America has closed approximately ten deals under the Catalytic Finance Initiative (CFI), totalling around \$1.5 billion, of which \$250m was from its own balance sheet. More than 25 per cent of the deals closed (by value) were in emerging markets.** The investment strategy of the CFI covers four key categories: investment-grade loans for clean energy infrastructure in OECD and emerging markets; senior and mezzanine debt for smaller-scale opportunities in emerging markets; green project bonds and green asset-backed securities; and philanthropic funds as catalytic first-loss capital to promote investment in energy access. As part of the initiative, in November 2014, the company announced a partnership with the Global Alliance for Clean Cookstoves and other commercial and development finance institutions to raise \$100m to help provide clean cooking solutions to millions of households in the developing world.

**CalSTERS, APG and PensionDanmark have collectively invested around \$29 billion in low-carbon investments, an increase of around \$11 billion in just one year.** This includes investments in renewable power generation and improving the energy efficiency of property portfolios.

**Swiss Re has provided advice to nine sovereigns/sub-sovereigns, and offered around \$1.5 billion of climate risk coverage.** Of these nine sovereigns/sub-sovereigns, seven are from developing countries, and these have been offered in excess of \$1.1 billion of risk coverage. Across all nine, take-up rates of protection have been around one third.

**TABLE I - Private sector commitments and targets made at the UN Secretary-General's Climate Summit 2014 are on track to being delivered**

Organisation	Original commitment/target	Progress over the last year	Assessment
International Cooperative and Mutual Insurance Federation (ICMIF)/ International Insurance Industry	Doubling of 'climate-smart' investments to reach \$84 billion by COP21, and a tenfold increase by 2020	\$109 billion by July 2015 expected to reach \$130 billion by October	Reached initial target
Portfolio Decarbonisation Coalition	To mobilize investors to commit to collectively carbon footprint \$500 billion of AuMs and to decarbonize \$100 billion	Decarbonisation commitment of \$63 billion reached, expected to increase to \$75 billion by October  Investors have committed via the UNPRI-organised Montréal Pledge to carbon footprint \$3 trillion	On track
CalSTRS, APG, Pension Danmark	To allocate more than \$31 billion to 'low-carbon' investments by 2020	Currently around \$29 billion allocated, an increase of \$11 billion over the year	On track
Swiss Re	Advise 50 sovereigns and sub-sovereigns on climate risk resilience and to have offered them protection of \$10bn against this risk	Advice to 9 sovereigns and sub-sovereigns (7 from developing countries) and offered protection to more than \$1.5 billion (of which \$1.1 billion offered to developing countries)	On track
Bank of America	Catalytic Finance Initiative (CFI) - \$10 billion of new investment in high-impact clean energy products by 2022	Closed around 10 deals totalling \$1.5 billion (of which \$250m from its balance sheet). \$400m of deals in emerging markets.	On track

*Note: It has not been possible to collect data to assess whether Credit Agricole's commitment has been reached or is on track.*  
Source: Vivid Economics

## 2.2 OTHER FINANCING ACTIONS AND INITIATIVES TOWARDS A LOW-CARBON CLIMATE-RESILIENT ECONOMY

**The commitments made and targets set at the 2014 Climate Summit mark an acceleration point in the intentions of the finance sector.** A raft of announcements linked to, or subsequent to, the 2014 Climate Summit further illustrate the early signs of a fundamental shift in the importance attached to climate issues across the sector and the commercial opportunities

it provides. Table 2 provides a non-exhaustive list of more than ten important announcements made within just the last year. In some cases, such as with Bank of America Merrill Lynch, these subsequent announcements have been explicitly linked to the momentum resulting from the 2014 Climate Summit.

**TABLE 2 - There have been more than ten important announcements relating to financing of climate change activities in the last year**

Date	Institution(s)	Sub-sector	Nature of action/announcement
September 2014	Coalition	Institutional investors and asset managers	374 organizations, accounting for more than \$24 trillion of assets, signed a statement expressing concern over the risks that climate change posed to their investments and an appetite to invest in the low-carbon economy subject to meeting their investment criteria and risk-return objectives
September 2014	PFZW	Institutional investor	Committed to increase its sustainable investments fourfold to at least €16 billion over the next five years and reduce the carbon footprint of its circa €150 billion portfolio by 50 per cent over the same period
September 2014	Barclays	Bank	Intent to invest £1 billion in green bond market
September 2014	Actiam	Asset manager	Intent to increase green bond holdings from €500m to €100 billion by end 2015
February 2015	Deutsche Bank	Bank	Intent to invest €1 billion in high-quality green bonds
February 2015	Citibank	Banking	\$100 billion towards lending, investing and facilitating activities focused on mitigating climate and other sustainability solutions over 10 years
February 2015	Yes Bank	Banking	Financing 5GW of renewable energy projects (roughly representing >\$5 billion in investment) over the next 5 years
May 2015	AXA	Institutional investors/asset management	Tripling its green investment footprint to reach over €3 billion by 2020
May 2015	Banco Santander, Ontario Teachers' Pension Plan and the Public Sector Pension Investment Board	Institutional investors	Launch of \$2 billion fund to manage and invest in renewable energy and water infrastructure assets globally
June 2015	Bank of America Merrill Lynch	Banking	Increasing its environmental business from \$50 billion to \$125 billion by 2025
June 2015	SoftBank, Taiwan's Foxconn and India's Bharti Enterprises	Banking	Venture set at \$20 billion with target to build 20GW of solar energy in India
June 2015	TIAA-CREF, University of California Office of the CIO, New Zealand Superannuation Fund, the Alaska Permanent Fund and Tamarisc	Institutional investors	Establishing \$1.2 billion vehicle to invest in opportunities that do not otherwise fit in fund-style investments. Expected to mobilize \$2.5 billion over the next five years
July 2015	Aviva	Institutional investors/asset management	£500m investment per year in low-carbon infrastructure up to 2020
September 2015	Coalition	Institutional investors and asset managers	Group of 15 investors with combined AuM of \$2.5 trillion have committed to scaling up financing for energy efficiency

Source: Vivid Economics

**These announcements cover all aspects of the sector, span institutions from around the world, and will result in a wide diversity of capital flows.** Institutional investors, insurers, asset manager and banks have all made important announcements in the last year. While the bulk of the announcements were made by European and North American organizations, Yes Bank and Bharti Enterprises illustrate a growing geographic spread of firms exploring the commercial opportunities provided by the transition to a low-carbon, climate-resilient world. The growing focus placed by Yes Bank on climate related-issues is discussed further in Box 1 below. There has also been some focus

on ensuring that the resulting capital flows are geographically diverse with, for instance, the plans by Bank of America Merrill Lynch and the Santander/Teachers/PSP investment vehicle having an explicitly global focus, although further progress in this regard will be required. The depth of interest has also grown: the statement made by investors and asset managers in the run-up to the 2014 Climate Summit attracted twice as many signatories as a less strongly worded statement prior to COP15, while the AuM accounted for by signatories to the United Nations Principles for Responsible Investment (UNPRI) has trebled between 2009 and 2015 to \$59 trillion (UN PRI, n.d.).

## **BOX 1. Changes in Yes Bank: a microcosm of the shifts in the banking community**

**Setting a vision and the core operational pillars** – Established in 2004, Yes Bank is now the fifth largest private sector bank in India. Since its founding, sustainability has been a core value proposition, and major competitive advantage in the market. The aim was to weave sustainability into its operations as well as create stakeholder value through positive impact business solutions. As a result, a central Responsible Banking team was set up from the beginning, with representation on the Board, and the mandate to set and drive the bank's strategy based on a triple bottom line of financial, social and environmental returns.

**Gradually building capacity and experience to realize full integration** – Although Yes Bank eschewed a fragmented approach (where 'green' is treated like a special initiative), it took time to develop the suite of capabilities needed for an integrated approach. During its initial years, Yes Bank created distinctive domain expertise that allowed it to be an early investor in renewable energy in 2006, and it quickly leveraged international knowledge and frameworks, for example, signing up to the Carbon Disclosure Project. It also embedded sustainability capacity in its Knowledge Bank, the team providing sector and thematic expertise to the other business units. By 2008, it was ready to undertake an internal review, with the aim of ensuring a comprehensive strategic approach and, in 2010, launched its Environmental & Social Policy, a robust framework towards responsible finance.

**Building out a comprehensive set of responsible investment activities** – As a result, by 2010, the bank was able to build out its investment activities at a rapid pace. It adopted Environmental Social and Governance (ESG) parameters that were fully integrated with credit risks in its lending criteria, monitored outcomes between sequential tranches of funding, and actively advised customers on how they could improve their practices. This strengthened engagement gradually,

changing their clients' perspective from one of reluctant compliance to one of proactive interest with a desire to leverage the bank's distinct expertise. It also set up a Sustainable Investment Banking group, which enabled it to invest in a broader set of opportunities, and served as a conduit for foreign and multilateral funds (for example, the Global Environment Fund). The bank was also able to develop investment approaches suitable to more challenging sectors, like rural communities and agriculture (such as large-scale drip irrigation), or to new clean technologies. By 2014, it had created enough opportunities to invest in renewable energy that it was able to commit to investing in 500MW per year (corresponding to roughly \$600m in investment per annum). Finally, the bank was able to strongly engage across the industry, and with the public sector, to support policy development (for example, through national guidelines for responsible investment), as well as policy implementation (for example, by aggressively supporting a pipeline of projects for the government's Green Energy Commitment, and helping leverage companies' contributions as part of the Corporate Sector Responsibility Law).

**Hitting the inflection point** – Out of this breadth of approaches, Yes Bank has begun to see major inflection points in the scale of its activities. In 2015 it met its 500MW more than twice over, and therefore doubled the target to 5GW over the next five years. Realizing that the scale of its activities would depend on expanding its sources of funding, it launched India's first green bond worth \$160m (double the original target). Finally, it was a strong advocate for the national clean energy target of 175GW by 2022, and has been empowered by the government to be an intermediary for the Green Climate Fund. In addition to the impressive investment achievements in the sustainable space, Yes Bank continues to grow at between 24 per cent and 27 per cent per year, and to keep its percentage of non-performing assets to a very low 0.46 per cent.

## 2.3 GROWING MOMENTUM PROVIDED BY LEADING ORGANIZATIONS

**The picture emerging from commitments at, and following, the 2014 Climate Summit is one of a growing coalition of investors and financial institutions driving towards a low-carbon, climate-resilient transition.** Importantly, organizations from across the developed and developing world are taking action – an indication that the transition, and the opportunities it creates, are beginning to reach the global scale required. Although the full transition will inevitably take years or decades due to its enormous scale, these forerunners create important long-run momentum. This is further emphasized by the long-term strategic nature of the commitments and actions: many institutions are not identifying changes they will make to their business practices in the near term, but instead focus on how their long-term business models out to 2020 or 2025 will adjust in response to the opportunities and challenges posed by climate change. This highlights how, in leading financial institutions, climate change is moving from being one element of ESG policy to being a mainstream driver of company investment strategy. This mirrors much broader trends in the salience attached to climate change by world leaders, as evidenced by the US–China Joint Announcement on Climate Change and Clean Energy Co-operation, or Pope Francis’ encyclical call for action on climate change.

**Restricting attention to a sample of institutions that have made public announcements, banks and other primary capital providers have announced plans to invest tens of billions of dollars annually over the next 5–10 years.** A number of organizations have announced plans that will see the size of their climate change-related activities doubling or trebling in the near-to-medium term. Moreover, in practice, many more investors and financial institutions have, and will continue to, make investments in these opportunities. This provides an early sign of a fundamental shift in market signals, indicating the future direction of investment opportunities. It will help generate a

proven track record that, if appropriately capitalized on, will allow other investors to scale up financing based on reliable assessments of risk and return, and drive the development of investment products and services suited to overcoming key investment barriers. Moreover, this finance is expected to flow both in developed and emerging/developing markets and between the two, although leadership and international cooperation will likely be required to ensure a genuinely global spread.

**Among institutional investors, we have seen commitments to either invest in low-carbon opportunities or decarbonize broader market portfolios worth hundreds of billions of dollars;** and to begin tracking carbon performance of AuMs worth trillions of dollars. This sends a powerful signal of strong investor demand for low-carbon assets, and potentially a significant expansion in future market liquidity for such assets. It could also begin to affect asset values far ahead of changes in the real economy. While the momentum this creates might not have a large effect on the cost and flows of capital in the short run, it is an important signal of long-run investor sentiment and behaviour.

**At the same time, investors are increasingly demanding that policymakers take further action - a call which is gaining traction.** The 2014 Global Investor Statement on Climate Change warns that failure to take further policy action ‘could jeopardise the investments and retirement savings of millions of citizens’. These calls for action from private sector investors are grounded in a recognition that making the low-carbon, climate resilient transition now involves lower economic costs, and higher financial market returns than delaying such a transition. Ultimately, many investors, along with some regulators, recognize that if climate change proceeds too far, there are significant risks to the entire financial system (Carney 2015).

# 3. MARKETS ARE SHIFTING

## A SERIES OF INFLECTION POINTS HAS BEEN REACHED

### Markets are shifting: key conclusions

- In crucial respects, long-term market signals are shifting towards low-carbon, climate-resilient growth, although in many cases these signals are fragile or geographically limited.

### Overall investment

- Renewable power investment has passed through an inflection point, with the bulk of growth driven by non-OECD countries. While progress is more tentative, there are also signs of growing investment in other low-carbon areas, such as energy efficiency, transport and REDD (Reducing Emissions from Deforestation and Forest Degradation).
- Yet overall investment levels are currently short of what is required to stay within 2°C of warming this century – growth in investment will need to continue, with expanded geographic spread, and in some cases a rejuvenation of plateauing investment in some countries.
- Data on climate resilience is lacking, but without further change there is likely to be a significant adaptation funding gap. This will affect small island developing states (SIDS) and least-developed countries (LDCs) most acutely.

### Primary investment instruments and tools

- A new green bond market has emerged and is expanding rapidly. Some developing countries are at the forefront, but others lack the capital market depth to make use of this important innovation.
- Yieldcos are a further important innovation demonstrating experimentation in low-carbon financing and

business models. To date, they are largely restricted to developed country markets.

- Investors' influence on the investment decisions of carbon-intensive companies has increased, and internal carbon pricing is growing rapidly with companies reporting a range of benefits.

### Secondary market developments

- Driven by initiatives such as the Portfolio Decarbonisation Coalition, more and more investors are seeking to first measure and then enhance their portfolios' alignment with the low-carbon economy.
- This is supported by new products and tools that facilitate diversification and hedging of climate-related risks.
- In the extreme, some investors are choosing to divest from high-carbon assets.

### Insurance for climate resilience

- The number of lives and value of assets insured has risen steadily, and risk reduction and disaster response measures have improved. Nevertheless, developing countries still face high exposure.
- Advances have been enabled by more sophisticated risk assessment tools, and by an expansion in practices such as sovereign risk pooling, microinsurance and index-based insurance. This has often been enabled by cooperation with the public sector and NGOs, and appears to be reaching an inflection point, with potential for rapid scale-up

The commitments and actions by specific organizations have helped precipitate, and are also emblematic of, broader market shifts. These broader shifts can be seen across a number of dimensions in

both primary and secondary capital markets, as well as in insurance markets.

### 3.1 PRIMARY MARKETS: LOW-CARBON AND CLIMATE-RESILIENT INVESTMENT

The finance community has mobilized both well-established and novel primary capital market products and approaches to target low-carbon, climate-resilient investments. Well-established instruments include project finance, corporate and project bonds, commercial lending, equity finance, and consumer finance. These have been supplemented by a number of new products, especially yieldcos, and various types of ‘green bonds’. Moreover, new approaches, including carbon footprinting and internal carbon pricing, have emerged to better guide investment decisions across all instruments.

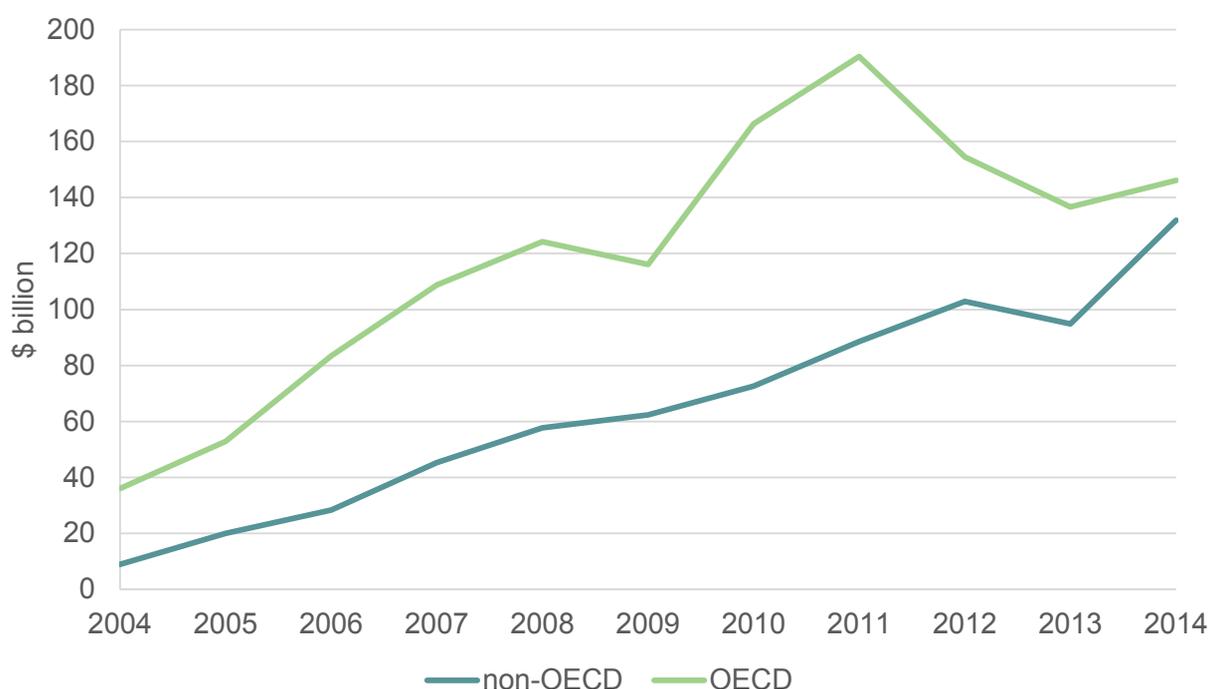
renewable energy investment is estimated to have been \$278 billion,<sup>8</sup> of which \$250 billion was invested in specific projects, with the remainder in technology development and equipment manufacture. This \$278 billion compares with just \$178 billion in total in 2009. The bulk of this financing has been through well-established instruments like project finance and balance sheet asset finance for larger-scale projects, and consumer finance for small distributed capacity projects.

#### 3.1.1 Overall growth in low-carbon, climate-resilient investment

Annual investment in renewable energy projects has grown by 55 per cent between 2009 and 2014. The most important contributor to overall low-carbon, climate-resilient investment – and the best tracked data –relates to renewable energy. In 2014, global

**This growth has been concentrated in non-OECD countries.** Figure 2 shows the steady rise in renewables investment over the last decade, split between OECD and non-OECD countries. While globally there has been a levelling off in investment in the most recent years, there continues to be rapid growth in non-OECD countries. Indeed, non-OECD countries account for more than 70 per cent of the growth in renewables seen since 2009. Notably, renewable power investment in 2014 was around 90 per cent higher than the net investment in fossil fuel power.

**FIGURE 2 - Non-OECD countries have driven much of the increase in renewables investment in recent years**



Source: Bloomberg New Energy Finance

**There is increasing diversity in the location of renewable energy investment: in 2014, 26 countries – of which 11 are developing countries including Indonesia, South Africa, Turkey, Kenya and the Philippines – invested more than \$1 billion in renewable energy.** This compares with only 17 countries (in total) in 2009. Box 2 describes the rapid growth in renewable energy investment in South Africa in recent years. In many countries, national, regional and multilateral development banks (MDBs) have led the market in financing renewable energy investment,

enabling private investment to assume a greater role over time. For example, in Brazil, BNDES's leadership in low-carbon infrastructure investment has paved the way for private actors like Itau Unibanco, which recently raised Rs.1.05 billion from a consortium of foreign investors to finance renewable energy and water treatment projects in Brazil. Similarly, MDBs, initially with the support of concessional funds from the Clean Technology Fund, have played an important role in the development of the wind sector in Mexico (Vivid Economics, 2014).

## **BOX 2 - Supported by private sector investment, South Africa has begun a decisive shift to renewables**

**South Africa's Renewable Energy Independent Power Procurement Programme (REI4P) has attracted high levels of private investment to rapidly develop renewable power.** Since 2011, 192 billion Rand (US\$ 14.4 billion) of investment has been committed to deliver 6.3GW of a planned 6.9GW (REN21, 2015). The capacity has been developed through an auction mechanism with four rounds to date, with some capacity from early rounds already coming online.

**Investment has come from a diverse range of sources – the majority private and domestic.** In the first three bid rounds, the 64 successful projects involved over 100 different shareholder entities, including banks, insurers and international utilities, as well as Development Finance Institutions (DFIs). Nearly 70 per cent of debt funding has come from commercial banks and pension and insurance funds, with the remainder from DFIs. 86 per cent of debt was raised from within South Africa, with South African pension fund Old Mutual becoming one of the largest investors in REI4P through its commitment to 16 projects in the first three auction rounds. The most common financing structure has been project finance, although about a third of the projects in the third round used corporate

financing arrangements. These trends appear to have continued in the recent fourth bid round (Republic of South Africa Department of Energy, 2015).

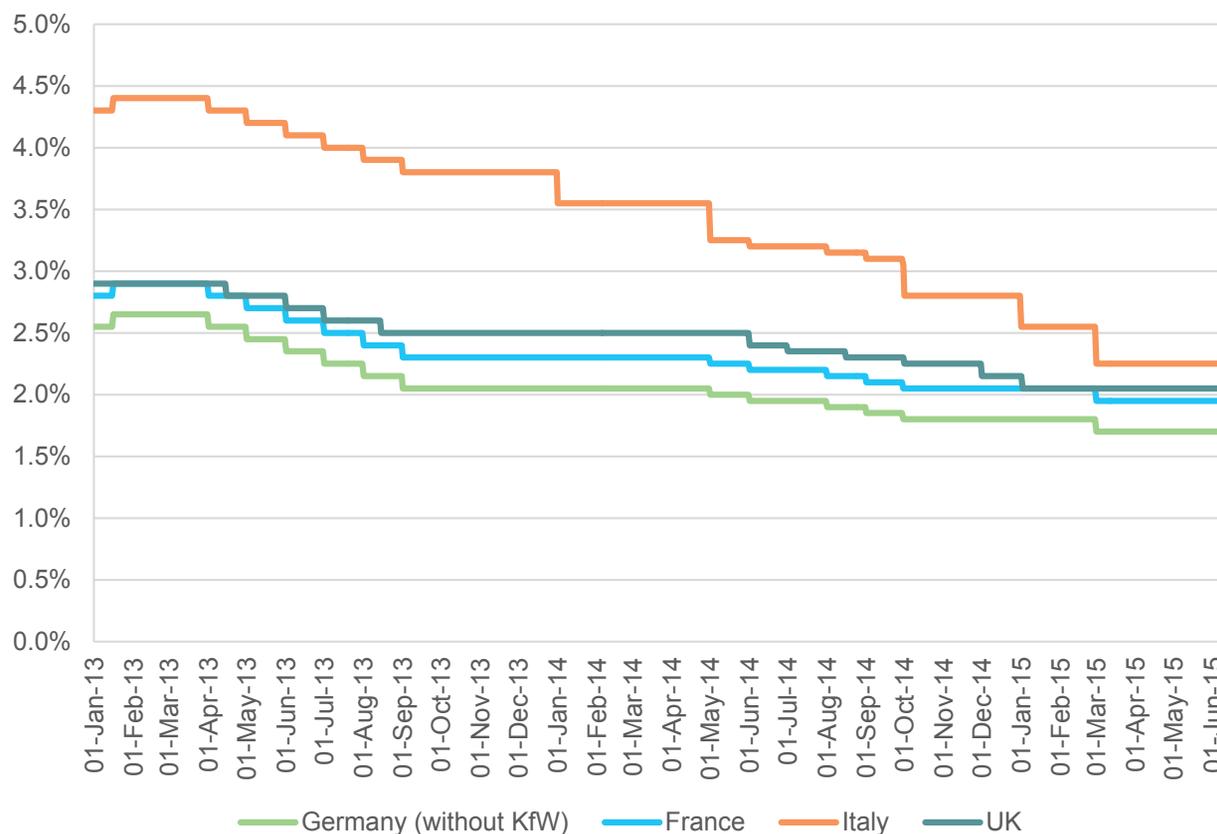
**Prices have fallen as the bidding mechanism has enabled REI4P to incorporate lessons and adjust to rapidly changing technology and development costs.** The average bid price in April 2015 terms, for all technologies, has declined by 67.5 per cent to ZAR 0.77 per kWh (REN21, 2015). Onshore wind costs are now close to Eskom's cost of electricity in 2014/15. Prices were initially high, providing a return of 17 per cent, but this has been evaluated as part of the REI4P's success, as it attracted a critical level of interest, leading to lower costs in the long run.

**The scheme has delivered substantial benefits, both locally and globally.** A recent study found that REI4P has made a substantial contribution to South Africa's economic well-being over the past 18 months by reducing the national electricity supply constraint, the frequency and stage-size of load shedding required, and the costs associated with fuel purchases required in coal- and diesel-based power generation (CSIR, 2015). The climate change benefit of the operational renewable energy generation capacity amounts to 4.4 million tonnes of CO<sub>2</sub>-equivalent reduction (REN21, 2015).

**Consistent with the growing maturity of the sector, the perceived risk of investing in renewables has fallen in recent years.** For example, since the beginning of 2013, the risk premium for European onshore wind projects has either fallen or remained constant

across a series of countries. This suggests, among other factors, a growing sense of comfort with, and understanding of, the risk profile of (this class of) renewable projects.

**FIGURE 3 - The risk premium for European onshore wind projects has fallen since the start of 2013**



Source: BNEF

**Yet, despite this progress, investment in renewable energy is not fully on track with the trajectory consistent with restricting temperature increases to 2°C.** Renewables investment in a number of OECD countries has fallen significantly, largely as a result of policy uncertainty and slower economic growth. Despite progress in a number of developing and emerging markets, others have yet to see investment levels that come anywhere close to matching their renewable resource potential, as a result of persistent economic and non-economic barriers (International Energy Agency, 2015b).

**There have also been encouraging signs in relation to investment in some other low-carbon technologies.** Bond issuance for **low-carbon transport** (predominantly rail) has increased from \$174 billion in 2012 to \$419 billion in 2014 (Climate Bonds Initiative, 2015). Sales of plug-in electric vehicles increased to around 300,000 in 2014 from around 5,000 in 2010 (International Energy Agency, 2015a) thanks in part to falling battery costs, improved performance, and favourable financing schemes. In 2014, this represented approximately \$4–\$6 billion in annual consumer finance for electric vehicle purchase or lease,<sup>9</sup> already

large enough to warrant special financing vehicles (for example, Toyota’s green bond discussed below). For most markets, this still represents a small proportion of vehicle sales and financing (<1 per cent), but the sales and associated financing opportunities are forecast to increase by tenfold to twentyfold by 2020 (International Energy Agency, 2013).

**Annual investment in energy efficiency is difficult to assess, but estimates range from \$310 billion to \$360 billion per year** (International Energy Agency, 2014a). While trends over time are not well tracked, assessments from 2010 to 2012 suggest annual growth rates of over 20 per cent (International Energy Agency, 2014b). One indication of growing finance in the broad group of ‘energy smart technologies’ (such as smart grid and smart meters, demand response, power storage, energy efficiency and electric vehicles) is the recent increase in investments in companies specializing in these areas by public market and private equity investors. Such investments have increased from roughly \$10 billion in 2009, to an all-time high of \$22 billion in 2014 (Frankfurt School UNEP Centre & BNEF, 2015). Despite these positive signs there is a recognized need for a significant acceleration in investment in all forms

of energy efficiency, especially in non-OECD countries, as well as renewable heat and smart grids (International Energy Agency, 2015b).

**The private sector also has a crucial role to play in supporting efforts to reverse deforestation.**

Overall, and as a result of a wide range of factors, deforestation is slowing, with the rate falling by more than 50 per cent between 1990 and 2015 (Food and Agriculture Organization of the United Nations, 2015). Private sector investment has played a role in this: as of 2011, it had made cumulative investments of around \$1.8 billion in commercial, production-oriented plantations in developing countries. The vast majority of this was concentrated in Latin America and Asia-Pacific, with smaller amounts in Africa. A further \$600–\$800m has been invested in REDD+ demonstration projects, with an expectation that these are largely focused in Latin America (Profor, 2014). However, overall funding for deforestation has been flat, and potentially declining since 2010 (Norman & Nakhooda, 2015). The New York Declaration on Forests, which emerged from the 2014 Climate Summit, aimed to reinvigorate investment to halt deforestation and accelerate reforestation. It endorses reducing natural forest loss by half by 2020 and eliminating it by 2030. It was signed by more than 50 companies including financial institutions such as Barclays, Lloyds and Deutsche Bank, as well as corporates based in developed countries such as Cargill and Proctor & Gamble, and those from developing countries such as Asian Agri and PT Rimba Makmur Utama. The private sector is supporting the achievement of these objectives in various ways, such as helping develop common sustainable sourcing guidelines, investing in projects to reduce deforestation, and participating in a number of public–private partnerships. Recent analysis indicates modestly encouraging progress towards the objectives of the Declaration, with around 50 per cent of companies reporting progress towards their zero/zero net deforestation targets; 68 per cent reporting progress towards their targets on procuring a mix of certified commodities and certificates; and 93 per cent reporting progress towards traceability (Forest Trends, 2015).

**The evidence base on adaptation investment, especially by the private sector, is poor, but despite important innovations significant increases in investment are likely to be required.** Case study evidence illustrates some of the actions being taken by the private sector. For instance, EEAB (the Bogota Water and Sewerage company) has been involved in an adaptation program in the Rio Blanco Watershed, where more than 200 vegetation-restoration processes have been implemented so as to ensure that the utility continues to have access to water supplies; while Ignitia is developing a platform to provide accurate tropical

weather forecasts to farmers in West Africa. Overall, the UNFCCC’s Private Sector Initiative database of actions on adaptation<sup>10</sup> lists around 100 adaptation projects supported by the private sector including initiatives by Ericsson, Microsoft, General Electric and BASF, and across all continents. Further evidence of the emerging private sector response, especially from insurers, is provided below. However, evidence on the overall investment in adaptation by the private sector remains elusive. An initial review of the role that MDBs have played in supporting private sector adaptation suggests that this activity has led to around \$5.5 billion of total adaptation investment (Vivid Economics, 2015). Despite such signs of progress, and in light of the considerable public and private adaptation investment required, there is expected to be a major adaptation funding gap after 2020 without significant change. The impact of this is likely to fall disproportionately on LDCs and SIDS (UNEP, 2014).

### **3.1.2 Growth in new financing products and approaches**

**This growth in investment has been facilitated by a range of new financing products and approaches, which could also have an important role to play in scaling up investments going forward.** Two of the most significant are green/climate bonds and yieldcos.

#### **Green and climate bonds**

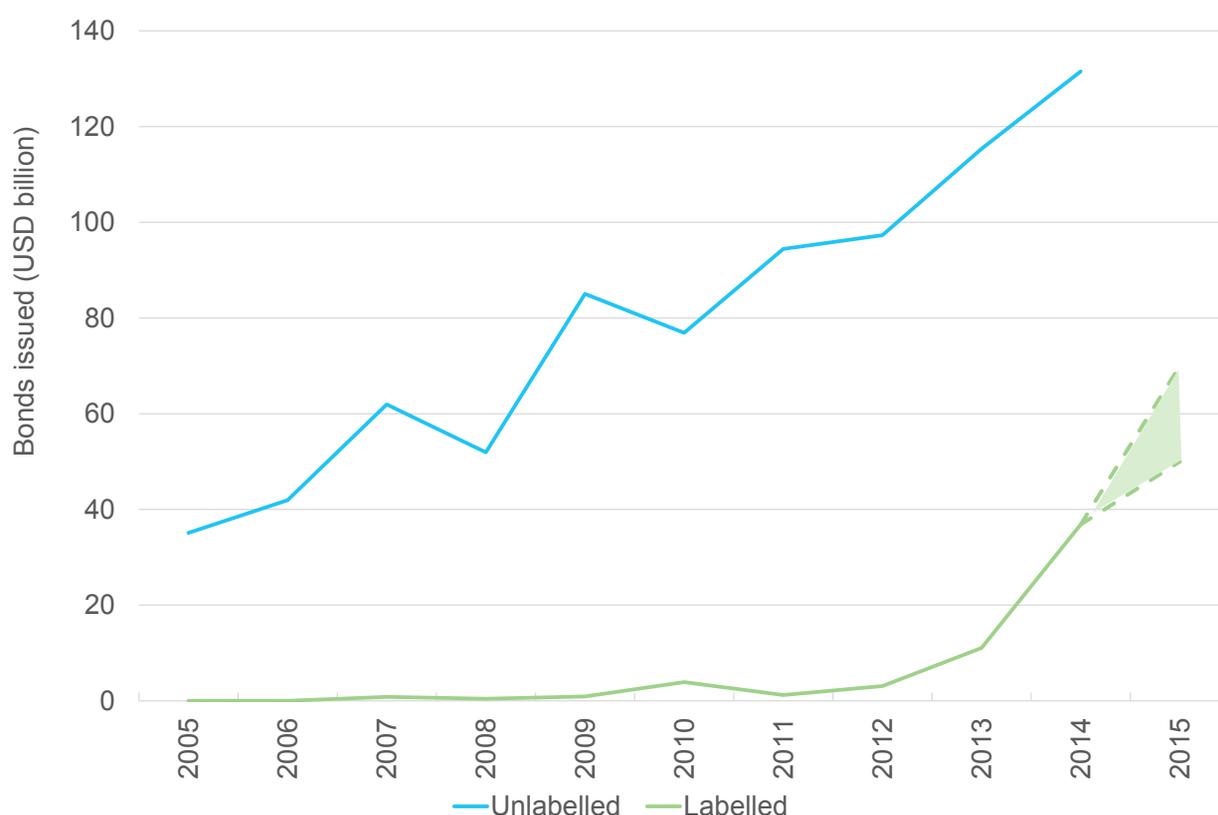
**The emergence of green bonds represents one of the most significant developments in the financing of low-carbon, climate-resilient investment opportunities.** Green bonds offer an attractive way to access institutional investor capital as the risk and returns of the bonds are typically determined by the issuer’s full balance sheet, not just the green assets. Essentially, the treasuries of issuing companies have been providing the risk-bridge needed to get green projects and assets to an investment-grade rating that meets the need of institutional investors.

**Green bond issuance has grown rapidly in recent years: while there were practically no green bonds in 2009, \$36 billion of labelled green bonds were issued in 2014, a threefold increase on the previous year.** Issuance in 2015 is expected to be between \$50 and \$70 billion. In addition to the labelled market, there is a much larger universe of bonds that finance climate mitigation and adaptation that are not labelled as green. As of June 2015, this additional unlabelled climate bond universe stood at \$532 billion (Climate Bonds Initiative, 2015). The energy and buildings sectors have received the bulk of proceeds to date (aside from multi-sector bonds) but, reflecting the growing maturity of the instrument, investment opportunities in transport, agriculture, waste and water have all been financed through green bonds recently. Despite this growth, green bonds currently account for only a very small fraction of the estimated \$100 trillion global bond market.

**Demand continues to outstrip supply.** A number of recent bond issuances have been oversubscribed, leading to an increase in supply. For example, strong demand allowed Yes Bank to double its February 2015 offering to INR 10 billion; while KfW's first AUD green bond in April 2015 doubled to A\$600m. Supported by Citigroup, Bank of America Merrill Lynch and Morgan Stanley, Toyota's industry-first green bond for low-carbon vehicle financing raised \$1.75 billion in 2014 (roughly double the initial target), and this was quickly followed up with a second issuance in 2015 for an additional \$1.25 billion. There has also been a rapid growth in the numbers of specialized green bond funds looking to invest in green bonds with, among others, Nikko

Asset Management, BlackRock, Calvert and State Street all recently developing and managing green bond funds. This strong demand is also reflected in a series of public statements by investor organizations. In December 2014 an investor statement, brought together by the Climate Bonds Initiative supporting the green bond market, was signed by asset owners and managers with a combined \$2.62 trillion AuM (Climate Bonds Initiative, 2014). This was followed in 2015 with another investor statement setting out expectations for the green bond market by Ceres Investor Network on Climate Risk and signed by 26 investors (Investor Network on Climate Risk, 2015).

**FIGURE 4 - The issuance of labelled and unlabelled green bonds has risen substantially in recent years**



Source: Climate Bonds Initiative

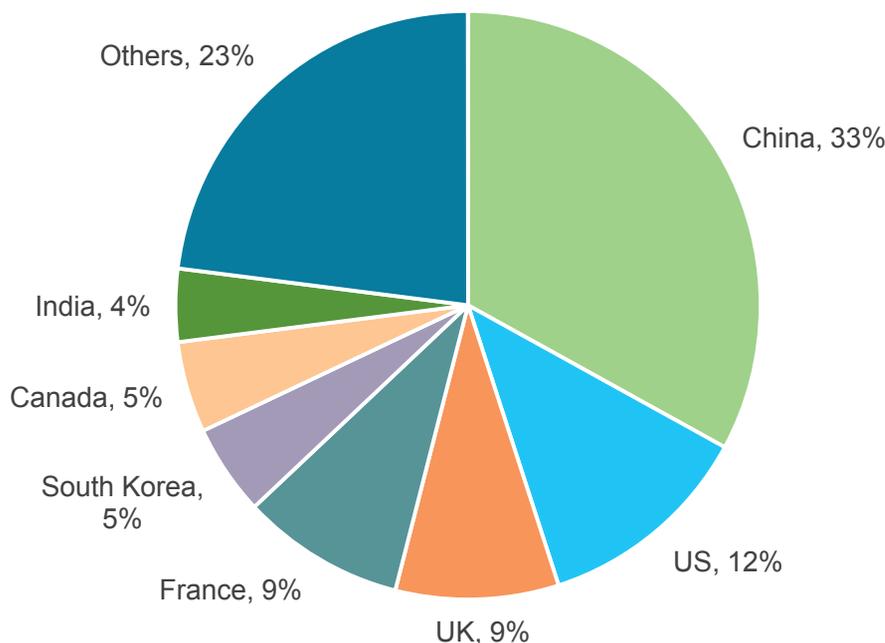
**Development banks and municipal governments played an important role in helping the market mature, but the market is now characterized by a diverse range of issuers including a number of corporates.** In the period to 2011 all labelled green bonds were issued by either development banks or local and municipal governments. These issuers played a crucial role in demonstrating proof of concept. However, the market is now developing rapidly with corporates, banks and green asset-backed securities collectively accounting for more than 40 per cent of issuance in 2014.<sup>11</sup>

**China is at the forefront of the recent green bond developments – with other emerging markets also showing considerable interest.** China is developing the foundations of its green finance market, including green bonds, with the Chinese central bank, People's Bank of China (PBoC), publishing a 14-point set of policy recommendations in April 2015. This included specific recommendations around green bonds, such as an evaluation system for allocation of funds and environmental impacts of green bonds; tax incentives; preferential risk weighting in bank capital requirements; and fast-track issuance for green bonds. Central bank regulations to govern a domestic green bond market will be published later this month (October 2015). In

India, there were two green bond issuances by banks in 2015 – Yes Bank (INR 10 billion) and Export Import Bank (\$500m); and the country’s first corporate green bond was recently issued by CLP Wind Farms (INR 6

billion). Furthermore, South Africa, Brazil and Mexico have already seen, or will imminently see, green bonds issued.

**FIGURE 5 - The market for climate-aligned bonds has issuers from a diverse range of countries**



Source: Climate Bonds Initiative, (2015)

### Yieldcos

A further sign of innovation in the low-carbon financing ecosystem is the emergence of yieldcos. These companies aim to exploit the predictable and low-risk nature of operational renewable projects to provide high dividends to investors, often on a quarterly basis, making them attractive to many investors. By establishing yieldcos, the original project developers and utilities can re-invest the proceeds to renewable project development activities, while the increase in liquidity in the market for purchasing operational assets makes initial project development activity less risky.

**In just the last two-and-a-half years, at least 12 yieldcos have emerged, raising more than \$13 billion through IPOs<sup>12</sup>.** Most yieldcos currently hold assets only in developed markets. However, there was a significant development in July 2015 when Terra Form Global raised \$675m in an IPO on Nasdaq in July with the specific aim of holding assets in emerging markets. Pattern Energy also holds assets in Chile as well as in North America.

The share price performance of yieldcos has fluctuated over time, but their significance lies in the ongoing experimentation around new business and financial vehicles to support low-carbon investment. The market capitalisation of the 12 largest yieldcos is estimated to be greater than \$20 billion as of mid-September 2015. This is more than 50 per cent higher than was raised by these companies at the time of their IPOs, suggesting that market confidence in these companies, and the underlying financial model, has grown over time. Nevertheless, in the last few months (to September 2015), there has been a decline in the share prices of a number of yieldcos, especially those based in the US, of around 25–55 per cent. This reflects a number of factors including wind conditions in the US, general stock market conditions, and concern over the long-term robustness of the business model. Similar volatility is, of course, seen in equity valuations of many other sectors of the economy as market sentiment shifts and sector and firm performance changes. From a wider perspective, the real significance of yieldcos is as a demonstration of both investors and

firms innovating with business and financial models to realize opportunities from the low-carbon economy although, to date, this experimentation is focused largely in developed markets.

### 3.1.3 Engagement with carbon-intensive companies to shift corporate investment

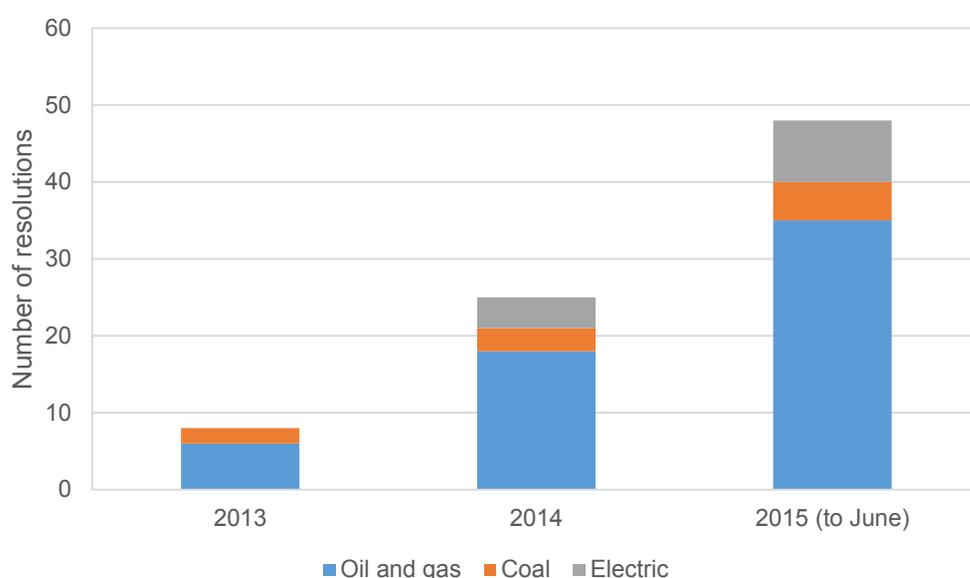
While innovations such as green bonds and yieldcos are important, the vast majority of investment decisions taken by corporates does not require them to access capital markets for funding. Rather, investments can be self-financed, drawing on free cash flows from existing operations. Indeed, this form of financing is likely to have become increasingly important in recent years.<sup>13</sup>

Investors are directly engaging with companies to influence the amount and type of low-carbon climate-resilient investment they undertake. This engagement includes asking companies to improve their carbon efficiency through operational improvements; to shift corporate growth strategy; or to change remuneration structures to place less emphasis on fossil fuel reserve replacement. There is increasing emphasis on the need for transparency in corporate disclosure regarding such activities. Much of this engagement has been facilitated by the UN Principles for Responsible

Investment which, since 2006, have coordinated more than 330 engagements.

**Engagement is growing and becoming increasingly successful.** One indicator is the number of shareholder resolutions related to the low-carbon transition filed by investors. Figure 6 shows that these have increased by a factor of six between 2013 and 2015. Moreover, whereas in 2013, none of the proposals received more than 50 per cent support, in 2015 more than a third received support from at least 50 per cent of shareholders. It is particularly noteworthy that, in 2015, the executives of Shell, BP and Statoil supported resolutions related to reporting on ongoing operational emissions management; asset portfolio resilience to International Energy Agency (IEA) scenarios; low-carbon energy R&D and investment strategies; relevant strategic key performance indicators (KPIs) and executive incentives; and public policy positions relating to climate change. These will be implemented from 2016. In 2014, Shell also changed its executive compensation structure in response to investor engagement, including from the Institutional Investors Group on Climate Change (IIGCC), replacing hydrocarbon production growth performance with relative return on average capital employed (ROACE) growth, to place more emphasis on capital efficiency. However, to date, this engagement has been largely concentrated in developed countries (Ceres, 2015).

**FIGURE 6 - The number of shareholder resolutions relating to the low-carbon transition is increasing**



One important way in which internal investment behaviour can be influenced to support the low-carbon transition is through the adoption of an internal carbon price for investment appraisal. This

makes it less likely that emissions-intensive activities or investments will be pursued.

**A number of recently launched initiatives encourage corporates to adopt an internal carbon price and support carbon pricing policy development more generally.** The UN Global Compact, together with UNEP and the UNFCCC secretariat<sup>14</sup>, launched the Business Leadership Criteria on Carbon Pricing to encourage companies to demonstrate good business practice and leadership in climate action. Part of this compact asks signatories to commit to setting an internal carbon price. The Compact is linked to the Carbon Pricing Leadership Coalition led by the World Bank Group and partners – a coalition encouraging policymakers to expand the use of effective carbon pricing. This coalition arose directly from a groundswell of support for carbon pricing at the 2014 Climate Summit, where 74 countries and more than 1,000 companies expressed support for carbon pricing

**Rapid growth in the number of companies using, or committed to using, internal carbon prices means that there are now more than 460 companies<sup>15</sup> – accounting for around 15 per cent of the**

**S&P 500<sup>16</sup> – that have adjusted their investment appraisal techniques in this way.** One of the key data sources for this estimate indicates that, in just the last year, there has been an almost threefold increase in the number of companies adopting this approach, while a further 580 companies are expected to introduce internal carbon pricing within the next year (CDP, 2015). The companies using internal carbon prices include some with highly carbon-intensive activities including Lafarge, Shell and Statoil. It also includes companies headquartered in a wide range of countries including China, Brazil, Egypt, Nigeria and Pakistan. In total just under 20 per cent of the companies that have publicly disclosed that they have or will use internal carbon prices are from developing countries. Companies that have adopted internal carbon pricing report various rationales and benefits, including value creation for customers by helping them comply with carbon regulations, hedging against carbon price risk, reducing energy costs, building brand profile and fulfilling sustainability commitments (Caring for Climate, 2015).

### **BOX 3 - Developments at Aviva: a microcosm of the shifts in understanding the investment impacts**

With around £250 billion in AuM, Aviva Investors is a global asset manager with offices in 15 countries. Like many asset managers discussed in this report, it has made steady progress over many years in deepening its understanding of the impact of climate change on investments, and using this to guide investment decisions.

#### **Setting a vision and building up initial experience**

– Awareness of climate change issues at Aviva spans more than two decades. Aviva Investors was a founding member of the Carbon Disclosure Project (now CDP) in 2000, an early member of the Institutional Investor Group on Climate Change, and a founding member of the Principles for Responsible Investment in 2006. In the early 2000s, it began to engage with companies to better report on their climate change-related performance and risks, and integrated this into its Corporate Governance and Corporate Responsibility Voting Policy. It made its own operations carbon-neutral in 2006.

#### **Establishing the core operational capacity to realize full integration**

– By 2010, it began making innovative investments in low-carbon infrastructure, and in 2011 it played a catalytic role in forming the Carbon Action program of the CDP, which called for companies to move beyond disclosure and begin targeting concrete GHG emission reduction measures. By 2012, Aviva Investors decided to establish its Global Responsible Investment (GRI) team with a mandate to fully integrate ESG issues into all asset classes across all regions. This was driven by the conviction that long-term returns could be improved by better incorporating climate change and broader sustainability considerations into investment decisions. It also established an internal Responsible Investment Officer (RIO) network – identifying fund managers and analysts within each investment desk to facilitate integration by linking the GRI team's expertise with the bottom-up investment process.

**Engaging policymakers and regulators** – In parallel with accelerating its internal activities, Aviva Investors became more actively engaged in the public policy debate, based on its belief that a low-carbon transition requires

systemic action, and that climate change is a systemic risk to long-run returns. In 2011, it convened the Corporate Sustainability Reporting Coalition which called for leaders at Rio+20 to develop national regulations, formal codes or listing rules that encourage annual reporting on sustainability issues. In 2012, this coalition achieved a successful inclusion of sustainability reporting within the Rio+20 outcome document and strongly supported the UK mandatory GHG emissions reporting which was announced at the conference. In 2014, Aviva published the Roadmap for Sustainable Capital Markets, laying out a series of steps policymakers could take to enable private investors to harness the investment influence of capital markets. In 2015, it signed a letter to the G7 finance ministers urging them to support the inclusion of a long-term emissions reduction goal, and called on the OECD to consider a Convention on Fiduciary Duty and Long Term Investing, focusing on long-term rather than short-term outcomes. In 2015, it also commissioned a study estimating for the first time Value at Risk from climate impacts, and outlining a set of policy recommendations to help avert these impacts.

**Hitting the inflection point** – As its climate change-related investment and policy advocacy activities expanded, shareholders demanded a comprehensive strategic approach to optimize Aviva's impact both on investor returns, and on society and the environment at large. Aviva undertook a full examination across its investment teams to determine how far its existing commitments went, and to identify the opportunities for new targets between 2015 and 2020. The result was Aviva's Strategic Response to Climate Change, including a goal of investing £2.5 billion in low-carbon infrastructure over the next five years, and a focused engagement campaign to accelerate a low-carbon transition among 40 companies with significant coal-related revenues. Most recently, Aviva signed the Montréal Pledge, and determined to drive more accurate and transparent measurement methods as a basis for better informed and more effective investor action.

## 3.2 EXPANDING LIQUIDITY AND SHIFTING INVESTOR APPETITE IN SECONDARY MARKETS

**Secondary markets for low-carbon, climate-resilience-related securities have deepened.** These developments increase the information flow and improve price signals, reduce volatility and increase investor confidence, and ultimately contribute to a reduction in the cost of capital. While initial deepening was driven by a smaller set of forerunner investors, it is increasingly reflected in the broader adoption of more sophisticated investor strategies for diversifying their portfolios and reducing their climate-related risks. It could be argued that this broader investor reaction to deepening markets further improves information flows and a reduces the cost of capital.

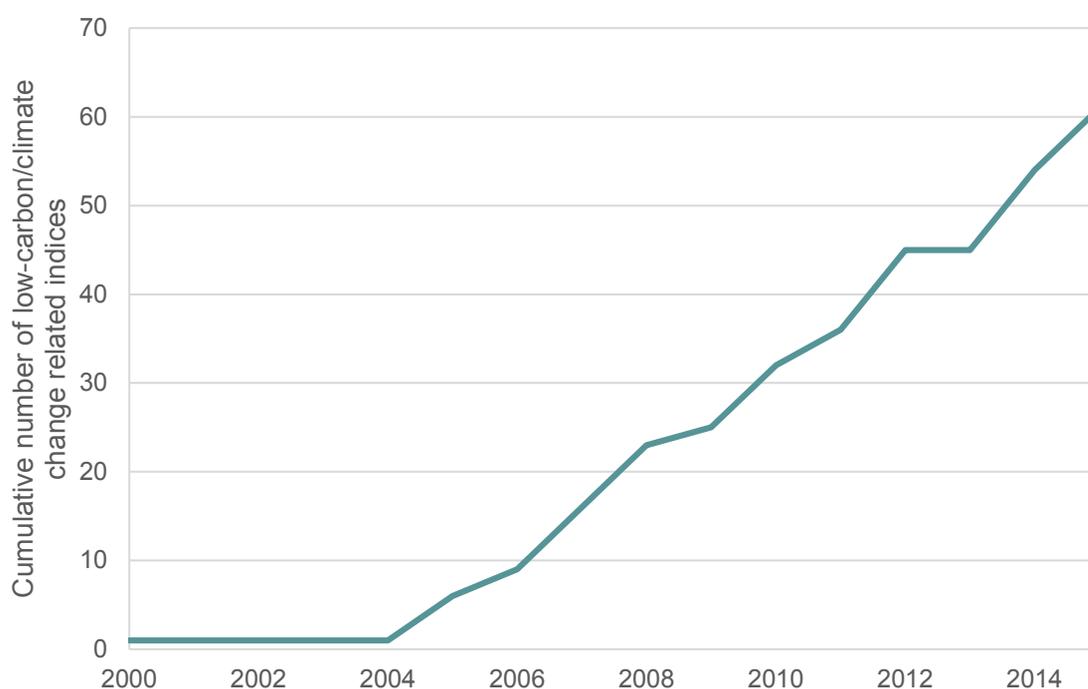
### 3.2.1 Carbon asset risk

**A particularly important trend has been increasing investor awareness of the carbon asset risk challenge – the possibility that future climate change action will erode the capital value of carbon-intensive assets and that this, in turn, could be a risk to financial stability.** The PDC provided a crucial impetus to this process and, as reported above, is on track to meet both the decarbonisation and, through UN PRI, carbon footprinting elements of its commitment. In the past two years the number of institutional investors undertaking portfolio footprinting has risen from 60 in 2013 to around 200 by 2015, although many are

still building up their capacity to conduct this analysis robustly (Fulton, Cleveland, Schuwerk, & Weber, 2015). It is also generally recognized that carbon footprinting is just the first, if important, step in understanding exposure to carbon asset risk (Fulton & Weber, 2015).

**In response to this growing interest, a number of new indices have been launched to reduce investor exposure to carbon-intensive companies and assets.** These include exclusionary indices which exclude fossil fuel companies or sectors from their holdings; non-exclusionary indices which have greater holdings of companies that score more highly on environmental or ESG criteria (such as that developed by AP4 discussed in Box 4); and green thematic indices which focus on companies involved in climate change mitigation and adaptation strategies (Abramskiehn, Buchner, & Wang, 2015). Figure 7, based on a sample of these indices,<sup>17</sup> suggests that this product space continues to grow and mature. This is matched by a broader surge – of around 70 per cent in the seven months to July 2015 – in the number of Exchange Traded Funds and other equity funds tracking ESG indices (Wagner, 2015). In sum, an increasingly healthy and competitive ecosystem is emerging around the products that will best allow investors to reduce their exposure to carbon-intensive companies and assets.

**FIGURE 7 - The cumulative number of low-carbon indices has grown rapidly in the last decade**



Source: Vivid Economics based on data from BNEF

**These products appear to offer similar or stronger returns than the market as a whole.** A 2014 synthesis of over 190 academic studies and sources on sustainability and its effect on the cost of capital, operational performance and stock prices found support for the hypothesis that integrating ESG factors has positive implications (Clark, Feiner, & Viehs, 2014). Looking specifically at environmental performance, Lyon & Shimshak (2015) found that, immediately after the release of *Newsweek's* Green Company rankings in 2009, US companies in the top 20 per cent had returns that were 0.6–1.0 per cent higher than those firms in the remaining 80 per cent. PDC members with decarbonisation targets are also clear that they expect to achieve the same investment performance as the major indices but with significantly lower carbon footprints and with the possibility of significant long-term investment benefits (see also Box 4).

**In the extreme, some investors are turning to divestment.** While it is unclear whether divestment will be economically effective in terms of changing the cost of capital for the companies affected, especially in the near term, it has gained considerable media attention, and may be sending important long-term signals to the market. A range of institutional investors have embarked on this action including – notably, some US university endowments which are traditionally perceived as very conservative investors. One of the most significant recent announcements was by the Norwegian sovereign wealth fund which in 2015 stated that it would divest from companies that generate more than 30 per cent of revenues from coal. Estimates suggest that this will affect 122 companies and that the total value of the assets divested will be around €7.7 billion (Fulton et al., 2015).

#### **BOX 4 - Changes at Fjärde AP-fonden (AP4): a microcosm of the shifts in the asset owner community**

**Setting a vision and technically robust investment strategy** – Fjärde AP-fonden (AP4) is one of five buffer funds in Sweden, with invested capital of around \$38 billion, a high proportion (58 per cent) of which is invested in equities. AP4 is responsible for ensuring strong and stable returns for Sweden's pensioners, and as such it factors in underlying drivers of risk and return over a time horizon of 30–40 years. By 2010, it had become clear to the fund's leadership that climate change was one such factor, and AP4 began to seriously consider what it might mean for the quality of its investment holdings, and how this might influence its investment strategy. It concluded that CO<sup>2</sup> emissions were significantly under-priced by the market and began to consider investment strategies that could improve the long-run risk–return profile of its portfolio by lowering the carbon exposure, while achieving the same or better performance compared to their benchmark indices.

**Accessing and building the technical capacity to launch a 'carbon-hedged' investment strategy** – Given its core mandate, and the need to demonstrate a robust and transparent commercial case, AP4 decided to create a low-carbon equity index based on two fundamental investment criteria: strong tracking with diversified market indices (to ensure stable long-run returns), and significant reduction of the carbon intensity of constituent securities (to create a hedge against increases in the price of CO<sup>2</sup>). Over the course of 2011, based on AP4's leadership, S&P and Trucost constructed an index based on the S&P 500. This incorporated various sources of data on company carbon footprints – measurement being critical to the realization of such a strategy – drawing on recent advances in the availability of such data resulting from efforts such as the CDP. In addition, they built up a strong technical knowledge of how selecting only the most carbon-efficient companies in an index might affect overall tracking error.

**Effecting a low-carbon investment strategy and demonstrating its impact** – Based on this strong technical knowledge, AP4's management team was able to bring this investment strategy to the board, address its questions, and gain buy-in on the merits of its strategy. In 2012, it invested an initial \$200m in a low-carbon index based on the S&P 500. While gaining experience and a track record around this initial investment, it continued to develop vehicles for a variety of other indices, starting with the MSCI Emerging Markets index, and then moving to European indices – each time working through the data and methodological challenges until they were confident in the tools developed. Over the course of 2013, AP4 began to expand its investments to include additional markets. In the process, it was supported by a coalition of interested partners (including Amundi, UNEP-FI, and CDP), and its investment experience helped coalesce this partnership and draw interest from others.

**Hitting the inflection point** – In 2014, in order to accelerate the emerging shift across various asset owners and asset managers, this group of partners launched the Portfolio Decarbonisation Coalition at the 2014 Climate Summit (discussed above). In addition, AP4's initiative directly resulted in S&P, MSCI and ABC offering a whole family of indices that overweigh low-carbon companies covering all major markets. To date, AP4's low-carbon portfolio has consistently outperformed the benchmark indices, while the company is committed to decarbonizing its entire equity portfolio by 2020. AP4 has also added climate change considerations into its role on a number of board nomination committees, and they are currently looking at how to decarbonize their corporate bond portfolio, as well as their direct and other outside investments.

### 3.2.2 Reforms in market institutions

#### Credit rating agencies

**Rating agencies are starting to look to the wider effects of climate change on the risk profile of companies.** Both S&P and Moody's now broadly include ESG metrics within their rating methodologies, although, to date, they have not formally incorporated climate change or carbon risk within their ratings criteria. Dagong (the Chinese rating agency) now includes climate risk among its non-traditional security risk factors within the national management capabilities pillar (Dagong, 2014).

**Agencies have also devoted a number of studies to understanding how credit ratings might be affected by climate change in the longer term, pointing out the large potential impacts of climate-related damages on sovereign risk, as well as some of the regulatory impacts on corporate risk.** One agency has described climate change as one of two global mega-trends affecting sovereign risk over the 21<sup>st</sup> century and notes that these impacts are likely to be disproportionately felt by the poorest and lowest-rated sovereigns (Standard and Poor's, 2014a). Looking at recent downgrades also suggests that climate change-related factors are beginning to play a role in credit ratings, with a number of such downgrades being accompanied by explanations related to exposure either to regulatory limits on carbon emissions, or to climate risks. However, the significance of these factors to the ratings change is not specified.

**Challenges in incorporating climate aspects remain.** One of the main conceptual obstacles to integrating climate risk more fully in ratings is the time horizon: ratings' time horizons span from 2–5 years, whereas potential regulatory and climatic effects often have a longer time frame. This, combined with regulatory

and political uncertainty, makes factoring in climate change-related risk difficult. Nevertheless, increasing pressure from investors to have more visibility on carbon and climate risk is creating a strong pull in the ratings market for this information, and rating agencies are expected to continue to improve their ratings process in this regard.

#### Sustainable stock exchanges

**The Sustainable Stock Exchanges Initiative helps participants in equity markets acquire, understand and process ESG information, including that related to emissions and climate risks.** In total, 24 exchanges are members of the initiative, including six which have joined in 2015, with over half of the members from developing countries. The earliest members of this initiative included stock exchanges in Brazil, Egypt, Turkey and South Africa.

**The Initiative's influence both within and beyond its membership base is growing.** Surveys of the members of the World Federation of Exchanges reveal that the number of stock exchanges providing sustainability-related training to companies and investors trebled between 2010 and 2014, while the number of exchanges requiring or encouraging social and environmental reporting has increased fivefold (Responsible Research, 2010, 2012; UNCTAD, Principles for Responsible Investment, The Global Compact, & UNEP Finance Initiative, 2014).

**However, while the Initiative is growing in importance generally, its specific impact on the climate and carbon emissions aspects of ESG reporting is not clear.** Corporate disclosure of emissions-related information remains fragmented, with only 39 per cent of the world's largest listed companies disclosing emissions data and with reporting by the energy sector being particularly weak (Corporate Knights Capital, 2014).

## 3.3 MANAGING THE RISKS OF THE TRANSITION

**Even with concerted climate action, some climate impacts are already occurring, and future – more extreme – changes are locked in.** Ensuring the resilience of economic growth and inclusion will require the development of appropriate products and approaches for preventing, reducing, sharing, transferring, preparing for, and responding to climate risks. The insurance industry, often in partnership with the public sector, will play a key role in this process. **This issue has been given prominence by the recent G7 commitment to increase the number of people covered by disaster insurance by 400 million by 2020.**

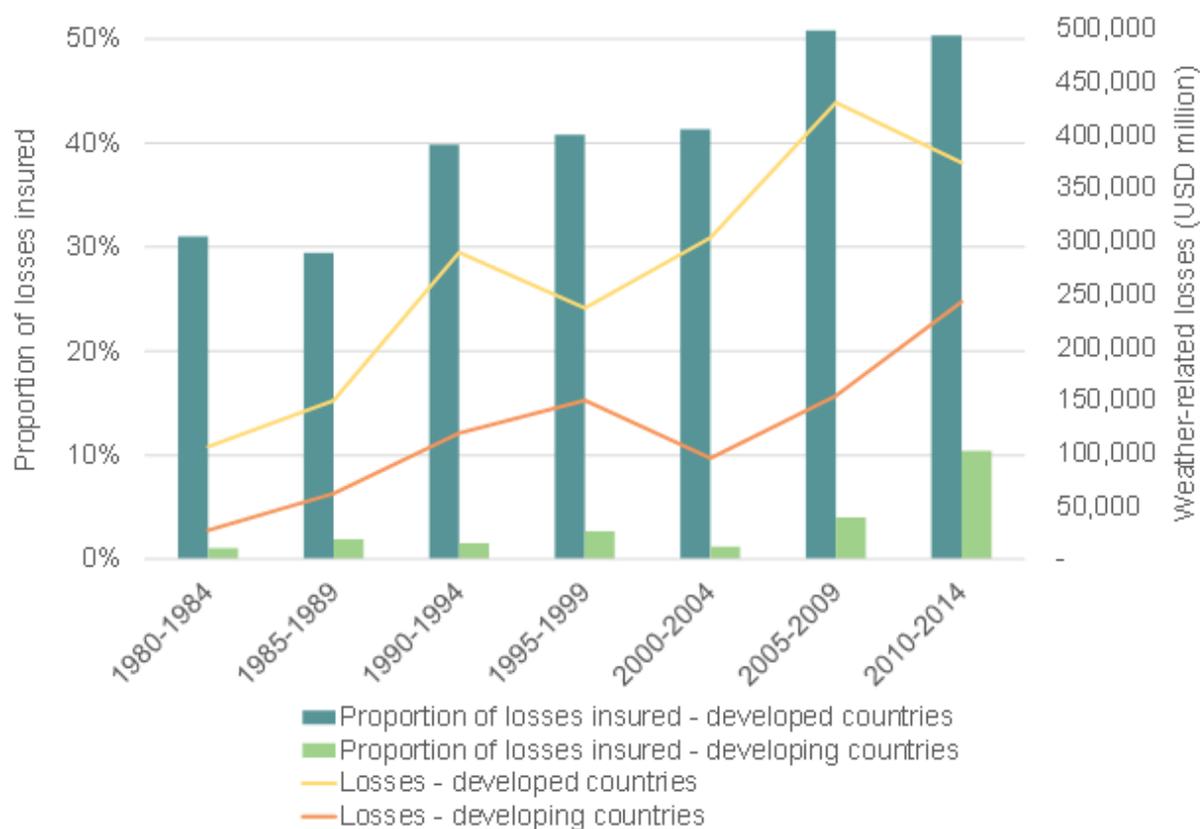
### 3.3.1 Growth in climate impact insurance products

**Insurance for weather-related losses is growing.** Driven by the evident growth opportunity, the private sector has helped ensure increasingly broad geographic coverage and deep product penetration. Mature markets in the developed countries of Europe, Japan and the US generally insure about 40–50 per cent of total losses, and this has grown steadily from about 30 per cent in the 1980s, even as weather-related losses (in dollar terms) in these countries have more than tripled from

\$25 billion on average per year from 1980–89, to \$80 billion from 2005–14 (Munich Re, 2015). In developing countries<sup>18</sup>, the proportion of losses insured has increased sharply in recent years from 1–3 per cent to more than 10 per cent (Figure 8), again despite a quadrupling in weather-related losses from \$9 billion on average per year from 1980–89, to \$40 billion from 2005–14

(Munich Re, 2015). At the same time, the absolute levels of uninsured losses continue to increase rapidly in both developed and developing countries. Moreover, there is evidence in some countries that insurance penetration is not increasing as fast as it should in relation to GDP growth – creating an insurance penetration gap, especially in fast-growing developing countries.

**FIGURE 8 - In both developed and developing countries, the proportion of insured weather-related losses has grown**



Note: Developed countries include the US, Japan and Europe. Developing countries include Africa, India, China, Pakistan, Bangladesh, Southeast Asia and South America.

Source: Munich Re, NatCatSERVICE (2015)

**Innovations by private sector companies, often working in partnership with governments and development finance institutions, have ensured that their products and services better incorporate the increasing importance of climate change on risk levels.** These innovations support both the continued, effective growth of their traditional indemnity-based products, and also drive the development and scale-up of a number of new products. In both cases they have been underpinned by the increasing sophistication of weather and climate risk-related data and modelling, including satellite-based data, remote sensing for local data gathering, techniques for the analysis of large datasets, and modelling of weather and climate systems. Four key examples are highlighted below:

- Due in large part to improved satellite data and climate risk modelling, **index-based or parametric insurance** for individuals or communities has emerged in recent years to help overcome some of the core challenges inhibiting penetration of disaster insurance, especially high transaction costs, adverse selection and moral hazard. In low- and lower-middle-income countries, where such challenges are particularly acute, index-based schemes represent the majority of available climate-related insurance schemes (Climate Wise, n.d.), although overall penetration levels remain low, and challenges persist in relation to basis risk (that is, a mismatch between where actual losses occur and where payments are made). To further improve potential, considerable

investments in technical capacity are required, and a number of insurance companies are involved in R&D in this area, often in partnership with public sector organizations and NGOs.

- **Microinsurance** has significantly expanded the penetration of property, agriculture and health insurance in recent years, all of which increase resilience to climate impacts. The number of climate change relevant products has taken off exponentially since 2009, and the number of people covered has increased from the thousands to the millions in Africa, and from the millions to tens of millions in developing Asia (McCord, Steinmann, Tatin-Jaleran, Ingram, & Mateo, 2013; Premasis Mukherjee, Oza, Chassin, & Ruchismit, 2014). These often utilize index-based approaches and typically involve the use of novel distribution channels, including mobile phones, retailers, and financing institutions. While community-based organizations, NGOs, and state-run entities drove the initial launch of many such products, commercial insurers now provide the vast majority of coverage, often in partnership with communities, NGOs and governments. This helps to ensure sufficient underwriting capacity, advanced risk assessment techniques, and operational efficiency, while also ensuring that the cover remains affordable, including to the most vulnerable. Box 5 discusses the example of the ACRE (formerly Kilimo Salaman) program. Another example is India's Weather Based Crop Insurance Scheme (WBCIS), which offers weather-index-based microinsurance to farmers. WBCIS grew from less than a million farmers insured in 2009 to tens of millions today (Greatrex et al., 2015). Moreover, after decades of state-provided crop insurance programs being predominate in India, the WBCIS has enabled significant private sector participation, helping to accelerate scale-up.
- The private sector has driven significant growth around the world in **catastrophe bonds** in recent

years in order to preserve the insurability of ever more severe and frequent disasters. Although annual issuance was consistently less than \$2 billion in the period until 2005, it has since been consistently above \$4 billion, reaching a peak in 2014 with \$9.4 billion secured. 70 per cent of property catastrophe bonds utilize indemnity triggers, but as seen elsewhere, index-based triggers are increasingly important for issuance, especially in developing country schemes. In 2014 the outstanding volume of catastrophe was \$22.4 billion, demonstrating its importance as a strategic and efficient risk management tool (AON Benfield, 2014).

- **Sovereign disaster risk transfer products** have grown impressively in developing countries, as pooling risk across countries has become necessary in the face of large climate risks. For example, the African Union's Africa Risk Capacity (ARC), run by a private sector company but operating in a framework determined by African states and anchored in the African Union, has rapidly provided drought protection coverage to five countries, and will soon be expanding to ten. It expects to reach to 20–30 countries by 2020 and to expand its coverage to include tropical cyclones and floods in 2016 and disease outbreaks and epidemics by 2017. A key feature of ARC is its quick pay-out time: in 2015, Senegal, Mauritania and Niger had already received around \$16.5m, \$6.3m and \$3.5m, respectively, by the time a mid-February appeal to fund humanitarian support in the Sahel was launched. Pay-outs will ultimately benefit more than 1.3 million food-insecure people and close to 600,000 livestock across the three countries (African Risk Capacity, 2015). A further example is Swiss Re's commitment to provide advice to 50 sovereigns or sub-sovereigns and offer \$10 billion of risk coverage by 2020 which, as discussed in section, is on track to being delivered.

## **BOX 5 - ACRE (formerly Kilimo Salama): an example of an index-based microinsurance product**

ACRE provides an index-based insurance product to farmers in East Africa using mobile services. It is a private entity emerging from an initial cooperation between Safaricom (Kenya's largest mobile network operator), Syngenta Foundation, and UAP Insurance (a Kenya-based insurance and financial services company with a presence across East Africa).

The company delivers crop insurance to smallholder farmers, based on measurements from weather stations and other climate information in different agricultural regions in rural Kenya, Tanzania and Rwanda through the use of mobile phone payment services. Over time, it has developed insurance products to cover a variety of crops against drought, excess rain, and disease, as well as a range of supplemental products such as dairy livestock insurance, replanting guarantee, and

loan-linked insurance (allowing credit institutions to enter agricultural lending by mitigating weather-related repayment risk).

The mobile phones play a key role in the registration process of individual farmers, in getting the farm's location (as the insurance cover is location-specific), and in promptly providing payment in the event of compensation. Through this use of mobile phones, ACRE can design and distribute products for smallholder farmers with relatively low premiums.

The number of farmers covered has increased exponentially from 10,000 in 2010 to 234,000 in 2014, and by 2018 ACRE hopes to cover 3 million customers, across ten African countries, with expected sums insured of more than \$800m (Hess & Hazell, 2015)

**While the development of specific risk management products and approaches provides considerable value, the finance community has also begun to explore integrated approaches, especially through public-private partnerships.** These combine the provision of insurance with risk reduction and preparedness measures, and sometimes with credit (such as contingency finance) and savings products. This is particularly important in the face of climate change risks. The intention is to encourage the lowest-cost combination of risk management measures (across both public and private sectors). These approaches also reduce barriers to insurance uptake, including asymmetric information and high distribution costs.

**One integrated approach that has gained traction has been the combination of early warning alerts with index-based insurance.** Enabled by mobile technology, customers receive information about weather risks, and advice for dealing with them on a near real-time basis. This allows both producers, and supporting government institutions (for example, those related to food security or flood response) to take near-term precautionary measures that reduce exposure and vulnerability, and to invest in longer-term adaptation measures. This information can also inform lending institutions which can provide or adapt lending practices to facilitate climate investment in resilience, while the information about weather parameters can also be used to determine insurance pay-outs in the case of extreme events. Since the insurance is index-based, moral hazard is avoided, clients are encouraged to make valuable investments and they acquire valuable

information regardless of whether pay-outs are made. Ultimately, the cost of insurance should decline. This approach has already been deployed in the Climate Risk Adaptation and Insurance in the Caribbean project, while the International Livestock Research Institute (ILRI) has led the development of an index-based livestock insurance product for pastoralists in the Horn of Africa based on a vegetation index closely correlated with livestock mortality. To help commercialize and accelerate the distribution of the product, ILRI has partnered with Takaful Insurance of Africa, APA Insurance, and Oromia Insurance in Kenya and Ethiopia (Bailey, 2013; IBLI, n.d.).

**A number of other integrated approaches have also been developed to support better planning and increased investment in resilience and response measures.** For example, the R4 Rural Resilience initiative partners with Swiss Re to offer rainfall index-based insurance to rural households which can opt to pay their premiums by undertaking work on climate-adaptation measures. It promotes a participatory model and results in a product tailored to the needs of the farmers. The initiative expanded rapidly in Ethiopia and Senegal from 200 households in 2009 to more than 26,000 in 2015, with plans of expanding in Malawi and Zambia to cover 100,000 households by 2017. Elsewhere, insurance has been combined with contingency planning. For example, to become a member of ARC, a country must prepare and gain pre-approval of contingency plans describing how insurance pay-outs will be used should the coverage be triggered. Such approaches can also improve the credibility of such insurance products by ensuring that

benefits are targeted at those suffering the most from climate impacts.

**The private sector has also worked with public entities to improve general risk reduction and response capacity.** For example, the Insurance Development Forum (IDF), formed in 2015 under the auspices of the Political Champions Group for Disaster Resilience, brings together national and regional governments, the global insurance sector, UN Agencies and other international institutions to enable the growth of insurance-related capabilities and capacity to support disaster risk reduction and the wider objectives of the Sustainable Development Goals.

**Despite these developments, key challenges remain.** Crucially, insured losses remain low in many developing countries (as mentioned above). Moreover, the core challenge of climate change risk – the gradually and steadily increasing levels of risk – are only starting to be addressed through integrated risk management and insurance approaches. Information critical to progress is still not as robustly available as it might be, especially data on the socio-economic drivers of disaster risk, and even basic risk information in some regions. There is also a fundamental lack of information about how effective various disaster reduction and response measures are, so insurance premiums could potentially be reduced for those regions taking progressive action. Finally, much progress to date has been driven by relatively high concessional support levels. While this support is crucial in helping to pioneer development and innovation, and continued partnership with the public sector will remain essential, concessional levels will likely need to fall in order for progress to scale up over time.

### 3.3.2 Growth in products and approaches that reduce the risk of low-carbon investments

**In addition to climate damage risks, low-carbon investment itself involves a number of risks which insurance providers can help to manage.** Critical risk management products and approaches include the risk rating and insurance of installed equipment and its performance, as well as various risk mitigation instruments (for example, guarantees) related to sovereign or policy risk.

**Comprehensive and performance insurance for renewable energy and energy efficiency is available.** New technologies associated with renewable energy and energy efficiency involve new kinds of risks, often not as well understood as risks relating to more traditional energy investments. Instruments that transfer these

risks to the insurance market reduce uncertainty about cash flows, and increase the ability of many investors to allocate capital to these sectors. For example, Munich Re's Hartford Steam Boiler (HSB) insures renewable technologies such as wind, solar, biomass, and hydroelectric and geothermal plants. It also introduced insurance coverage for the efficiency of energy-saving measures for buildings in 2014. Similarly, Hannover Re, a leading international reinsurance company working with Energi Insurance Services, launched an Energy Savings Insurance product for energy service companies known as the 'Energy Savings Warranty' in 2010. According to Swiss Re, the current expenditure on risk management services in renewable energy is around US\$800m and is expected to rise between \$1.5–\$2.8 billion by 2020 (Swiss Re, 2013).

**Political and policy risk represent some of the greatest risks to private sector low-carbon investments.** A survey by the World Bank's Multilateral Investment Guarantee Agency (MIGA) identified political risk as the second most important constraint to Foreign Direct Investment in developing countries (after macroeconomic instability) and that, within the category of political risk, adverse regulatory changes were the greatest concern (MIGA, 2014). In a comparative analysis of risks affecting low-carbon investment, project developers ranked policy risks in the category of most salient risks (Frisari, Hervé-mignucci, Micale, & Mazza, 2013)

**The bulk of support to manage these risks has been provided by the public sector.** For instance, the Multilateral Investment Guarantee Agency of the World Bank Group provides political risk cover that in some cases also covers policy and regulatory risks. At present, it has extended risk coverage to around 25 projects that have a low-carbon focus, with a gross exposure of around \$3.5 billion.<sup>19</sup> OPIC offers similar policies and, notably, has recently explicitly prioritized this support for climate-relevant sectors. Private sector providers such as ACE, Zurich and Munich Re also provide political risk insurance and have historically provided tailored support for projects generating carbon credits. It remains to be seen whether such private sector providers can become significant sources of such insurance, either leveraging or replacing public funds.

### 3.4 TOWARDS A ROBUST FINANCE ECOSYSTEM

Overall, the early signs of a fundamental shift are emerging – especially in the form of a series of inflection points – but continued momentum is needed to accelerate these shifts and broaden their geographic scope, and hence realize the large investment opportunity of a transition to a low-carbon, climate-resilient economy. Figure 9 shows the real progress that has been made towards the robust financial system required for this transition. It illustrates five clear inflection points:

1. **As illustrated in section two, a range of financial institutions from developed and developing countries have now committed hundreds of billions of finance to support low-carbon and climate-resilient investments in all parts of the world.** Many of these commitments have been made in just the last year, at and following the 2014 Climate Summit. This capital will finance investment in both developed and developing countries and reduce emissions/improve climate resilience while providing energy, reducing air pollution and delivering a host of other benefits.
2. **A new green bond market has been created and is expanding at a rapid pace.** Six years ago, green bonds were a concept. In 2015, it is expected that issuance will be between \$50 and \$70 billion.
3. **A rapidly increasing number of companies are adopting internal carbon prices.** There has been around a threefold increase in the number of companies factoring carbon prices into their investment appraisal decisions in just the last year. A further 580 companies are expected to introduce carbon prices in the next two years.
4. **In secondary markets, investors are expressing increasing concern about the activities of carbon-intensive assets and companies.** Within the first year of the Portfolio Decarbonisation

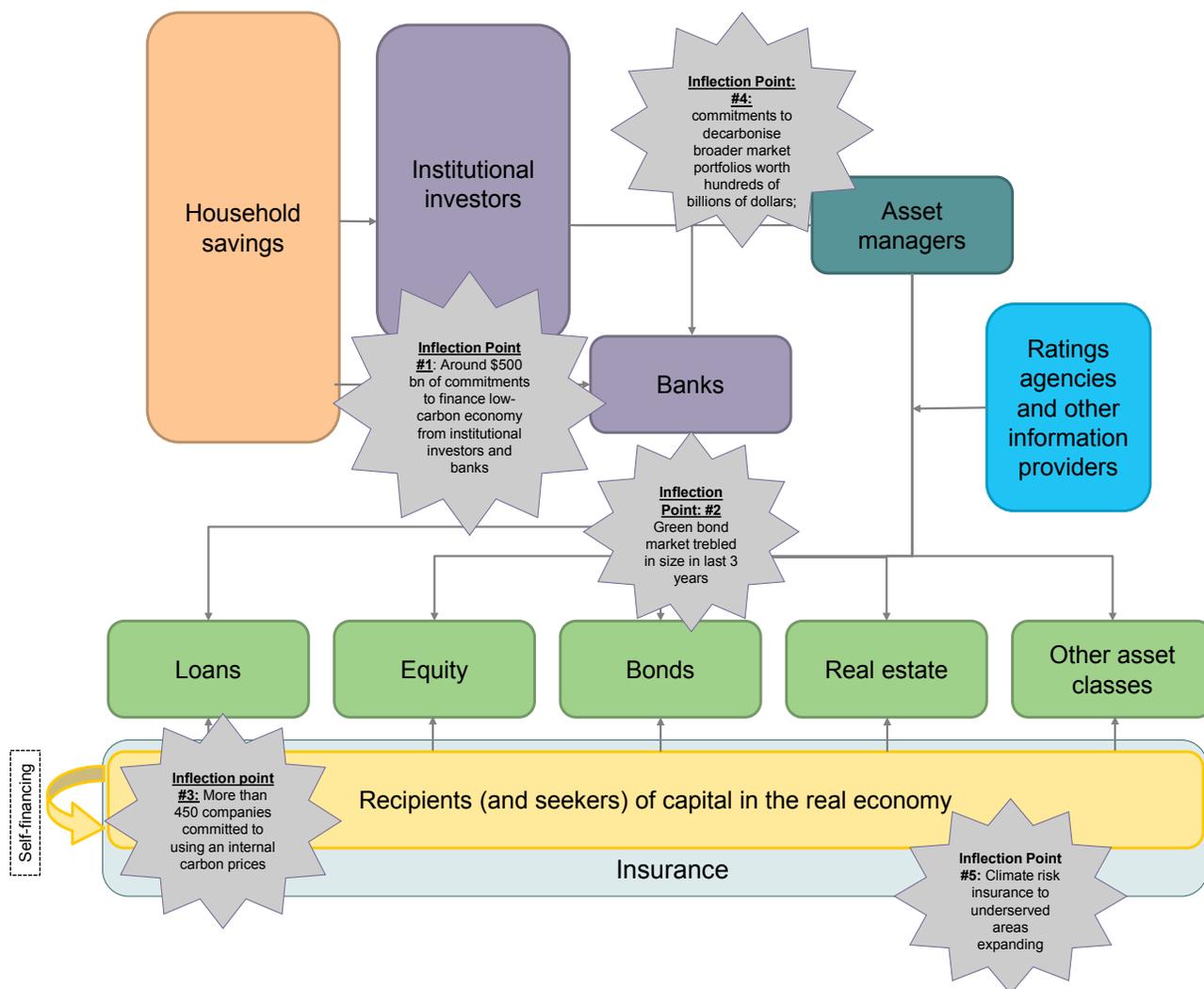
Coalition, investors have made commitments to decarbonize broader market portfolios worth hundreds of billions of dollars; and to begin tracking carbon performance of AuM worth trillions of dollars.

5. **The insurance sector is scaling up its efforts to respond to the climate impacts that are already locked in.** There has been a steady rise in the number of lives and value of assets insured, and an improvement in risk reduction and disaster response measures.

These developments come at a time when renewable power investment has already passed through an inflection point, with annual new investment in renewable power almost 90 per cent higher than annual net investment in fossil fuel power.

**Despite this progress, much more needs to be done – this will require policy action.** Total low-carbon investment remains too low to avoid breaching the 2°C threshold this century while adaptation funding gaps are anticipated. Similarly, enthusiasm regarding many of the inflection points and other developments discussed in this chapter must be tempered by recognition that their significant relative to the market as a whole is often modest. The geographic breadth of current trends is of particular concern: for example, despite the rapid expansion in the penetration of insurance coverage many households in vulnerable developing countries almost entirely lack insurance protection against climate risks. Similarly, it seems likely that the financing commitments made by financial institutions will largely be met by making investments in developed country markets. To address these challenges at the necessary speed and scale will require partnership between public and private sectors, supported by government rules changes. Some of these possibilities are discussed in the following chapter.

FIGURE 9 - Across the finance ecosystem, there are early signs of a fundamental shift



Source: Vivid Economics

## 4. TRANSFORMING RULES

### FURTHER RULE CHANGES ARE NEEDED TO CEMENT THE GROWING MOMENTUM

#### Transforming rules: key conclusions

- The financial consequences of failing to maintain temperature increases to 2°C this century would be very substantial: the value at risk of financial assets could be tens of trillions of dollars.
- To avoid these risks, governments must strengthen their actions and change rules. This will ensure that the leadership shown by some in the finance sector becomes widespread and rules-based. Investors are clearly calling for this action.
- Carbon pricing is essential for levelling the playing field between low- and high-carbon alternatives. This can unlock substantial macroeconomic benefits. Extending and prioritizing political and policy risk coverage from organizations like MIGA and the Green Climate Fund can also play a crucial role.
- Governments should adjust their infrastructure needs assessments to prioritise low-carbon, climate-resilient infrastructure and explicitly publicise the results.
- Policymakers can support risk management through building awareness, appropriately subsidizing or mandating coverage, and facilitating the development of sovereign risk pools.
- Improving information flows through stronger, internationally coordinated disclosure requirements for both companies and investors will promote better decision making. Rules supporting and harmonising stress-testing would allow investments in resilience to be recognised and rewarded by the market.
- According to national circumstances, credit enhancement, fiscal policy and the creation of dedicated green financing institutions can all be effective government tools to support climate financing. This might be supported by a recalibration of prudential governance to better reflect long-term economic and environmental realities.
- According to national circumstances, credit enhancement, fiscal policy and the creation of dedicated green financing institutions can all be effective tools to support climate financing. This might be supported by a recalibration of prudential governance to better reflect long-term economic and environmental realities.

**In recent years, the systemic financial and macro-economic implications of climate change have become increasingly understood.** It is generally recognising that allowing global average temperatures to increase by more than 1.5-2°C will lead to particularly damaging impacts in terms of, among others, declining agricultural yields and increased risk of flooding and drought. These changes will place severe risks on individuals and communities, especially the most

vulnerable. In recent years, this understanding has been complemented by analysis focusing on the wider macro-economic and financial implications of these impacts:

- One credit rating agency has described climate change as one of only two global mega-trends that are likely to have a bearing on sovereign risk, and hence the cost of government financing, over the

course of the 21<sup>st</sup> century (Standard and Poor's, 2014).

- Recent research points to the value at risk to financial assets from climate impacts to be US\$4.2 trillion rising to US\$13.8 trillion if warming reaches 6°C by 2100. These numbers rise to US\$13.9 and US\$43.0 trillion, respectively, when using a public sector discount rate. For context, US\$4.2 trillion is roughly on par with the total value of all the world's listed oil and gas companies, while US\$13.8 trillion is around 10% of the world's total financial assets (Economist Intelligence Unit, 2015).
- In the insurance sector, some estimates suggested that currently modelled losses could be undervalued by as much as 50 per cent if recent weather trends are reflective of longer term patterns under a changed climate. (Standard and Poor's 2014a)

**The financing actions and market shifts described in this report show that the finance community is able to respond to the challenge of not exceeding 2°C, and to the impacts that will remain – but partnership with national and international policymakers is crucial to achieve change on the scale required.** The individual and collective financing allocated to the low-carbon economy from around the world, supported by the development of new products and financing models; the increasing attention on, and shift in investment away from, carbon-intensive assets and activities; and the tailoring of risk products to help manage climate impacts all indicate that the finance community has, on a number of dimensions, reached

an inflection point. It is now much better positioned to contribute to the global response to climate change than in the run-up to the COP15 negotiations. But, at the same time, the changes required are transformational and further policy action will be required to accelerate reform across the sector. While there are clear signs of individual and collective leadership from within the finance community, others remain uncertain and wedded to the status quo. In the run-up to, and during COP21, clear and decisive leadership from policymakers is necessary to seize the momentum following the 2014 Climate Summit to further support the progress that has been made and to secure its geographic breadth.

**There are clear opportunities for policymakers to allow the finance sector to further contribute to progress towards the objective of staying well under the threshold of 2°C warming this century, and to help respond to the climate impacts that this will impose.** Rule changes can both increase the demand for capital for low-carbon, climate-resilient investment opportunities, and unlock the supply of this capital through reforms to the financial system. Many of these opportunities have been identified by recent analyses including the UNEP Inquiry into the Design of a Sustainable Financial System (UNEP Inquiry, 2015) and the Canfin Grandjean Commission (Canfin-Grandjean Commission, 2015). It is also recognized that the G20 finance ministers and Central Bank governors have asked the Financial Stability Board (FSB) 'to convene public and private sector participants to review how the financial sector can take account of climate-related issues' and provides ideas for its consideration.

## 4.1 DEMAND-SIDE CHANGES

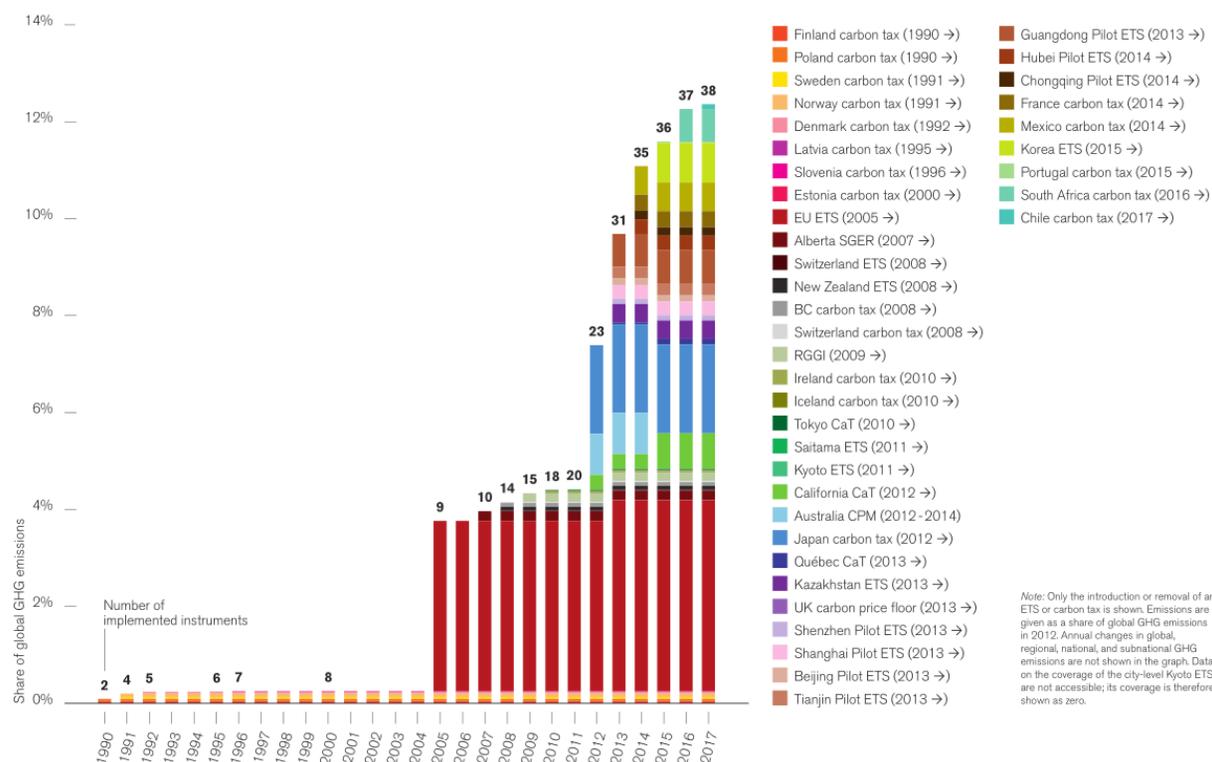
### 4.1.1 Pricing reform

**Price signals are crucial for redirecting capital towards low-carbon, sustainable activities.** Ensuring that energy and other carbon-intensive goods reflect their full costs, including their external emission costs, provides the clearest and most cost-effective way of reallocating capital towards low-carbon investment opportunities.

**Important progress has been made in recent years.** As of 2015, about 40 national and more than

20 sub-national jurisdictions are putting a price on carbon. This includes a wide diversity of countries including various pilots in China (in the expectation of a full emissions trading system by 2020), Kazakhstan, Mexico and Korea. Figure 10 shows that the percentage of global emissions subject (or planned to be subject) to a carbon price is now around 12 per cent – more than three times higher than at the time of COP15 (Kosoy et al., 2015). Similarly, a number of countries including India, Indonesia and Morocco have begun energy subsidy reform processes.

**FIGURE 10 - The share of global emissions subject to a carbon price has grown rapidly in the last five years**



Source: (Kossoy et al., 2015)

**The benefits from reforming energy subsidies are substantial.** The G20 has already committed to removing inefficient fossil fuel subsidies. Globally, energy subsidies – including the failure to internalize the cost of carbon emissions – are estimated to be around \$5.3 trillion, or 6.5 per cent of GDP. Removing these subsidies could reduce CO<sub>2</sub> emissions by 20 per cent and deaths related to fossil fuel emissions by over 50 per cent. The fiscal dividend would be around \$2.9 trillion (3.6 per cent of GDP) while the overall net gain from removing these subsidies, after accounting for the impact of higher energy prices, is projected to be \$1.8 trillion (2.2 per cent of global GDP). Gains could be much larger if the fiscal gain is used for growth-enhancing tax cuts on labour and capital or investments in education, health or infrastructure (Coady, Parry, Sears, & Shang, 2015).

**Evidence of the macroeconomic benefits of carbon pricing is growing.** For example, since introducing a revenue neutral carbon tax, British Columbia has been able to grow more quickly than the rest of Canada; has provided its residents with the lowest personal income tax rates in the country; and, in particular, has cut the tax burden on low-income households, all while cutting fuel use by 16 per cent and growing a thriving clean

tech sector (Elgie, 2014; OECD & World Bank Group, 2015). While there are understandable concerns over the impacts on industrial competitiveness and low-income groups, there is strong evidence to show that well-designed policies can address these challenges (Kossoy et al., 2015; OECD & World Bank Group, 2015).

**The appetite for rational energy pricing, including carbon pricing, within the financial and business community is rapidly growing.** More than 1,000 businesses and investors signalled their support for carbon pricing at the 2014 Climate Summit while, as described above, the number of companies adopting internal carbon pricing has grown threefold in just the last year. This message was reiterated at the Business and Climate Summit held in Paris earlier this year. Some businesses have been proactively involved in helping to design and test (simulated) carbon pricing schemes to ensure that they operate effectively, including in both Brazil (Bartlett, 2014) and California (Partnership for Market Readiness, 2015).

**Further support from policymakers would provide vital momentum to this process:** this could include progress on the G20 commitment to eliminate ‘inefficient’ fossil fuel subsidies; making new commitments to

introduce effective, explicit carbon prices; or providing more information about the likely future trajectory of carbon prices. An increasing body of evidence on how to design successful carbon pricing schemes, based on experiences to date, is available to policymakers to support and guide this process (OECD & World Bank Group, 2015).

#### 4.1.2 Broader improvements in the investment climate

**Beyond carbon and energy pricing reform, much can be done to encourage climate investment.** A good investment climate has many dimensions but is clearly linked to the quality of institutions, government policies and the legal and regulatory framework. It requires political and economic stability, a level playing field between market participants and a tax system which is universally applied but not unduly distortionary. Policy and regulation to promote renewable energy, energy efficient and other low-carbon and climate-resilient investment need to be ‘long, loud and legal’. The benefits from strengthening the investment climate are likely to be felt most by small and medium-sized enterprises in developing and emerging economies – and those providing capital to such enterprises – which often lack the resources to navigate complex and challenging business environments. At the same time, it is notable that policy uncertainty is one of the key factors behind the tailing off of renewables investment in many OECD countries.

**An expansion of public support to overcome policy and political risks and support investment in a wider-range of developing countries is needed.** While policy reforms and improvements in the business environment provide the most sustainable long-term route to boosting private sector investment, the urgent investment needs - and the benefits from developing an investment track record in a wide variety of geographic contexts – can help justify public support. The difficulties that private investors face in managing policy and political risk is often a key barrier: in a recent survey, 41 per cent of respondents identified that they had either withdrawn or cancelled planned investments in the previous 12 months due to adverse regulatory change (MIGA, 2014). Public instruments to overcome these risks can be a ‘powerful catalyst’ to financing investment (Canfin-Grandjean Commission, 2015). A significant expansion of instruments to address these risks, prioritizing low-carbon climate-resilient investment and designed in a way that makes them accessible to private sector entities with modest resources, could be an important role for the Green Climate Fund, and other public climate finance providers such as the Multilateral

Investment Guarantee Agency (MIGA) of the World Bank Group.

#### 4.1.3 Documenting infrastructure provision

**The decisions made by public authorities over the amount and type of infrastructure they wish to develop will have a crucial bearing on the speed at which the transition to a low-carbon, climate-resilient economy takes place.** It is policymakers, rather than businesses, who make many of the most important decisions over the infrastructure financing needs of a country, region or city. Relatively modest changes in planning processes so as to prioritize the identification of low-carbon, climate-resilient infrastructure would have substantial ramifications for the speed and cost of the transition. However, this may need to be accompanied by institutional strengthening, in some cases with the support of international public funds, in areas such as: drawing up contracts with the private sector on appropriate risk sharing principles; project management, including monitoring and evaluation, for complex schemes; and integration of sustainability considerations into strategies and projects (Bhattacharya, Oppenheim, & Stern, 2015).

**The explicit documentation by countries (or regions or cities) of their low-carbon climate-resilient infrastructure requirements, and whether and how they wish to engage the private sector through, for instance, public private partnerships (PPPs), could provide visibility to investors over country plans.** Currently, less than 50 per cent of G20 countries publish a clear project pipeline of infrastructure investments (Bhattacharya et al., 2015). Publishing a pipeline of low-carbon, climate-resilient infrastructure would raise investor confidence and accelerate the development of adequate financing instruments, such as infrastructure funds and sovereign risk management products. It would also allow countries to tap the substantial and growing investor appetite for green bonds. Such a pipeline could potentially be published alongside INDCs.

#### 4.1.4 Insurance provision and risk management

**The recent G7 commitment to increase the number of people covered by disaster insurance by 400 million by 2020 has provided an important stimulus to ensuring the effective management of climate risks.** It should help augment the growth of the market which, as described above, although impressive, faces difficulties in keeping up with the increases in exposure resulting from climate change.

**There are a number of options available to policymakers to transform this high-level commitment into concrete policy action, taking advantage of various public-private partnership opportunities.** Such policy action can help tackle the underlying drivers of inadequate insurance, especially lack of risk awareness or experience with risk management products and practices; unaffordability, especially among lower-income households or small enterprises; immature regulatory and legal frameworks; and fundamental limits to insurability (Kalra, 2010; Schanz & Wang, 2014).

**Public support for improved climate risk data; and broader risk awareness and risk management capacity provides a critical basis for improved insurance penetration and risk management practices.** Despite advances in satellite and remote sensing technologies expanding the amount of global weather-related data available, there is still a scarcity of data in most developing economies. This includes data about the size and frequency of climate events, as well as about exposure and vulnerability levels. Governments and NGOs can play a critical role in facilitating insurance and risk management solutions by supporting the collection, standardization, and updating of data, as well as risk related research and modelling. They can also serve as the coordinating agent to pull together the broad consortium of partners required.

**Public support can also help provide education on climate risks and insurance.** While the private sector has a strong incentive to educating potential clients about the benefits of insurance, no single company will have an incentive to overcome pervasive, society-wide deficits in awareness or capacity. Through both core educational activities and awareness campaigns, governments can support the expansion of insurance literacy and risk management capabilities. In a number of countries, such government programs have been co-funded or supplemented by private sector sponsored efforts,

and there is room for extending such partnerships to other countries.

**Public action can ensure sufficient demand by subsidizing or mandating insurance coverage and risk mitigation investments.** These policies protect the interests of everyone affected by an event by ensuring fuller pooling of risks, greater risk mitigation efforts, and a reduction of the residual risk covered by publicly funded disaster relief. Subsidized or compulsory insurance schemes need to be well-structured to avoid distorting the insurance market, and subsidies can be targeted to help those unable to afford insurance coverage. Governments can also play an important role in promoting risk prevention, avoidance and resilience measures through improved construction codes and early warning systems. At an international level, there are opportunities for greater cooperation across countries to create sovereign risk pools. These can enable risk sharing across a larger pool, and over longer periods of time, which will be critical to increasingly catastrophic climate impacts. Such sovereign risk pools can also serve as a vehicle for international support to lower-income and vulnerable countries through contributions to premiums by developed countries.

**Government can also play a positive role in facilitating privately-funded risk mitigation activity by establishing a sound regulatory framework, and adopting market enabling policies.** Sound regulation can help ensure solvency, while facilitating licensing, product innovation and reinsurance placement. In addition, public vehicles can be efficiently designed to allow the private sector to insure a large portion of risk, while leaving only a residual risk (in very extreme circumstances) to public sector funding. Finally, governments can facilitate market conditions for international risk pooling and diversification, to ensure sufficient risk protection for national-level disasters.

## 4.2 SUPPLY-SIDE REFORM

**There have also been some important regulatory and policy developments at the national level to support investment in low-carbon opportunities.** Often, but not exclusively, pioneered by developing country governments, and typically placed in the context of achieving broader green/sustainability objectives, examples include:

- By 2016, all banks in Bangladesh will be required to allocate 5 per cent of their loans to green projects (renewables, energy efficiency and waste

management) with concessional refinancing and capital provision variations to offset the additional risks.

- In China, the China Banking Regulatory Commission promotes lending to environmentally sustainable projects through its Green Credit Guidelines (UNEP Inquiry, 2015).
- The UK has established a publicly owned Green Investment Bank to invest in the creation of modern, green infrastructure

While policy changes such as these reflect domestic circumstances they illustrate that some efforts have been made to boost the supply of capital to low-carbon, climate-resilient investments. There are many more examples.

**But, comparatively speaking, policymakers have taken a light touch approach in the face of rapid developments in the financial markets; instead, most rules to date have resulted from voluntary industry initiatives.** For instance, in relation to green bonds, rules on what activities can be financed from the proceeds of green bonds have been led by industry initiatives such as the Green Bond Principles or the Climate Bonds Standards. Likewise, the Soft Commodities' Compact, a voluntary initiative among ten banks to support attainment of zero deforestation among commodity supply chains, has set its own rules on defining zero net deforestation and on options for verification. Similarly, the recently launched 1-in-100 initiative seeks to apply the climate and natural hazard risk stress tests that have transformed the resilience of the insurance industry into the wider financial sector and across the economy. This includes the development and adoption of risk assessment standards for companies and public entities to evaluate the 1 in 100 year, 1 in 20 and annual average loss from these risks and the integration of these assessments into accounting practices and credit rating methods.

**There is now an opportunity for policymakers to seize this positive momentum in order to accelerate action across the financial sector in response to the challenges and opportunities posed by climate change. This includes setting new rules that shift practice from an important but small group of leaders to mainstream behaviour.** While industry-led initiatives and rules have played a pioneering role in shifting the sector and reaching a number of inflection points, it inevitably leads to gaps with differing levels of ambition demonstrated by different actors who often choose to interpret rules under voluntary initiatives in differing ways. Policy action can help accelerate further progress at the necessary pace and help ensure geographic breadth. Indeed, there are already at least two compelling examples of this trajectory:

- Portfolio carbon footprinting and exploring opportunities to reduce exposure to climate risks began as a minority activity among a small group of individual investors in the early 2000s (the Carbon Disclosure Project was launched in 2000). As discussed earlier, this activity coalesced to become an industry-wide initiative in the form of the Portfolio Decarbonisation Coalition, announced at the 2014 Climate Summit, and the complementary

Montreal Carbon Pledge. These activities have also been supported by the growing focus that voluntary initiatives such as the Sustainable Stock Exchange Initiative have placed on the disclosure requirements placed on corporates by exchanges. Building on this momentum, France adopted a law that follows a similar approach by requiring institutional investors to disclose information on sustainability factors in their investment criteria and to explain how they take into account exposure to climate and carbon risks.

- China's central bank (PBoC) is currently building on the lessons learned from the industry-led initiatives on green bond standards to set its own definitions which will be embedded in a broader suite of policies to stimulate the green bond market including an evaluation system for allocation of funds and environmental impacts of green bonds; tax incentives; preferential risk weighting in bank capital requirements and fast track issuance for green bonds

**There are a number of opportunities for policymakers to bring about long-lasting reforms.** We focus on two specific areas:

- improving information flows so that all parts of the financial ecosystem are better informed about the risks and opportunities posed by climate change, improving asset pricing, and, in the long-run, smoothing the transition to a low-carbon climate-resilient economy;
- making it easier and cheaper to raise and allocate capital to appropriate investment opportunities. This can be achieved by a combination of rule changes as well as, in some cases, the public sector taking an active role

#### 4.2.1 Improving information flows

**To perform its fundamental roles in allocating capital and managing risks, the finance and investment community, as well as its regulators, needs access to all relevant information.** However, with only an emerging understanding of what information is actually needed and how it might be collected, coupled with misaligned incentives and other market failures, this information is not always available. This applies to risks associated with both climate impacts, and current and future policy action to reduce emissions.

**There are a number of actions and rules and regulations that can ensure better disclosure of information and hence facilitate better decision-making by both the sector and its regulators:**

- The analysis above demonstrates a growing investor desire for better information around the carbon

asset risk of carbon intensive firms. At present, corporate sustainability disclosure remains subject to a mix of regulations and voluntary initiatives, with fears among individual exchanges about the negative competitive impact of unilaterally introducing greater requirements. In total, only 39 per cent of the world's largest companies disclose their greenhouse gas emissions (Corporate Knights Capital, 2014). An international effort at developing systematic disclosure rules potentially led by an internationally coordinated and politically supported Climate Disclosure Task Force, as has recently been suggested by the Governor of the Bank of England and Chair of the Financial Stability Board, Mark Carney (Carney, 2015) – could make an important contribution to improving market transparency. This could also focus on encouraging transparency from sell-side equity analysts on the use of sustainability information, especially as regards carbon asset risk, in their models and price forecasts.

- Building on existing precedents, there is an opportunity to require institutional investors to disclose information on sustainability factors in their investment criteria and to explain how they take into account exposure to climate and carbon risks
- Across the financial sector, there is a need to develop rigorous stress-testing to ensure the robustness of business models to key climate and other sustainability risks. While some banks are already exploring this issue, regulatory rules, especially if internationally co-ordinated, would ensure that natural hazard risk would be more fully taken into account and allow investments in resilience to be recognized and rewarded by the market. Again, this is an idea that has recently been suggested by the Governor of the Bank of England and Chair of the Financial Stability Board, Mark Carney (Carney, 2015).

#### **4.2.2 Rules and roles to support raising capital for low-carbon, climate-resilient opportunities**

**A key challenge in financing many low-carbon and climate-resilient infrastructure options is that they do not benefit from a long history or track record of asset performance that could help inform investor decision making.** This can be a barrier to the provision of debt capital in particular. The clearest response might be to provide credit enhancement – building on examples such as the dedicated green credit enhancement program offered by OPIC. Alternatively, first-mover investments by dedicated green financing institutions can often deliver a powerful demonstration effect to the rest of the markets.

**Support for bank lending to low-carbon and climate-resilient opportunities is likely to be particularly important in developing and emerging markets.** There may be opportunities to establish priority lending programs, as has been undertaken in India, or through more extensive use of interest rate subsidies as practiced by many development finance institutions.

**Fiscal incentives are commonly used to encourage particular savings and investment behaviour – and could be used more extensively to support climate related investments.** For example, in the United States, tax relief on the income from municipal bonds is a longstanding feature designed to encourage lending for investment in local infrastructure. However, potentially as part of a more general re-assessment of how fiscal policy directs and encourages long-term sustainability within the financial sector, there is likely to be scope in many countries to directly target fiscal incentives at supporting greater financing of low-carbon, climate-resilient opportunities.

**Finally, there may be cases where existing rules could – unintentionally – hold back allocation of capital to low-carbon and climate-resilient investment opportunities.** Stronger integration between climate and financial stability policy – and the adoption of an explicitly long-term perspective on the possible drivers of financial (in)stability – may allow for a re-assessment of the relative risk profile of low-carbon and climate-resilient versus high-carbon alternatives and hence facilitate a recalibration of prudential governance to better reflect long-term economic and environmental realities.

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# END NOTES

1. All references to private climate finance and the quantity of private capital that has or might be mobilised towards low-carbon or climate resilient development are made without prejudice to the ongoing discussions within the UNFCCC as to what constitutes climate finance or on what should be counted towards the Copenhagen Accord commitment by developed countries to a goal of mobilizing USD 100 billion dollars a year by 2020 to address the needs of developing countries.
2. Based on data provided by BNEF.
3. Estimates from the International Energy Agency and the Global Commission on the Climate and Economy indicate a cumulative need for tens of trillions of dollars of low-carbon and climate-resilient investment over the next decades.
4. Part of this commitment also included the development of a definition and working framework of Smart Risk Investing that has the support of the insurance industry through ICMIF and IIS.
5. In the context of the coalition commitment, decarbonisation relates to cases where climate change-related activities or commitments drive an investment decision and where the impact on investment decisions and the portfolio as a whole can be clearly identified. This includes explicit commitments to reduce the carbon footprint of investment portfolios; to increase investment in areas such as renewable energy; to withdraw capital from high energy consumption activities and to encourage companies and other entities to reduce their emissions and support the transition to a low-carbon economy.
6. It has not been possible to collect data to assess the extent of progress made by Credit Agricole.
7. The figures in the body of the text relate to the PDC's narrowest definition of decarbonisation where commitments drive an investment decision and where the impact on investment decisions and the portfolio as a whole can be clearly identified. PDC also monitors performance against a broader decarbonisation definition, where investment processes and objectives incorporate Environmental, Social and Governance issues, including climate change. Under this definition, more than \$150 billion of AuM are already covered.
8. These figures reflect an update on those figures presented in Frankfurt School UNEP Centre & BNEF (2015).
9. Estimate by Vivid Economics.
10. [http://unfccc.int/adaptation/workstreams/nairobi\\_work\\_programme/items/6547.php](http://unfccc.int/adaptation/workstreams/nairobi_work_programme/items/6547.php)
11. Based on data provided by the Climate Bonds Initiative.
12. All market data related to yieldcos provided by Bloomberg New Energy Finance.
13. For instance, rates of net equity issuance have turned negative in recent years as companies return cash to shareholders (Van Rixtel & Villegas, 2015).
14. With the support of Caring for Climate strategic partners – CDP, The Climate Group, UN Foundation and the Principles for Responsible Investment.
15. List taken from combining signatories to the Business Leadership Criteria on Carbon Pricing and those companies reported by CDP (2015).
16. Calculation by Vivid Economics based on data provided by BNEF.
17. Sample provided by BNEF based on a selection of thematic indices, as well as those with 'low-carbon' or 'climate' in their name (as available from Bloomberg terminals). Subsequently refined by Vivid Economics to focus only on those indices for which an explicit launch date was found.
18. Data for Africa, Southeast Asia, South America, India, Pakistan, Bangladesh, and China.
19. Vivid Economics estimates based on data downloaded from the MIGA website.

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