

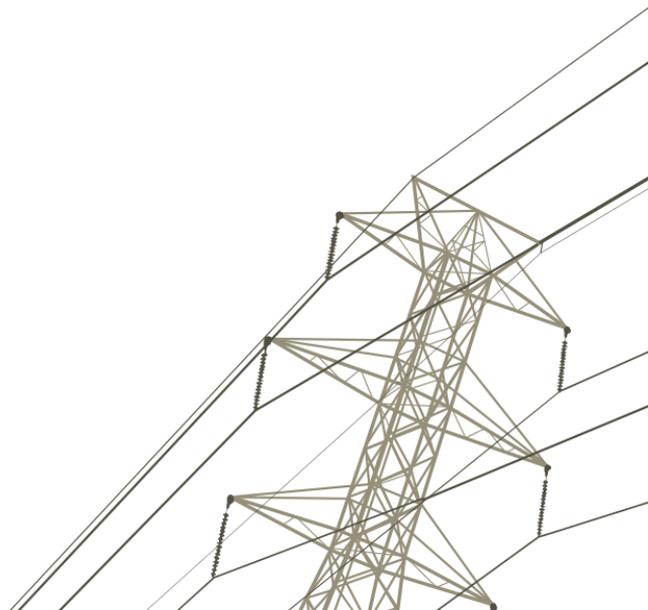


E3G

Financing the Decarbonisation of European Infrastructure

30 percent and beyond

Ingrid Holmes, Jonathan Gaventa,
Nick Mabey and Shane Tomlinson





E3G

Financing the Decarbonisation of European Infrastructure

30 percent and beyond

Ingrid Holmes, Jonathan Gaventa,
Nick Mabey and Shane Tomlinson

June 2012

About E3G

E3G is an independent, non-profit European organisation operating in the public interest to accelerate the global transition to sustainable development.

E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change.

E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.

More information is available at www.e3g.org



E3G

Third Generation Environmentalism Ltd (E3G)

47 Great Guildford Street

London SE1 0ES

Tel: +44 (0)20 7593 2020

Fax: +44 (0)20 7633 9032

www.e3g.org

© 2012 E3G



This work is licensed under the Creative Commons Attribution – Non-Commercial – Share-Alike 2.0 licence.

You are free to:

- Copy, distribute, display, and perform the work
- Make derivative works

under the following conditions:

- You must attribute the work in the manner specified by the author or licensor.
- You may not use this work for commercial purposes.
- If you alter, transform, or build upon this work, you may distribute the resulting work only under a licence identical to this one.
- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

Acknowledgements

We would like to thank the following people for their assistance in developing this paper.

In the UK: Susan Davies, Edinburgh University; Jason Langley, AXA; Helene Winch, BT Pension Scheme; Richard Wilcox, Cooperative Bank; Stephanie Pfeiffer, IIGCC; and Adrian Jones, MBIA.

In Estonia: Andrus Treier and Mirja Adler, Kredex; Martti Talgre, SEB Estonia; Ando Leppiman, Eesti Energia; Einari Kisel, Ministry of Economic Affairs and Communications; Joakim Helenius, Trigon Capital; Heidi Kakko, Ott Parna and Lauri Matsulevits, Estonian Development Fund; Laura Arengu and Ryan Mitchell, British Embassy, Tallinn; and Rene Tammist, Estonia Renewable Energy Association.

In France: Blaise Desbordes, CDC; Benoit Leguet, Alexandre Ossola and Herve Allegre, CDC Climat; Christian Dubarry and Jacques Rosement, Oséo; Romain Talagrand, BNP Paribas; Pierre-Loic Caijo, Independent; David Loggia, Independent; Vivianne Akriche Eurazao; Camille Sera, Worldwatch Institute; and Jean-Philippe Roudil, French Renewable Energy Association.

In Germany: Achim Neuhäuser, Berlin Energie Agentur; Reinhard Giese, Federal Ministry of Economics and Technology; Rainer Hinrichs-Rahlwes, German Renewable Energy Federation; Brigitte Wesierski and Stefan Becker, Association of German Public Sector Banks; Aki Kachi, Adelphi; Martin Schröder, Joachim von Rottenburg and Eberhard Hein, BDI; Eric Heymann, Deutsche Bank; Tatjana Bruns, Gudrun Gumb and Martin Link, KfW; Jan Andreas, Frankfurt

School of Finance and Linde Griesshaber and Christoph Bals, Germanwatch.

In Poland: Karina Kostrzewa and Robert Kowalski, BGK; Adam Pool, Continental Wind & Environmental Investment Partners; Tomasz Żylicz, Warsaw University; Grzegorz Zielinski, EBRD; Krzysztof Bobinski, Independent; Tadeusz Skoczkowski, KAPE – Polish National Energy Conservation Agency; Jacek Piekacz and Ewa Gąsiorowska, Vattenfall; Anna Zyla and Bartłomiej Pawlak, BOŚ Bank; Jan Rączka, National Fund for Environment Protection and Water Management; and Agata Hinc, Demos Europa.

In Spain: Oscar Perez and Pedro Michelena, Qualitas Equity Partners; Álvaro Arenillas de Chaves and César Puentes Martin, Banesto; Miguel Solona, Antonio Garcia Mendez and Inés Bernardo, Santander; Rafael Munilla Muñoz, Nuno Martins, David Otero and Miguel Bautista, EDP Renovaveis; Iciar Zárata Fernández and Antonio Bandrés, ICO; Manuel Alvarez Caser; Michele Weldon and Aurelio Garcia, ECODES; Iñigo Velazquez Prado, Caja Madrid; Peter Sweatman, Climate Strategy & Partners.

Contents

Executive summary	9
1 Scale of the challenge	23
2 Understanding the task ahead	27
2.1 The long-term story: investment required to 2050	27
2.2 The short-term story: investment required to 2020	30
3 The role of public funds in risk-managing the transition	34
3.1 Using public funds to leverage private investment	35
3.2 Targeting public investment to the most macro-economically beneficial investments	37
3.3 Maintaining public investment in critical areas of RD&D and infrastructure that promote medium term growth and competitiveness	38
4 Building investor confidence: risk-managing the transition to facilitate investment	40
5 Financing the transition: the role of policy and finance	43
5.1 Addressing market capacity limits	47
5.2 The need for investment grade policy frameworks	60
5.3 Driving regulated investment	67
5.4 Addressing the aggregation challenge	72
5.5 Scaling up support for development and deployment of innovative technologies	83
6 Conclusions	89

Executive summary

“Some argue that good government policies and waiting for the financial market to return to ‘normal’ after the credit crunch will be enough to deliver the necessary investment [to decarbonise the economy]. We disagree. Even a return to the ‘old normal’, which is not likely, would not accommodate the unprecedented scale, urgency and nature of the challenge. The only sensible plan given the conclusion of the Stern Review is to act now to facilitate the required investment needed to safeguard our future.” UK’s Green Investment Bank Commission, July 2010

Why infrastructure decarbonisation matters

Decarbonisation is needed to increase European energy security and economic resilience. Efficient decarbonisation of the European Union (EU) economy in line with the European Commission’s 2050 Roadmap will enable the EU to meet its greenhouse gas (GHG) reduction targets and tackle dangerous climate change. But additionally it will mitigate the draining effect of ever-increasing fossil fuel costs on the European economy, making it resilient to future oil price shocks. In 2010, the EU spent \$297 billion on crude oil imported from outside the EU. If the same level of consumption continues at an oil price of \$115bbl, for example, the oil import bill will rise to \$433 billion per annum – or 2.6 percent of EU GDP.

Europe’s current lead in clean energy markets is being eroded. The technologies needed to deliver decarbonisation are becoming of increasing strategic importance to major economies around the world. Governments in both developed and emerging economies have woken up to the opportunities presented by the low carbon race to secure their competitiveness and prosperity in future global markets. This is being achieved

through a mixture of targeted public investment and supportive policy and institutional frameworks. For example, while as a bloc currently leads the way on clean energy investment globally – receiving 39 percent of total global investment in 2010 – this is a 5 percent reduction on 2009 levels. Other countries are catching up fast. In 2009 China overtook the USA. In 2010 China had secured second place in the clean energy stakes – with 22 percent of the global total. Europe’s top ranking position is now at risk as China and South Korea, in particular, increase their efforts to stimulate clean energy investment.

China’s energy saving and environmental protection sector is expected to be worth \$715 billion (¥4.5 trillion) by 2015. In its 12th Five Year Plan, China will spend 2.2 percent of GDP on public innovation spending. Renewable energy growth is set to match EU installed capacity by 2015, as low carbon and clean energy industries are placed at the heart of China’s forward growth strategy. South Korea, too, expects to invest \$4 billion in renewables in 2011 alone. This will be backed by nearly \$1 billion in public investment. By contrast Europe lacks a clear focus on how it will deliver required low carbon investment. It continues to argue about whether a 30 percent 2020 GHG reduction target should be adopted – and it is unclear how much public money will be allocated through the EU and national budgets to catalyse this investment.

Securing these long-term benefits poses a short-term financing challenge. Shifting the EU economy onto a low carbon path is a hugely ambitious task, requiring an unprecedented upfront ‘pulse’ of investment. For example, power sector investment needs to increase by 2.5 times from business as usual (BAU) levels over the next 10–20 years. Investment in energy efficiency needs to increase much more than this and has a far weaker supply chain and financial infrastructure

supporting it. Given the pressing need to renew much of the EU's infrastructure, low carbon technologies will need to be developed and deployed simultaneously if lock-in to inefficient and high carbon investments is to be avoided. Current analysis suggests that this level of investment cannot be supported on the balance sheets of existing companies and banks alone. This indicates a need for new financial products and mechanisms for shifting liabilities off balance sheet and recycling this capital (for example through low carbon asset-backed securities) or the entry of new large corporate players (for example Russian, Indian or Chinese companies).

Looking at overall investment levels in transport, energy and buildings these levels of investment could be made manageable. The European Commission estimates a 5 percent uplift in business-as usual (BAU) investment levels (€8.6 trillion versus €8.2 trillion for BAU investment) is required to 2020. However these aggregate numbers mask a non-trivial large-scale shift in investor preferences from well understood high carbon industrial sectors, business models and technologies to less mature and more policy-dependent low carbon ones.

Rising to the challenge: securing sufficient investment

E3G analysis indicates that a shift of at least €1.5 trillion to €2.1 trillion into low carbon sectors is needed to deliver 30 per cent GHG cuts in 2020. This level of investment required is beyond the reach of the public purse alone, so the critical challenge is how to persuade private capital providers to make this radical shift at a scale and pace consistent with the requirements of EU climate and energy policies.

Based on conservative assumptions E3G estimates that public financing of the order of €465 billion to €712 billion

over 10 years could be needed to drive this investment. A substantive portion of this (~30 percent) would be required to support retrofitting of buildings, which has high economic, social, employment and energy security benefits. There are legitimate concerns over how to meet the higher investment needs implicit in a low carbon economy given current constraints on public finances. But this is simply an example of the broader cyclical macroeconomic dilemma of how to maintain investment in future growth during an immediate recession. These are real constraints but they can be overcome with the creation of effective regulatory frameworks, targeted use of public financial instruments and a rigorous assessment of investment priorities including:

- Deploying public finance instruments within regulatory and policy frameworks that maximise leverage of private capital;
- Ensuring any public investment flows to the most beneficial investments in terms of providing resilience against systemic macroeconomic risks such as fossil fuel price shocks;
- Maintaining public investment in critical areas of research and development (R&D) and infrastructure that have high dividends in terms of medium-term growth and competitiveness.

Achieving the necessary scale and pace of low carbon investment will also require a strong and credible political commitment at EU and Member State level to build investors' confidence in the long-term sustainability of policy frameworks, underpinned by a dynamic and coordinated policy and financing strategy.

Focused management of private sector financing risks is needed to reduce public costs. Achieving the scale of private investment needed will require public interventions based on a much better understanding of the constraints on institutional investors who control much of the long-term finance suitable for infrastructure investment. **Thus the capital markets – public equity (stocks) and particularly low cost debt (bonds) – are the real prize, as this is where scale will be found. However, this ‘prize’ will only be reached when low carbon investments are considered more mainstream. Governments must therefore play a role in accelerating the time to this happening. Doing this will require a ramping up of the sophistication (including ‘bankability’) and ambition of policies and financial tools designed to promote investment.**

For example, recent analysis by the Fraunhofer and Ecofys indicates that energy efficiency investment opportunities in buildings could be worth up to €65 billion per annum to 2020 across the EU. However this sector ranks at the lower end of the scale of climate change-related investment activities. The public sector does little better, with nearly €8 billion of EU Cohesion Funds set aside for energy efficiency unspent as of December 2010. The mismatch between investment potential and activity indicates there are very significant barriers to mobilising these large amounts of capital. **Energy efficiency must be given a higher priority in the EU’s decarbonisation plans, with greater efforts made to blend EU and National Budget funds to create scaled support and public banks establishing or increasing the role they play in financing retrofit programmes.**

While securing relatively low cost bond finance in particular is another key part of filling the investment gap both for

energy efficiency but also other low carbon assets, it is very unlikely to happen spontaneously. First, the regulatory framework must be fit for purpose. Many low carbon infrastructure investments have returns supported by regulatory surcharges on consumer bills, which are relatively low risk. In addition, the risks associated with the operation of such assets declines over time. Financial regulators must review current Solvency II and pension industry-related proposals to ensure that while they act to address systemic risks in the financial system, they also recognise the dynamic nature of infrastructure investment risk profiles. Final decisions about capital adequacy, particularly for infrastructure-backed bonds, must reflect these dynamic risk profiles. Second, a substantive public ‘down payment’ is required to manage selected risks. This is because low carbon infrastructure investments often rely on policy incentives to improve returns. Yet policy-backed low carbon investments are often perceived as highly risky and – since investors are looking for adequate risk-adjusted returns – they require a higher return to make them attractive, pushing up costs. It is inefficient – and probably politically unsustainable – to balance this equation solely by increasing returns to investors through higher carbon prices and direct public support such as higher Feed-in-Tariffs (FITs). Instead the focus should turn to addressing risks.

European public bank experience of developing financial products to support low carbon investment shows that there is no ‘one-size-fits-all’ solution. Efficient public finance interventions vary across sectors and countries and will vary over time as markets mature and private sector fears over political risk recede. However, some areas of action around key market failures can be identified from our understanding of current market dynamics. These fall into five categories.

- **Addressing market capacity limits** – through introducing a bigger role for public banks to encourage investment at scale and creating financial regulation that is conducive to low carbon infrastructure investment.
- **Designing investment grade policy frameworks** – the need for targets and for policies that are transparent, of suitable duration, avoid retroactive adjustment and are easy to comprehend.
- **Driving regulated asset base investment** – accelerating the process by which regulators provide clarity on what is required from regulated investment as well as early clarity on who pays for innovation.
- **Tackling the aggregation challenge** – ensuring policy-makers focus on ensuring both small and large scale infrastructure investment is adequately incentivised.
- **Scaling up support for development and deployment of innovative technologies** – a renewed public investment effort to secure high quality European jobs and revenue flows for the future.

As a first step, the policy support needed to drive this investment at Member State level must be robust and retrospective changes to support avoided. **Policy makers should consider the impact of policy changes on market expectations as systematically as fiscal policy makers already do.** More thought also needs to be given to designing policies and interventions – and with the long-term holders of capital kept in mind. For example the risks are different in the construction phase (which requires equity provided by funds and companies as well as debt provided by banks) compared to the

operational phase of low carbon assets (which is more suitable for bond finance).

Public banks have a key role to play in reducing costs and accelerating investments. They have a key role to play in building confidence among investors – because through co-investment they can clearly align the financial interests of the public and private sectors. Public banks are also usually better able to adapt and remove financial interventions based on the changing realities of markets than support mechanisms directly controlled by government officials. They can also drive innovation in the market – for example by acting as an aggregator of smaller scale investments or as a trusted broker of pioneering financial instruments such as EU Project Bonds or energy efficiency securities.

16 Historically public banks have often played a role in the transformation of economies. For example, the Sparkassen (public savings banks) in Germany helped bankroll the industrial revolution and Caisse des Dépôts et Consignations in France was founded to reorganise the French financial system after the fall of Napoleon. Like Europe's newest public bank – the UK's Green Investment Bank, whose goal is the help 'green' the UK economy – public financing institutions now have a key role to play in transforming the wider European economy. Their financial expertise and public interest mandate can act as another check and balance in the system to ensure that Member State governments effectively target scarce public money to maximise the leveraging of private capital. They can also help build confidence – by ensuring governments have 'skin in the game'.

A core part of the European Investment Bank's (EIB's) mandate is already to invest in low carbon assets and in 2010 these

represent ~30 percent of the EIB's EU-based activities. However, there is more that the EIB could potentially do to give low carbon priority over traditional higher carbon investments. Given the scale of low carbon investment needed, the EIB should double its activities in this area. **A target of 60 percent of all EIB financial activity to focus on low carbon investment by 2020 should be set. This should be combined with a presumption against high carbon investments unless it can be proven they do not lead to lock-in of a high carbon trajectory.**

Similarly, individual Member States need to scale up their public financing response to the decarbonisation challenge. This could be achieved by setting up or expanding dedicated low carbon investment departments within existing organisations and setting a target for 50 percent of financing activity to focus on low carbon by 2020. Alternatively, Member States could commit to setting up dedicated Green Investment Institutions – such as the UK's Green Investment Bank – focused on mainstreaming these investments.

Efficient targeting of public finance interventions makes such support affordable. E3G's analysis of the amount of public funding necessary at EU and Member State level to leverage the private capital needed to decarbonise the EU economy suggests total public financing of the order of €465 billion to €713 billion over 10 years. This includes funds already allocated to these sectors and so is not all new money. This would mainly be in the form of co-investment and risk management facilities and should therefore not be seen as a cost but as a public investment that should result in positive financial returns over the lifespan of the assets.

Some finance can – and already does – come from the EU. In June 2011 the European Commission Communication ‘A Budget for 2020’ proposed €1.025 trillion be allocated through the Multi-financial framework (MFF) covering 2013–2020. The proposals suggest a significant proportion of this could flow to clean energy and efficiency projects through Cohesion and Research Funding. It is also proposed that €50 billion be allocated to the new ‘Connecting Europe Facility’, with €9.1 billion going to energy infrastructure (gas and electricity grids). The remainder of the public financing requirement must be sourced from a combination of other European funds – including Cohesion Funding – from National Budgets and public banks and the targeted use of consumer charges.

While significant sums are required, amounts become manageable when shared between 27 Member States and spread over a decade – and it can be delivered within existing EU and National Budget envelopes through the use of innovative financial instruments and policies. Using public money in this way has clear public value in terms of reducing overall costs.

Current European Budget proposals are not ambitious enough. The EU Budget is an important tool for delivering the EU’s low carbon transformation. The shift toward a MFF represents a unique opportunity to take a more strategic approach by targeting public funds to cross-border initiatives to achieve European-wide policy objectives. While it is unlikely there will be an increase in the overall EU Budget cap, there is an opportunity to bring about genuine Budget reform by refocusing spending to ensure that climate and energy security objectives are met through ‘climate proofing’ the Budget. This outcome would match up to the aspirations set out in the Commission’s Communication ‘A Budget for Europe 2020’.

The budget proposals need to be strengthened in four critical areas:

- **Cohesion Funds:** maximising the potential of Cohesion Funds to support increased energy efficiency and clean infrastructure through performance-based incentives and innovative financial mechanisms at EU and Member State level.
- **EU Project Bonds:** these represent a good opportunity to target public funds to catalyse greater private sector investment in strategic low carbon assets. However, the currently suggested eligibility criteria mean they will have only a very limited impact on improving financial flows to the low carbon infrastructure needed to achieve 2020 and 2050 decarbonisation goals.
- **Infrastructure Financing:** the allocation of European-level funding to energy infrastructure needs to be increased in order to meet projected power sector decarbonisation trajectories beyond 2020. Alongside clear regulation on cross-border cost-sharing and permitting, the proposed Infrastructure Regulation needs to ensure priority for strategic investments in the European grid that provide access to major strategic sources of low carbon electricity from solar, wind, hydro, geothermal and biomass energy on Europe's periphery.
- **Strategic Energy Technology (SET) Plan Financing:** SET Plan investments should be prioritised inside the innovation financing framework due to their high contribution to European climate, energy security and competitiveness goals. E3G analysis based on a 50:50 public:private spending ratio (shifting from the unrealistic 30:70 ratio in

the existing plan) implies a public share of the SET Plan investment to be €31 billion to 2020. Some of this additional funding should come from Cohesion Funds and should be focused on innovative grid infrastructure (smart grids, storage technologies and electric vehicle charging infrastructure) where China, South Korea and others are making significant investments.

- **The need to strengthen the EU GHG reduction targets.** Innovative financing mechanisms are a necessary but not sufficient step to accelerate low carbon investment in the EU. Equally important is for Europe to adopt a 30 percent GHG reduction target for 2020 as well as a clear trajectory to 2050 that includes decarbonisation of the power sector by 2030. For many investors the decision on 30 percent is a ‘litmus test’ of the EU’s commitment to longer term infrastructure decarbonisation and the benchmark against which many will assess the attractiveness of investment in Europe compared to other market opportunities.

The task of decarbonising Europe’s infrastructure represents a vast challenge – but it is technically and financially feasible if strong political and financial commitments and collaboration between Member States are forthcoming. Failure to deliver a coordinated shared vision and approach can mean Europe is in danger of losing out in the global competition for limited private capital to more attractive emerging market opportunities.

Key recommendations

Recommendation 1: A target of 60 percent of all EIB financial activity to focus on low carbon investment by 2020 should be set. This should be combined with a presumption against high carbon investments unless it can be proven they do not lead to lock-in of a high carbon trajectory.

Recommendation 2: All Member States need to scale up their public financing response to the decarbonisation challenge. This could be achieved by setting up or expanding dedicated low carbon investment departments within existing organisations and setting a target for 50 percent of financing activity to focus on low carbon by 2020. Alternatively, Member States could commit to setting up dedicated Green Investment Banks focused on mainstreaming these investments.

Recommendation 3: Financial regulators must review current Solvency II and pension industry-related proposals to ensure that while they act to address systemic risks in the financial system, they are also structured so as not to unduly restrict institutional investors' ability to invest in these long-lived infrastructure assets.

Recommendation 4: Heads of Member States should adopt in 2012 a 2020 30 percent GHG reduction target.

Recommendation 5: The risk of underinvestment in network infrastructure is higher than the risk of

overinvestment. A shift from a short-term to a long-term focus on incentivising investment in grid infrastructure is needed. The Connecting Europe Facility is essential, but it needs to be reoriented towards the strategic investments required for decarbonisation. Regulatory reform is also required to enable anticipatory investment in key lines and increase the ‘smartness’ of network investment.

Recommendation 6: Energy efficiency must be given a higher priority in the EU’s decarbonisation plans, with binding targets agreed within the Energy Efficiency Directive. Member States should ensure energy efficiency financing facilities are in place and make greater efforts to blend EU and National Budget funds. At EU level, the proposed 20 percent earmarking of the European Regional Development Funds for investment in energy efficiency and renewable energy must be endorsed by the European Parliament and Council of Europe and combined with a requirement for release of the other 80 percent of funds to each Member State being contingent on funding first being allocated to finance investment programmes in these areas.

Recommendation 7: There must be a renewed political focus on the European energy and innovation agenda framed around the economic benefits accruing to Europe in securing a significant share of global low carbon technology markets. Solutions must be put in place to ensure sufficient additional public funding – estimated at €31 billion both in the current pre-2014 EU Budget period and in the post-2014 period – is secured.

1 Scale of the challenge

In the wake of the global financial crisis there have been calls to slow down the pace of EU decarbonisation because it is seen as too costly given the state of public finances and depressed economic growth. This would be a mistake. The work of Stern and others has firmly established the need for Governments to take proactive action to decarbonise their economies. While there is a cost to this – in 2006 Stern estimated 1 percent of global gross domestic product (GDP) – the cost of taking this action is declining as time passes. This is because Stern's analysis used an oil price with a distribution ranging from \$20 to over \$80 a barrel¹, whereas the IEA has warned that with oil market supply and demand balance remaining tight, prices will remain above \$100 a barrel, despite weakening economic growth in Europe and elsewhere². Conversely the same Stern Review noted that failure to take action could cost the global economy 5 to 20 percent of global GDP each year. This puts the maximum potential losses every year in perpetuity on a scale equal to the value lost in 2009 from the global economy due to the financial crisis – estimated at 19 percent of global GDP³.

1 Stern Review: The Economics of Climate Change, 30 October 2006. Stern used a Monte Carlo simulation which included oil prices with a probability distribution ranging from \$20 to over \$80 per barrel. Whereas the spot price of Brent Crude (source: <http://www.bloomberg.com/energy/>) is at \$105bbl (as of 15/12/11). The IEA in its World Energy Outlook 2010, used an oil price of \$135bbl for its "current policies scenario" in 2035. This reflects the prevailing current view that oil price rises are not just a temporary spike but will remain for at least the next 2.5 decades.

2 <http://www.ft.com/cms/s/0/2610abd2-0b8a-11e1-9a61-00144feabd0c.html#ixzz1dPkj5czG>

3 IMF's World Economic Outlook, April 2010 estimates banking system write-downs in the hardest hit economies at \$2.3 trillion. It also estimates that discretionary fiscal stimulus and direct support to the financial sector was less than 20 percent of the debt increase which would put the overall cost of the crisis at over \$11.9 trillion. The CIA estimates 2010 GWP (gross world product) at \$62.27 trillion using official exchange rates (CIA: <https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html>). Therefore as a percent of Global GDP it equals $11.9/62.27 = 19.1$ percent

According to the Intergovernmental Panel on Climate Change, avoiding the worst of these effects will require a reduction in EU emissions by 80 to 95 percent by 2050, a target the EU has now adopted for GHG reduction. Europe is now clearly off-track to reach its 2050 GHG reduction goals. The first political step to bringing it back on track is to move from a 20 to 30 percent GHG reduction target by 2020. Delaying action to deliver this investment will only put off the inevitable – and mean the EU must ‘play catch up’ with deeper and faster emissions reductions at a later stage. This will not only mean the benefits that come from infrastructure investment will be lost just at a time when there is a desperate need for growth⁴, but it will also increase costs substantially.

The International Energy Agency (IEA) estimates a delay in developing low carbon technologies will add around €500 billion per year to the cost of decarbonising the world economy⁵. In addition, and reflecting lowered output from the European economy as a result of the recession, the European Commission expects that a move from a 20 percent to a 30 percent target would cost only 0.2 percent to 0.3 percent of GDP⁶.

In times of recession it is tempting for countries and companies to cut down on investment in innovation and infrastructure that will only pay dividends in 5 to 10 years time. This is a false economy as it will undermine the future growth needed to

4 There is strong evidence linking infrastructure investment, especially in energy efficiency, to growth. For example OECD (2009) *Going for Growth*; UN (2009) Extract from *World Economic and Social Survey 2009*, Chapter I, pp. 23–28; 31–34.

5 IEA (2009) *World Energy Outlook*

6 It is arguable that real cost will actually be lower since the Commission’s Impact Assessment on the “Roadmap for moving to a competitive low carbon economy in 2050” assumes that in 2030 oil will cost \$88 a barrel under the fragmented action scenario whereas the oil price is currently \$105/bbl (Bloomberg, *ibid*).

restore stability to the public finances. Too often investment in low carbon technology is seen solely as a cost rather than a source of future revenue. The debate often also masks the fact that a huge amount of infrastructure investment is required in any case as part of BAU asset renewal – and that there is actually a proportionally small uplift required to ensure investment is in low not high carbon assets. The European Commission’s Roadmap to a Low Carbon Economy, for example, indicates that under a BAU scenario, €8.2 trillion will be invested across the power, transport, industry and residential sectors up until 2020; under a low carbon scenario, investment levels would increase by just 5 percent to €8.6 trillion to 2020. Given expectations of continued high fossil fuel prices – accentuated by political instability in the Middle East – global markets for energy efficient and clean energy technologies are growing extremely fast, with estimates that this market will be worth \$4 trillion per year in 2015⁷. Much of this accelerated growth is occurring in emerging markets and sectors where European firms are technological leaders. However, without continued investment in Europe this competitive advantage will be eroded along with the long-term export benefits it brings.

Moving to a low carbon energy system is the ultimate insurance policy for Europe’s economic future. It should not be seen solely as an economic cost but as an investment in public infrastructure, energy security and future competitiveness. Economic analysis by Ecofys and others shows that moving to a 30 percent target now will lead to GDP gains of about 10 percent by 2050⁸. It is therefore a false economy to reduce

7 Speech by the UK’s Secretary of State for Energy and Climate Change 2 November 2010. http://www.decc.gov.uk/en/content/cms/news/lse_chspeech/lse_chspeech.aspx

8 Emmanuel Guerin, IDDRI, Ecofys and Climate Strategies (2010) Is there a case for the EU to move beyond 20 percent GHG emissions reduction by 2020? DRAFT interim results <http://www.climatestrategies.org/our-reports/category/57/271.html>

expenditure in these areas while high fossil fuel prices continue to cost the European economy hundreds of billions of US dollars per year. In 2010, the EU spent a total of \$297 billion on crude oil imported from outside the EU. If the same level of consumption continues at the current oil price of \$115bbl, the oil import bill would rise to \$433 billion – or 2.6 percent of EU GDP⁹.

The focus should now turn to how to design and deploy policies and targeted financial instruments that are effective at driving the necessary low carbon investment at lowest cost to taxpayers and consumers. In turn this will generate financial returns, create jobs, deliver tax receipts to Finance Ministries and create growth, without materially increasing risks to countries' financial stability or placing additional burdens onto the public finances.

9 Market Observatory: EU Crude oil imports.
<http://ec.europa.eu/energy/observatory/oil/doc/import/coi/eu-coi-2010-01-12.pdf>

2 Understanding the task ahead

2.1. The long-term story: investment required to 2050

There is no consensus on the amount of investment required to deliver a decarbonised European economy, not least because there is no consensus on technology selection. However, in 2011 the European Commission published its Roadmap for moving to an 80 to 95 percent GHG reduction by 2050. This report sets out the possible actions the EU could take up to 2050 to enable it to deliver the required GHG reductions¹⁰. A number of different scenarios are modelled in this work and the Commission concludes that the most cost-effective medium term pathway would be to reduce emissions by 40 percent in 2030 and 60 percent in 2040 – with reductions of 25 percent domestically by 2020 (and an additional 5 percent being achieved through international offsets). The Commission's Roadmap is one of a number of such studies of the costs and benefits of moving to a low carbon economy in Europe 2020 and beyond, which include analyses done by the European Climate Foundation, Eurelectric, EREC and IEA as well as the UK, Czech, German and French Governments¹¹.

The plethora of different numbers can be confusing, but in fact they all point to one key fact: a huge amount of

10 A Roadmap for moving to a competitive low carbon economy in 2050, European Commission, COM (2011) 112, 8 Mar 2011

11 For example: European Climate Foundation (2010) 2050 Roadmap www.roadmap2050.eu; Eurelectric (2009) The Role of Electricity <http://www2.eurelectric.org/Content/Default.asp?PageID=729>; EREC (2010) Rethinking 2050 <http://www.rethinking2050.eu/> the UK's Department for Energy and Climate Change 2050 Roadmap http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/ccs/policy/roadmap/roadmap.aspx and World Energy Outlook at <http://www.worldenergyoutlook.org/>

upfront investment will be needed to decarbonise Europe's energy infrastructure over the next 40 years. This partly reflects the vast volume of assets due for renewal across Europe. To illustrate this point, Figure 1 shows the European Commission and the European Climate Foundation Roadmaps normalised against the same baseline. The shape of the investment profiles is remarkably similar out to 2035. This is of particular interest because the two models took fundamentally different approaches but came to the same initial conclusions. The Commission's analysis uses a forecasting methodology, taking investment levels for today and showing how they might scale up. In contrast analysis by the European Climate Foundation and others takes a back-casting approach, i.e. starting from levels of investment required by 2050 and working back.

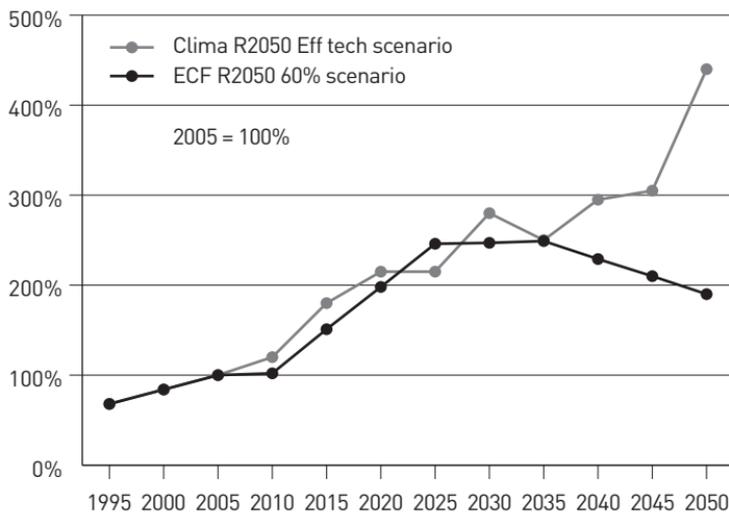


Figure 1. Comparison of ECF and European Commission 2050 Roadmap power generation investment profiles. (On post-2035 costs, the ECF investment outlook may be more

likely since technology learning can be expected to drive costs down over time. For example the price of installed solar photovoltaic (PV) has dropped by around 45 percent in Germany since 2006.¹²⁾

The consistency in these findings serves to underline the fact that the immediate investment challenge is huge – and the amount of effort that will need to be put in by the EU and Member State governments to ensure that it happens is equally huge. Rather than a gradual ramping up of investment, a sharper ‘pulse’ of investment is required over the next 15 to 20 years. For example, power generation investment needs to roughly double over the next decade compared to current levels¹³. Despite this, even under conservative fuel price assumptions, the higher upfront investment costs are more than offset by fuel savings – and this effect is amplified under high fossil fuel and ‘oil shock’ scenarios¹⁴.

Similarly, investment in residential energy efficiency will need to increase even faster from business as usual levels: for example the cost of significantly upgrading the energy efficiency of the UK’s housing stock could be in the region of £7 billion to £11 billion per year over the next 15 years, a major ramp up from existing investment of £1 billion to £2 billion per year¹⁵.

12 Renewables International (January 2011) Cost of turnkey PV in Germany drops <http://www.renewablesinternational.net/cost-of-turnkey-pv-in-germany-drops/150/510/29911/>

13 European Climate Foundation (2010) Roadmap 2050: A practical guide to a prosperous, low carbon Europe. <http://www.roadmap2050.eu>

14 European Commission (2011) Roadmap for moving to a competitive low carbon economy in 2050.

15 Holmes, I. (2011) Financing the Green Deal <http://www.e3g.org/programmes/systems-articles/financing-the-green-deal/>

Given the pressing need to renew much of the EU's energy infrastructure, low carbon technologies will need to be developed and deployed simultaneously if lock-in to inefficient and high carbon investments is to be avoided. Current analysis suggests that this level of investment cannot be supported on the balance sheets of existing European utilities. This in turn implies the need to deploy new financial instruments to shift liabilities off balance sheets (e.g. securitisation of assets), greater direct investment by institutional investors or the entry of large new corporate players in the EU power market (e.g. Russian, Chinese and Indian players).

This makes intuitive sense. A low carbon EU energy system, for example, is far more capital intensive than a fossil fuel-based one. IEA modelling of global energy investment has shown that capital spending in the fossil fuel extraction and transportation sectors will reduce proportionately¹⁶. However, because the EU is a major fuel importer these investments will mainly lie outside the EU. Therefore moving to a low carbon energy system can shift EU investment into technologies and jobs inside the EU, ending a continued dependence on imports of fossil fuels from abroad.

2.2 The short-term story: investment required to 2020

Working back from 2050, the European Commission's Impact Assessment attached to A Roadmap for Moving to a Low Carbon Economy in 2050 estimates that under an effective technology, fragmented action scenario, internal investment needed to reach 25 percent GHG reduction in the EU by 2020

16 IEA (2006) World Energy Outlook

is €8.6 trillion, which represents an uplift of €430 billion to £470 billion above BAU investment levels¹⁷. (Note that around 80 percent of this investment is allocated to transport infrastructure, however.) E3G undertook a separate bottom up analysis of the potential investment needed across seven key sectors: renewable electricity; renewable heat; carbon capture and storage (CCS); buildings energy efficiency; grids; transport efficiency improvements; and research, development and deployment (RD&D). Our analysis indicated that at least €1.5 trillion to €2.1 trillion is needed to deliver 30 percent GHG cuts in 2020. When wider transport infrastructure financing requirements are excluded, these numbers are similar to those in the European Commission’s analysis.

Whatever the final numbers, however, it is clear that the amount of capital required is on a scale beyond the reach of public finance alone, and much greater private sector investment is needed. However, because climate science and therefore politics requires the market to deliver this investment at a pace far beyond that which the market is comfortable with, public sector capital will need to play a critical risk-sharing role both to catalyse the required levels of private investment and to ensure optimal economic but also social and environmental outcomes are achieved.

E3G analysis based on European Commission figures and conservative estimates of public-private leverage levels across different sectors indicates total public financing of

17 For further context on the 2020 challenge, other European Commission estimates indicate €855 billion–€992 billion is required to 2020 across electricity infrastructure, low carbon generation, renewable heat and transport and to support innovation including the SET Plan. This excludes CCS which E3G estimates at an additional €20 billion. A report by Accenture/Barclays estimates that an investment of €2.9 trillion is needed to develop, commercialise and deploy 15 key buildings, transport and energy technologies that could deliver 17 percent reduction in EU GHGs to 2020

the order of €465 billion to €713 billion over 10 years could be needed to drive this investment (see Table 1).

Table 1. Potential European investment and public funding requirements over 10 years. Public funding includes a mixture of grants, incentives and public co-investment – debt or equity. (Source: E3G analysis.)

Average annual investment required to 2020 (€billion)					
	Total investment – low end	Total investment – high end	Total public funding – low end	Total public funding – high end	Notes
Renewable electricity ^a	36.7	45.1	7.34	9.02	20:80 public private
Renewable heat ^b	22	24	4.4	4.8	20:80 public private
CCS ^c	2	2	1	1	50:50 public private
Building retrofits ^d	35	65	14	26	40:60 public private
Grids ^e	14	14	1.4	1.4	10:90 public private
Transport ^f	30	50	15	25	50:50 public private
RD&D ^g	6.75	8.05	3.38	4.03	50:50 public private. Includes SET Plan
Total annual investment	146.45	208.15	46.52	71.25	
Total cumulative investment	1465	2082	465	713	

-
- a,b Source: Ernst & Young et al RES financing study for the European Commission, 2011 http://ec.europa.eu/energy/renewables/studies/doc/renewables/2011_financing_renewable.pdf Given the technology mix will include some mainstream and some emerging technologies, a 20:80 public:private ratio was selected as the indicative level of support needed.
- c The European Commission has an aspiration for 10–12 CCS plants to be built by 2020. However given the challenging nature of this target, a conservative assumption that 10 CCS will go forward is made. Given the experimental nature of CCS technology a 50:50 public:private finance split is assumed.
- d Source Fraunhofer ISI and Ecofys (2011) The upfront investments required to double energy savings in the European Union in 2020. Indicative modelling for the UK shows 50 percent public funding may be required to deliver an ambitious building retrofit programme. Extrapolating this number and factoring in increasing energy costs and decreasing technology costs we have assumed 40 percent public funding is required across the EU.
- e Source Source CION (2011) Proposal for a regulation on guidelines for trans-European energy infrastructure. The 10:90 public: private ratio is averaged across the EU, although more absolute investment is needed in the Central and Eastern European (CEE) States as well as a higher level of public funding is needed in CEE states compared to the rest of Europe.
- f Source: Fraunhofer ISI and Ecofys (2011) The upfront investments required to double energy savings in the European Union in 2020. Since much of the technology is still emerging a 50:50 public:private ratio is assumed.
- g Source http://ec.europa.eu/energy/technology/set_plan/doc/2009_comm_investing_development_low_carbon_technologies_impact_assesment.pdf. This assumes the public spending element increases from its current 30 percent to 50 percent.

3 The role of public funds in risk-managing the transition

There is a legitimate concern over how to meet the higher investment needs of a low carbon European economy given constraints on the public finances. This dilemma can be characterised as a good example of the broader cyclical macro economic dilemma of how to maintain investment in future growth during an immediate recession. These are real constraints but they can be overcome with robust and targeted use of public financial instruments and rigorous prioritisation of scarce public resources to deliver best economic but also social and strategic value to the economy, including:

- deploying public finance instruments to maximise leverage of private investment into low carbon sectors;
- ensuring any available public investment flows to the most macro-economically beneficial investments given future systemic risks e.g. fossil fuel price shocks;
- maintaining public investment in critical areas of RD&D and infrastructure that have high dividends in terms of medium term growth and competitiveness.

Most European governments have put in place severe austerity measures that aim to reduce the scale of public borrowing, and eventually public debt, to sustainable levels. So in recent years there has been a reduction in investment funded directly from government budgets in areas such as roads, public transport and public service infrastructure (e.g. schools). However, this ignores the fact that much of the investment needed for the low carbon transition – power stations, grid infrastructure,

energy efficiency – can be funded from increased user fees, which are not counted as part of public spending. In sectors for which higher user fees are not an option, public money will be needed however.

3.1 Using public funds to leverage private investment

Public money needs to be targeted at reducing the cost of capital, managing risks and helping build early stage markets. The public financing instrument used should be selected based on a full assessment of the market failure or investment barrier to be solved and the product most likely to effectively address it. Some examples are shown in Box 1; a more detailed discussion can be found in the IEA 2010 report Global Gaps in Clean Energy RD&D.

The decision in 2010 by the UK Government to establish a public Green Investment Bank was driven by rigorous analysis of such market failures and their potential solutions. The analysis showed that the most cost effective way to address many of them was through a wide range of targeted – and often time-limited – public financial interventions¹⁸.

Box 1 Targeting public funds – fitting the financial intervention to the challenge

Targeted use of development capital – For small entrepreneurs grants and subsidies are the most appropriate support for early stage, high risk, technologies that

18 Green Investment Bank Commission (2010) Unlocking Investment to Deliver Britain's Low Carbon Future.

would not otherwise gain funding. For larger companies investing in R&D tax rebates (for example enhanced capital allowances) can be useful. These come at the highest direct cost to the public purse because they are not paid back. Equity or near equity (first loss debt for example) is most suited for early stage ventures, and especially for small and medium-sized enterprises (SMEs). The advantage is that if the technology is successful the equity stake will rise in value and can be sold to recover costs, whereas a grant or subsidy will not be directly recovered. In addition, since the finance does not have to be paid back it does not place a high debt burden on smaller SMEs.

Overcoming the valley of death – Concessional loans from public financing institutions can be used to support project economics. These come at lower cost to the public purse because they are paid back. However, they are more suited to supporting innovation within larger companies and technologies closer to market. This is because larger companies are likely to have higher credit ratings and be able to obtain lower cost loans compared to SMEs – which are likely to have lower credit ratings, particularly when technologies are pre-commercial and lending would form a high proportion of their debt burden. When providing support to such SMEs, equity is likely to be preferable.

Assisting with deployment – Once technologies are near-commercial, two further approaches may be used:

- (i) Guarantees can be used to mitigate high credit risks

in new technology sectors; they can also be provided to underwrite technology performance risks. Guarantees are a flexible solution and are essentially unfunded. However they do rely on the provider having a strong understanding of often complex risks. (ii) Blended grant/loans can be used at the technology diffusion stage to support first of kind technology deployment at scale¹⁹.

3.2 Targeting public investment to the most macro-economically beneficial investments

Even with constraints on public finances, many countries are still maintaining some level of public infrastructure spending. However this is not necessarily flowing to the highest public value investments, as defined by the economic returns, but also the environmental and social benefits they generate. For example energy efficiency retrofits to homes and businesses can greatly reduce economic vulnerability of Member States to future oil price shocks²⁰, as well as delivering higher quality living and working conditions and greater competitiveness. However, while in some Member States such retrofits can be quite profitable, there is a general issue with energy efficiency programmes not generally being considered on a level-playing field with more traditional transportation or urban infrastructure investments. This is in part due to the distributed nature and low visibility of energy efficiency investments – but it

19 Think (2011) Public Support for the Financing of RD&D Activities in New Clean Energy Technologies Final Report.

20 Modelling indicates that investing in energy efficiency could save the EU over €300 billion in GDP losses from a 3 year oil price shock in 2020. ECF (2010) 2050 Roadmap.

means the high economic, social and environmental returns accruing from these assets as well as their ability to leverage private investment into the depressed construction sector continues to be ignored. A rigorous process to prioritise potential public investment across the full range of options, and against realistic scenarios of future fossil fuel prices, is required to ensure the maximum public return is achieved on public funds invested in both the short and long term. The outcome of such an allocation process is likely to result in higher allocation of resources into low carbon assets – and is currently beginning to be implemented across the next €240 billion of UK public investment²¹.

3.3 Maintaining public investment in critical areas of RD&D and infrastructure that promote medium term growth and competitiveness

Low carbon investment has a strong potential to contribute to growth both through the learning effects of developing and diffusing new technology and through improved energy efficiency in particular. Switching to low carbon technologies through directed technical change can lead to dynamic gains in both carbon savings and welfare gains that continue to accrue over time²². Early action by Member States to develop expertise in low carbon technology sectors could allow them to ‘capture’ innovation clusters and high value R&D and manufacturing jobs.

A low carbon race has started to emerge as different countries vie to secure a competitive advantage in low carbon. In 2010 stimulus funding for clean energy more than tripled on 2009

21 IUK (2010) National Infrastructure Plan

22 <http://blogs.worldbank.org/prospects/category/tags/endogenous-growth>

levels to \$74.5 billion, led by sharply increased funding for projects in China, the USA, Japan, South Korea and Germany. China now ranks first in the world for clean energy investment on a per country, rather than bloc basis, securing 22 percent of global investment in 2010. In 2010 it accounted for 50 percent of all manufacturing of solar modules and wind turbines. Yet only 1 GW of solar capacity was installed locally, showing most of its production was for export markets²³. China intends to build on this lead further: the Government's 12th Five Year Plan has signalled a clear intent to expand its low carbon sectors and to expand total public innovation spending to 2.2 percent of GDP²⁴. Meanwhile the EU has slipped from holding 44 percent of global investment in clean energy in 2009 to 39 percent in 2010²⁵ – and risks further erosion of this lead in future, unless greater effort is made to secure medium term growth opportunities.

23 The Pew Charitable Trusts (2011) Who's Winning the Clean Energy Race?

24 E3G (2011) Chinese Challenge or Low Carbon Opportunity.

25 The Pew Charitable Trusts (2011) Who's Winning the Clean Energy Race?

4 Building investor confidence: risk-managing the transition to facilitate investment

While there is some clarity on the long-term direction of travel for carbon reduction in the EU²⁶, which gives a sense of potential market size, there is a lack of clarity on which technologies and business models will be the most effective in delivering against these targets. There is also a lack of clarity on how the infrastructure to underpin it will be financed and managed. So for many investors there is a lack of visibility on the overall long term value proposition and how returns will be delivered²⁷. In essence, this is what EU institutions and Member State governments must now work to address. It is particularly important because most low carbon technologies are not cost-competitive with conventional fossil fuels without some form of explicit policy support – this dependence on public policy support means that investors pay even closer attention to public policy in relation to low carbon investments than when investing in the energy sector more generally²⁸.

In terms of how this can be practically delivered, it will require Governments to:

- Ensure policies are ‘investment grade’ i.e. that they provide commitments to deliver the transparency,

26 There is relative certainty to 2020, provided by the EU 2020 Climate Package, but very little to 2050.

27 Deutsche Bank (2009) Global Climate Change Policy Tracker: An investor's assessment http://www.dbcca.com/dbcca/EN/investment-research/investment_research_1780.jsp

28 IIGCC (2011) Investment Grade Climate Change Policy: Financing the transition to the low carbon economy.

longevity and certainty needed by investors²⁹. In addition policies must be comprehensive and effectively address market failures including inefficient pricing; pricing of externalities; lack of information; hidden transaction costs; and principle agent problems to ensure the required public policy outcomes are achieved³⁰.

- This may also require the use of public money to overcome investment barriers – such as closing the gap between potential and actual risks – and ensure an affordable source of finance is available by deploying public funds for risk-sharing with the market. This in turn will accelerate demonstration and commercialisation of new technologies and business models – but also accelerate the flow of funds into low carbon markets faster than would naturally happen.

In doing this, Governments can secure competitive advantage for the EU in the global low carbon race – and ensure that high quality jobs, and the monetary flows from those jobs into the wider economy, are secured for future generations.

A longer term view on how investment and growth will therefore be driven is needed alongside more granular efforts to drive that investment through deploying a dynamic and

29 IIGCC (2011) Investment Grade Climate Change Policy: Financing the transition to the low carbon economy.

30 To date public policies approaches have often been incomplete. For example, energy efficiency policies often fail to address information barriers or principle agent problems – resulting in lowered levels of uptake. Similarly, the EU ETS is important because it establishes a price for carbon. However alone it will not incentivise investment in critical technologies such as carbon capture and storage, which are capital intensive and untested at scale. This is partly because of the currently low and volatile nature of the carbon price, but more significant are the high technology and operational risks investors associated with CCS, which must be addressed through supplementary policies and financial support.

coordinated policy framework and financing strategy both at EU and Member State level³¹.

The first step is for the EU to adopt a 30 percent GHG reduction target for 2020 as well a clear trajectory to decarbonisation by 2050 that includes decarbonisation of the power sector by 2030. This will give investors a general indication both of the likely speed of growth and eventual market size for low carbon assets in Europe. This will then, of course, need to be re-enforced with policies operating over the same time frame, such as regulated returns or long-term feed-in-tariffs (FITs), to provide visibility on the likely cash flows that will come from investment in such assets. Details of any complementary public financing mechanisms focused on sharing risk in the early stages of investment and designed to complement policy frameworks will also need to be provided.

31 This should be facilitated by the fact that there is now a 'joint competence' between EU and Member States on matters of energy, as set out in the Lisbon Treaty.

5 Financing the transition: the role of policy and finance

Discussions with financiers, investors and other experts indicate a degree of scepticism over whether under current market conditions, and without further substantive EU and Member State government interventions, the EU's 2050 GHG reduction targets will be delivered within the required timescales. The single biggest issue of over-riding concern is how access to the scale of capital needed will be facilitated within this time frame.

Member States are facing very significant infrastructure investment requirements over the coming decade as assets are replaced and decarbonised. While the picture is mixed across Europe, there are some general trends. In the past, much of the private investment in low carbon energy assets has been delivered via energy company balance sheets, or via project finance that utilises various sources of equity and bank debt³². Such deals are now becoming harder to do. The ongoing impacts of the financial crisis mean scarce bank debt has become more expensive and, where maturities longer than 15 years are needed, more difficult to obtain. In addition, company balance sheets are simply not of a size that is able to support the scale of investment needed³³. It has also become difficult for both banks and companies to recycle existing capital investment through refinancing in the bond markets. All these issues point to difficulties with sourcing sufficient affordable capital. For example, sponsors of a 354 MW onshore wind project (ENEOP

32 Unlocking Investment to Deliver Britain's Low Carbon Future, Green Investment Bank Commission, June 2010; Ernst and Young (2010) Capitalising the Green Investment Bank.

33 Citibank (2009) Pan-European Utilities: The trillion dollar decade.

2 phase 2) decided to drop the commercial bank tranche in the project financing, inject more equity and continue a reduced debt financing with the EIB. The remaining commercial banks in the deal had requested margins starting at 400bp: this was prohibitively expensive for the sponsors³⁴.

Juxtaposed against these declining levels of investment is the European Commission's own analysis, which indicates that investment in the energy sector alone needs to double over the next 10 years. Several recent reports indicate that continuing to rely on financing low carbon infrastructure through balance sheets and project finance will lead to an investment gap because balance sheets of banks and utility companies are simply not of a scale to provide the finance needed³⁵. Therefore in order to scale up investment to meet 2050 GHG reduction targets, access to alternative capital pools must be accelerated.

Scale can be found in new corporate entrants or from the long-term holders of capital – institutional investors (i.e. pension and sovereign wealth funds and insurance companies). At the end of 2008, pension funds were estimated to hold \$25 trillion (€18 trillion) of assets under management globally. Global insurance premiums in 2009 totalled just over \$4 trillion³⁶. This capital can be deployed to low carbon assets in three main ways:

34 Project Finance (8 November 2011) ENEOP 2.2 to drop commercial banks.

35 For the power sector for example there have been warnings from market that there is not enough equity available from the existing power sector incumbents – see Moody's (March 2010) European Electric Utilities and the Quest for Debt Capital. For the banks, lending constraints already exist as they focus on rebuilding balance sheets in the wake of the financial crisis. This will be even more of an issue if new legislation (Basel III) requiring higher capital ratios for banks further limits their ability to lend.

36 Survey undertaken by Swiss RE <http://www.plunkettresearch.com/insurance%20risk%20management%20market%20research/industry%20overview>

- Via third party funds;
- Via direct investment;
- Via the capital markets – traded debt (bonds) and equity (stocks).

Accessing capital via third party funds has been the most common approach to date. Because most institutional investors lack the capacity and expertise to undertake individual investments they tend instead to outsource this role – for a fee – to fund managers. However, this is also an expensive way to source capital. For example, private equity funds may require a return of investment of 15–25 percent; infrastructure funds may require a return in the region of 10–20 percent³⁷. Thus costs of capital are high and reflected in the end costs borne by taxpayers and consumers. In addition, the percentage of an institutional investor's portfolio dedicated to the 'alternative investment bucket' (i.e. investments that are not the traditional equities, bonds, cash or property) is quite limited, at perhaps 10 percent of the overall portfolio. Thus this approach has significant natural constraints upon it with respect to scale and long-term affordability, and is a significant part of the reason an investment gap and concerns about rising costs have emerged.

Attempts have been made to overcome these constraints through a new generation of infrastructure debt funds – where a fund manager or bank raises commitments from institutional investors and either invest directly in projects or buys loans in the secondary market. But this is still a very early stage development, and there will be limited opportunities for refinancing

37 <http://www.efinancialnews.com/story/2011-08-19/infra-managers-resist-fee-pressure>

existing assets on balance sheets given the spread between pre- and post-financial crisis debt costs³⁸.

As mentioned above, institutional investors tend not to make direct infrastructure investments. This is starting to change. For example, in 2010 Borealis Infrastructure, the infrastructure investment arm of the Ontario Municipal Employees Retirement System (OMERS), entered into a joint venture with the Ontario Teachers' Pension Plan to purchase HSR1 – the link between London and the Channel Tunnel. In addition, there is a cohort of pension funds – OTPP, APG, PGGM, ATP – that do make direct investments, including to renewable energy assets, through vehicles they control. However this approach tends to be the exception rather than the rule and is limited to only the very largest investors.

The capital markets – public equity (stocks) and particularly low cost debt (bonds) – are the real prize, as this is where scale will be found. However, this 'prize' will only be reached when low carbon investments are considered more mainstream. Governments need to therefore play a role in accelerating the time to this happening. Doing this will require a ramping up of the sophistication (including 'bankability') and ambition of policies and financial tools designed to promote investment. Thus substantive further effort is required from the EU and from Member State governments to create an attractive investment environment in the European region.

There are five main issues to address.

38 In July 2011 Barclays launched a £500 million infrastructure debt fund. AMP Capital and Sequoia Investment are also attempting to raise €1 billion infrastructure debt funds. See Project Finance (3 November 2011) Debt Funds: more conduit than catch-all.

- Addressing market capacity limits – through introducing a bigger role for public banks to encourage investment at scale and creating financial regulation that is conducive to low carbon infrastructure investment.
- Designing investment grade policy frameworks – the need for targets and for policies that are transparent, of suitable duration, avoids retroactive adjustment and are easy to comprehend.
- Driving regulated asset base investment – accelerating the process by which policy makers provide clarity on what is required from regulated investment as well as early clarity on who pays for innovation.
- Tackling the aggregation challenge – ensuring policy-makers focus on ensuring both small and large scale infrastructure investment is adequately incentivised.
- Scaling up support for development and deployment of innovative technologies – a renewed public investment effort to secure high quality European jobs and revenue flows for the future.

5.1 Addressing market capacity limits

Institutional investors tend to be risk-averse and are frequently reluctant to invest in products or assets that are relatively new to the market – seeing such investments as risky, uncertain and unproven³⁹. Currently many low carbon assets are perceived as carrying unacceptable levels of risk. Capital providers see tech-

39 IIGCC, Investor Network on Climate Risk IGCC and UNEPFI (2011) Investment Grade Climate Change Policy: Financing the Transition to the low Carbon Economy.

nology risk (because technologies are often new); regulatory risk (fear of retroactive or frequent changes to the regulatory regime); and operational risk (because of a lack of certainty that the projects will perform as expected). While many of these perceptions do not actually match reality (for example onshore wind is now widely regarded as a mainstream technology), policy risk is increasingly a particular concern to investors. These underlying issues combined with the fact that bond finance – an essential part of the solution to the refinancing problem – has diminished markedly in the wake of the financial crisis⁴⁰ help explain the looming investment gap.

Public banks have a key role to play in overcoming the gap – both in terms of building confidence in stable policy regimes through the alignment of public and private financial interests⁴¹ – but also building capacity in low carbon investment.

5.1.1 The role of the EIB in building confidence

Both the EIB and national public banking institutions have a key role to play in bringing larger volumes of institutional investor capital into the low carbon market. A core part of the EIB's mandate already is to invest in low carbon assets – and in 2010 it saw lending to such projects increase by 19 percent to €19 billion, representing ~30 percent of the EIB's total lending within the EU⁴². As the bank charged with furthering

40 This is due in part to reduced activity from the monoline insurers and a lack of alternative credit enhancement options that would address some of these risks and create appetite for institutional investors to participate in refinancing such investments.

41 It has posited that the last-minute decision in 2011 by the Spanish Government to retroactively reduce but also extend the solar PV tariff was driven by the fact the public bank ICO had invested in several projects and would have incurred losses in the same way the private sector banks would have done.

42 Sally Bakewell and Ewa Krukowska (February 22nd 2011) EIB boosts climate lending, drafts CO2 permit sale rules. Bloomberg

the EU's policy objectives it is ideally positioned to take a stronger lead in developing EU low carbon markets. As the need for investment and pipeline of deals increases, it is arguable that low carbon should be given priority over some of the high carbon investments that continue to go ahead⁴³.

Reflecting the required ramp up in energy investment, the EIB's Board of Governors should instruct the Board of Directors to scale up investment in low carbon infrastructure to double that of existing levels by 2020. The EIB could scale up its efforts by issuing additional bonds, with proceeds ring-fenced to low carbon investment. The EIB does have some track record on this – in 2007 it issued bonds that were ring-fenced to support its Climate Awareness Programme (see Box 2). Scaled up ring-fenced bond issuances could be used to finance strategic infrastructure investments such as interconnectors or the North Sea grid but also build confidence in such investments in the wider market. In addition to this, the EIB – which is traditionally very risk-averse – could also take on more risk to help accelerate the mainstreaming of low carbon investment. To achieve this it would need to expand its team of technical experts but it could also deploy covered bonds, whereby investors have recourse to both the underlying assets and the EIB itself as an incentive to invest, to help underwrite additional risks⁴⁴.

The EIB should also play a role in reactivating the infrastruc-

43 In 2010, the EIB provided €150 million to Dong Energy to develop the Norwegian Trym gas field to supply the EU. According to CEE Bankwatch the EIB is currently appraising a hard coal cogeneration heat and power plant in Bielsko Biala, Poland. The EIB is considering provision of half the €143 million cost. (The EIB's and EBRD's role in changing the Polish energy market, CEE Bankwatch, January 2011)

44 However, this needs to be handled with great care – as there is danger it could reduce the attractiveness of the EIB's regular bonds.

ture bond market: its EU Project Bonds proposal – which is part of the European Commission’s proposed Connecting Europe Facility⁴⁵ – does just this and is a step in the right direction. It sets out a new role for the EIB in supporting EU transport, broadband and renewable energy infrastructure bond issuances. Under current proposals it is suggested that the EIB, backed by EU funds, perform some of the functions previously performed by monoline insurers and proposed that this could be achieved by the EIB providing support to infrastructure projects at a subordinated level. In this way credit enhancements should enable the issuance of senior debt tranches to institutional investors⁴⁶. Such enhancements could be provided either as a guarantee or a loan, depending on the exact financial characteristics of the project. As well as lowering the risk to other investors and so making more senior bond tranches more attractive, this has potentially another benefit of providing comfort to investors: because the EIB has ‘skin in the game’ it will exert its political influence in the event that regulatory regimes come under threat from governments. This is a very welcome development, and pilots are proposed for 2012–2013⁴⁷. However there is concern that newer technologies such as the grid infrastructure needed to support wider renewable energy deployment or harder to finance low carbon investments such as energy efficiency will be excluded on the grounds that they do not meet the eligibility criteria, losing out to investments that are easier to finance – such as road networks and broadband technology.

45 A new facility proposed by the Commission in the 2014–2020 Multi-financial Framework that would use both grants and financial instruments such as Project bonds to accelerate infrastructure investment.

46 European Commission (2011) EU Project Bonds.

47 European Commission (19 October 2011) A Pilot for the Europe 2020 Project Bond Initiative (COM(2011)660final).

But the EIB could be instructed to go further and set up a subsidiary specialised in offering products to manage political and regulatory risks – for example, products that guarantee revenue streams provided by Member State policies to infrastructure projects. This is what the Loan Guarantee Instrument for Trans-European Network (TEN) Transport⁴⁸ (from which the idea of Project Bonds has evolved) was designed to do: it guaranteed revenue risks during a limited period following construction of TENs projects, especially those under public-private partnerships (PPPs). This type of approach would benefit from a lower risk weighting and consequent lower costs of capital. Insurance need not be contingent on an EIB loan forming part of the project, but could be offered as a separate product.

The advantage of an EIB subsidiary providing such services as opposed to Member State-based institutions is that it could benefit from a portfolio approach across the EU which would not over-expose it to risk in one Member State. In addition, the all-important EIB ‘skin-in-the-game’ should reduce the likelihood of Member State ‘default’ on policy support since the Member State would in effect be defaulting against itself (as well as other Member States). Political influence held within the EIB Board of Governors and Board of Directors would act to mitigate the risk of a claim being triggered and thus make it likely any EIB products offered would be cheaper than anything commercial providers such as Euler Hermes or Coface could supply.

48 Most transport infrastructure to date has been developed by Member States. In order to establish a single, multimodal network that integrates land, sea and air transport networks throughout the Community, the European policymakers decided to establish the Trans-European transport network, allowing goods and people to circulate quickly and easily between Member States and assuring international connections. See http://ec.europa.eu/transport/infrastructure/index_en.htm

Recommendation 1: A target of 60 percent of all EIB financial activity to focus on low carbon investment by 2020 should be set. This should be combined with a presumption against high carbon investments unless it can be proven they do not lead to lock-in of a high carbon trajectory.

5.1.2 The role of national public banks in building confidence

Given the scale of the low carbon investment challenge, Member States also need to scale up their own institutional responses. In Germany, now the EU's top renewable energy investor, around 30 percent of KfW's financing is dedicated to low carbon investment – and KfW's commercial and promotional arms together are Germany's 5th largest holder of renewable energy assets. This has been further supported by activity among the State-based banks. In the UK, in acknowledgement of the fact there are very specific challenges around low carbon investment, a new institution – the Green Investment Bank – dedicated to low carbon investment is being established.

One of the primary concerns for potential investors in low carbon is policy risk (discussed in more detail in the next section): addressing such risk falls firmly within the realm of the public sector. There are a number of potential ways this could be achieved. In the UK, the Green Investment Bank debate is in part driven by discussion of the need for Government 'skin in the game' to give investors comfort that the Government is serious about its GHG reduction targets and that it will not retroactively downgrade policy support⁴⁹.

⁴⁹ The Netherlands similar discussions are taking place on whether a GIB dedicated to low carbon investment would be a useful addition to their existing public banks in terms of managing risk

Various products could be used – equity co-investment, debt provision and a variety of insurance products. Public financing institutions across the EU including Caisse des Dépôts et Consignations (CDC) in France, Bank Gospodarstwa Krajowego (BGK) in Poland, Instituto de Credito Oficial (ICO) in Spain already offer a wide range of such products for broader infrastructure, housing and the SME sector – and there is scope for such activities to be increased for low carbon technologies until they become more mainstream.

The ability of Member States to implement such actions, however, will either require the establishment of local Green Investment Banks (as is being suggested in the Netherlands⁵⁰), or refocusing the priorities of existing public banking institutions towards accelerating low carbon investment as a strategic priority (as has happened with KfW Bankengruppe in Germany⁵¹). While currently the finance gap is so huge there should be no danger of such public banks crowding out private capital, over time, and as technologies mainstream, care needs to be taken to ensure this does not become the case. The focus of public banking operations should therefore be to provide additional investment – i.e. ensuring funding is offered only to provide any shortfall left by commercial finance providers. Otherwise there is a danger that public banks will ‘cherry-pick’ the best investments through offering preferential rates. This also ensures limited public funding is targeted at the opportunities where it can be most effective.

50 Discussions with the Holland Financial Centre and Dutch Government on setting up a Green Investment Corporation.

51 Sustainability is one of the core promotional missions of KfW Bankengruppe http://nachhaltigkeit.kfw.de/EN_Home/Sustainability/index.jsp

Recommendation 2: All Member States need to scale up their public financing response to the decarbonisation challenge. This could be achieved by setting up or expanding dedicated low carbon investment departments within existing organisations and setting a target for 50 percent of financing activity to focus on low carbon by 2020. Alternatively, Member States could commit to setting up dedicated Green Investment Banks focused on mainstreaming these investments.

5.1.3 The role of public banks in unlocking bond finance for low carbon investments

In addition, to play a key role in building market confidence in new investments, public banks must play a role in kick-starting scaled refinancing opportunities. In this way they can help unlock bank and company balance sheets in the short-term as well as helping to accelerate the broader agenda of mainstreaming low carbon investments.

At the end of 2008, pension funds were estimated to hold \$25 trillion (€18 trillion), with 24–40 percent of portfolios dedicated to fixed income (bonds). There has been much discussion over the past few years about the role of ‘green’ or ‘climate’ bonds could play in addressing current market capacity limits. However, green or climate bonds are currently a niche market – with such investments being the exception rather than the rule. One of the issues for investors is that the term ‘green’ or ‘climate’ bond is a very generic term, making it difficult to assess where such bonds may fit within existing asset allocation frameworks. Some mainstream investors have said they have concluded such bonds must, for now, be financed from the alternative investment bucket – which limits the volume of capital available.

When trying to understand the policy implications of this, it is useful to think about how asset managers decide whether to buy a bond or not. The key criteria are:

- What is the basis for calculating the coupon payments and principle repayment – i.e. does this depend on policy-based subsidies or on the price of carbon?
- What are the underlying assets of the investment – i.e. is the bond a debt securitisation, backed by assets or similar?
- What is the capital structure?
- What is the credit-rating (risk) of the bond issuer, is there explicit Government backing?
- What is the size and maturity of the issue? What is the liquidity of the bond, i.e. is there a market for selling the bonds and will the issuer support this market?
- Do the bonds deliver genuine green/environmental benefits and how are these assessed?⁵²

Thus the underlying fundamentals of the projects and/or the financial product are the over-riding indicator of whether bonds will sell rather than anything inherent in the label green (see Box 2 for examples of such bonds).

52 IIGCC (2011) Positioning paper on green bonds

Box 2 'Green' and 'climate' bonds

One example of a green bond is public bank bonds ring-fenced for green investments. For example, in 2007 the EIB issued bonds that were ring-fenced to support its Climate Awareness programme (supporting projects in the fields of renewable energy and energy efficiency) in two currencies: SEK 2.2 billion and €600 million. In 2009 the 2nd Climate Awareness Bond was issued in SEK, again targeted at EIB's Scandinavian investor base. Nordic Investment Bank funds renewable energy projects around the Baltic Sea and issues 'environment-related bonds' to do so. In January 2010 Nomura Securities began selling 3-year Nordic bonds into the Japanese market, denominated in New Zealand dollars and South African rand. Funds are expected to be applied to loans for renewable energy and many other environmental projects. While it is labelled 'green', it actually carries the same characteristics as a regular EIB bond.

An alternative example is an asset-backed green bond linked to specific projects. For example, the Shepherds Flat Wind Farm is a \$525 million 22-year bond issued to finance an 845 MW wind farm in Oregon. However, \$420 million was guaranteed by the US Department of Energy.

See Climate Bonds Initiative: <http://climatebonds.net/resources/bonds-issued/>

While the term ‘green bond’ can be a useful short-hand therefore, it has also created some confusion in the market and the policy world. Those issues aside, however, sourcing sufficient bond finance is a critical part of addressing the market capacity limits and public banks can play a number of roles in facilitating this. Two generic examples of how this could work are set out below.

Example 1: Public bank green infrastructure bonds

Poland’s public bank BGK has a dedicated Road Fund for improving Poland’s road infrastructure. While roads are not low carbon, the approach taken to funding them is nonetheless interesting. Around one-third of the Road Fund’s capital comes from bonds raised by BGK (with other sources of capital including the Cohesion Funds). In August 2010 BGK offered around €144 million in 3-year notes to finance road construction. The offer was over-subscribed despite the fact that BGK hadn’t yet received a Treasury guarantee. In the UK it has been suggested that a similar approach could be taken to financing the UK’s flagship energy efficiency programme, the Green Deal. It has been suggested that the UK could issue revenue-backed Green Deal securities (bonds backed by aggregated revenue streams attached to 1000s of houses not householders on completion of energy efficiency upgrades) via the GIB⁵³.

As noted in Box 2, it is not absolutely necessary to issue bonds labelled and linked to dedicated green investment programmes, however. For example in Germany KfW dedicates around 30 percent of its financing volume to low carbon. It does not do this via dedicated bond issuances, but rather the investment is backed by ‘plain vanilla’ KfW bonds with

53 Holmes, I. (2011) Financing the Green Deal: Carrots, Sticks and the Green Investment Bank.

proceeds later allocated to low carbon investment priorities. The wider advantage of the low carbon infrastructure bond label is that it does help build the profile of such investments – which, in turn, is a part of building market confidence and capacity.

Example 2: Corporate low carbon infrastructure bonds

Public banks could also kick start a liquid market in corporate green infrastructure bonds, potentially in tandem with the EIB. They could either do this by:

- Taking on a monoline role (i.e. acting as bond insurers that for a fee provide a ‘wrapper’ for infrastructure bonds upgrading their credit rating and so lowering the risk and cost of borrowing – a similar proposition to the EU Project Bonds). This facility could alternatively be provided through a series of new spin-off Government-backed Green Insurance Companies.
- Purchasing tranches of subordinated debt from early market-initiated bond issuances (i.e. taking some first loss layers from early issuances, giving investors comfort that a government vehicle, acting as an ‘honest broker’ has ‘skin in the game’)⁵⁴.

5.1.4 Creating a regulatory environment conducive to low carbon infrastructure investment

Low carbon infrastructure assets possess the characteristics institutional investors require to meet their long-term liabilities. They are low risk, inflation-linked and have long term

54 Caldecott, B. (2010) Green bonds.

liability-matching cash flows. The European financial regulatory environment that controls investment in such assets is currently in a state of flux, as a regulatory response to the financial crisis is formulated. However, current proposals may inadvertently result in a shift towards short-term and lower risk investments – and away from investment in low carbon infrastructure assets which require a long term investment timeline to fully realise value. Solvency II, the new solvency regime for all EU insurers and reinsurers, is due to come into effect at the end of 2012. Solvency II aims to implement solvency requirements that better reflect the risks that companies face and is consistent across all Member States. This new system would demand high capital adequacy from investments in long-term low risk bonds, which is likely to deter investment in infrastructure bonds in particular⁵⁵. Yet in reality – and unlike corporate bonds – once an infrastructure asset is operational and has stable cashflows the risk of investment in such assets decreases over time⁵⁶. This is especially true where assets come under the regulated asset base and so cashflows come with a government guarantee of sorts. Thus, infrastructure bonds arguably deserve a different treatment and lowered capital adequacy requirements over time.

Similarly the new pensions regulator EIOPA (The European Insurance and Occupational Pensions Authority) has been tasked with addressing whether or not regulations similar to Solvency II should apply to pension funds. This could provide an opportunity to design regulation to encourage matching of assets to longer term liabilities such as direct infrastructure

55 Capital adequacy is the ratio which determines the capacity of an organisation in terms of meeting the time liabilities and other risks such as credit risk, operational risk, etc.

56 Analysis by Moody's showed that over time the performance of infrastructure assets with a B-rating was nearer an A-rating.

investment or long-term infrastructure debt without an undue focus on liquidity. However the rules governing pension funds appear to be heading in the same direction as Solvency II. This will have a similar detrimental effect on pension schemes' ability to invest in low carbon assets. However, if changes can be made to the regulation so that mature infrastructure investments can be deemed matching the liabilities by the regulator without adverse treatment for the illiquidity of the asset class then this may rebalance the negative effects. As yet there is no firm deadline for finalising these proposals. Efforts must be made to mitigate such unintended consequences as final decisions about long-term regulation of institutional investors are made.

Recommendation 3: Financial regulators must review current Solvency II and pension industry-related proposals to ensure that while they act to address systemic risks in the financial system, they are also structured so as not to unduly restrict institutional investors' ability to invest in these long-lived infrastructure assets.

5.2 The need for investment grade policy frameworks

When financiers and investors look at providing capital for the construction of low carbon assets, they will assess and price various risks into the cost of capital⁵⁷. Low carbon investment will take place if the risk-adjusted returns (a measure of the

57 These include: Economic risk (including construction risk, operation risk, macroeconomic risk, market risk, credit risk); Policy risk (regulatory, transfer-for-profit risk, expropriation or nationalisation risk); Legal risk (documentation or contract risk and jurisdictional risk); Force Majeure risk (e.g. war, riots, 'acts of God') . Many of these risks can be addressed through market-based mechanisms (though it is arguable whether these come at an accessible cost for pre-commercial technologies). Policy and regulatory risks, however, are difficult to hedge or contract away – and these risks are one of the biggest concerns for those looking to invest in European assets.

projected returns versus the risks taken) are better than for alternative investments. If other sectors, e.g. high carbon investments, offer better risk-adjusted returns then investors will continue to place their capital elsewhere. Similarly, if opportunities outside the EU are more attractive, investors may prefer to invest in for example Chinese or US low carbon infrastructure.

Institutional investors in particular, as noted above, have a tendency toward risk-aversion and are frequently reluctant to invest in products or assets that are relatively new to the market – seeing such investments as risky, uncertain and unproven⁵⁸. Governments can address these issues either through raising rewards further – or focusing on lowering/managing risks to investors. Raising rewards requires increasing subsidies (e.g. through higher prices or additional public sector grants) until the investment flows. Managing risk requires coherent, clear and long-term regulatory frameworks that provide clarity on cash flows and match investment timescales or public sector financing and guarantees – or a combination of both. Relying on increasing ‘rewards’ will ultimately deliver high rents to many investors in order to ensure the marginal investment is delivered. Given that taxpayers and consumers eventually pay for the cost of projects – whatever mechanism is used – it is critical that unnecessary rents are avoided. In particular, it seems inefficient to raise rewards simply to address a perception of the political risk that climate targets will not be met or adequately supported when a government could, as an alternative, remove this risk itself through using effective financial tools and policy support mechanisms.

At present, political and regulatory risk is seen to be high in

58 IIGCC, Investor Network on Climate Risk IGCC and UNEPFI (2011) Investment Grade Climate Change Policy: Financing the Transition to the low Carbon Economy

some EU Member States. The lack of agreement on future global GHG reduction targets, combined with opposition within the EU to a 30 percent 2020 target and a lack of certainty over long term policy support for critical low carbon infrastructure investments including renewable energy and energy efficiency creates uncertainty over whether the EU will stay committed to decarbonising its economy over the longer term. It also reduces confidence that the carbon price created by the EU Emissions Trading Scheme (EU ETS) will be high enough over a long enough period to create stable cash flows that deliver the return on capital required to make the initial investment attractive.

5.2.1 The role of targets in reducing risk

Unlike China – which has a Five Year Plan⁵⁹, the EU must use targets (backed up by devolved Member State targets and policies) as a high level signal of political intent across the region. Therefore, reluctance to adopt a 30 percent GHG reduction target for 2020 creates uncertainty as to whether the EU is serious in its ambition to scale up demand for low carbon investment. The first practical action the EU can collectively take therefore to address concerns of EU political risk is move to a 30 percent GHG reduction target. This will increase the attractiveness of the EU to investors, but this will need to be followed by indications of the likely increase in GHG cuts in

59 The EU is facing strong competition from other countries especially China which is to set itself targets of achieving 16 percent reductions in both carbon and energy intensity by 2015 under its imminent 12th Five Year Plan (2011–2015). Although its absolute CO₂ emissions will continue to rise in the foreseeable future, these increased targets could save between 0.5–2.5 Gt CO₂ emissions in 2020, creating a strong domestic market in low carbon industries. To put this in context, EU emissions reductions will be 0.5 Gt in 2020 under the 20 percent target or up to 1.1 Gt if that is increased to 30 percent. Chinese Challenge or Low Carbon Opportunity, The implications of China's 12th Five-Year-Plan for Europe, E3G, February 2011.

2030, 2050 and beyond to align with investment timescale of 15–25 years and give a sense of long term market growth.

Recommendation 4: Heads of Member States should adopt in 2012 a 2020 30 percent GHG reduction target.

National targets for Member States, and of course underlying policies that reward investment, are also important. Again, they signal the size of market opportunity – a key factor for investors who will factor scale of opportunity into decisions on which geographies to place capital in. In Portugal, the share of renewable electricity is now almost 45 percent, having risen from just 17 percent in 2005 when the target was set. Installed renewables capacity more than tripled during 2004–2009 from 1.2 GW to 4.3 GW, driven by strong targets and support mechanisms⁶⁰. Germany has a target of 35 percent of electricity to be generated from renewables by 2020⁶¹ and lies third in the global renewable energy country attractiveness indices behind China and the USA.

5.2.2 The importance of a stable investment-grade policy environment

To support the attainment of Member State targets, and in the absence of a stable high carbon price delivered through the EU ETS, Member States have deployed a range of supplementary policy support measures to improve project economics – including grants, capital allowances and market-based mechanisms such as FITs and the Renewables Obligation Certificates

60 Renewable Energy Country Attractiveness Indices, Ernst & Young, November 2010, Issue 27

61 Energy Concept (Energiekonzept), Federal Ministry of Economics and Technology, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 28 September 2010

to act as additional drivers of investment. Much has been written about what investors look for from policy frameworks and the need for ‘investment-grade policy’ that is of the appropriate duration, scale, simple to understand, provides certainty over revenues and avoids retroactive adjustment⁶². However, governments also need to retain sufficient flexibility over policy support to be able to adjust it as technology costs come down – in this way overly high ‘rents’ can be avoided and value for money delivered to taxpayers and consumers.

It is possible to reconcile these differing needs if the right approach is taken, but the key aim should be to maintain investor confidence. Tariff or other adjustments should therefore be made with sufficient warning to the market of what is happening and why and existing low carbon investments should be protected through grandfathering (i.e. no retroactive adjustments to support are made)⁶³. Certainty is critical to investors – and confidence is particularly susceptible to any consideration of retroactive adjustment of policy support. This simply reflects the fact that investments generally take 15–25 years to deliver a return on capital, and thus returns are eroded if retroactive adjustments to support mechanisms are made.

Retroactive adjustments, where they have been made, have not only drawn legal action from existing investors, as happened in Spain⁶⁴, but also impact on future investment volumes. Investors will always have plenty of other countries in which

62 Deutsche Bank (2009) *Paying For Renewable Energy at the Right Price*. IIGCC, Investor Network on Climate Risk IGCC and UNEPFI (2011) *Investment Grade Climate Change Policy: Financing the Transition to the Low Carbon Economy*.

63 Grandfathering relates to exempting investments that took place before the policy change from the proposed regulatory change.

64 Investors sue Spain for solar PV compensation
<http://www.environmental-finance.com/news/view/1595>

they can invest their capital. Thus, Spanish proposals to retrospectively change tariff support for PV saw a massive fall off in demand: only 100 MW of generating capacity was installed in 2009 and 2010 compared 2.7 GW in 2008⁶⁵. Renewable energy investments are not yet considered mainstream by many investors, and the Spanish story – while not as bad as it sounded from the ‘headlines’⁶⁶ – has not only damaged the confidence of foreign investors in the Spanish PV market but also confidence in renewables overall.

Similarly, rapidly introduced downward adjustments play havoc with supply chains – giving businesses little time to adapt – with the boom and subsequent bust again damaging confidence. For example, while announcements by the UK Government in October 2011 to halve the PV tariff in April 2012 were anticipated, it was not anticipated that the cut-off date for new installations to be eligible for the old tariff would be brought forward by nearly 4 months to 11 December 2011 – leaving only 6 weeks to register, plan and install existing project pipelines. Legal challenges to the UK Government are likely to follow, as they did in Spain.

Governments must of course retain the right to reduce technology support as costs come down. But if reductions are needed, the approach taken by Germany, which grandfathered existing investments, phased in reduction and managed the media discussion effectively, is better. Difficult market

65 <http://www.renewableenergyworld.com/rea/news/article/2010/11/spains-solar-power-sector-falls-into-the-abyss?cmpid=WNL-Wednesday-November17-2010>. In 2011 the Spanish Government set out

66 In the end, although the Spanish Government did reduce tariffs levels, they were kept high enough to enable debt to be repaid and their duration was extended from 25 to 28 years. From discussion with Spanish banks it is understood that only one project has faced financial difficulty.

conditions in 2010 in key countries such as Spain led to a severe drop in demand for solar PV and a consequent surplus of kit. Costs were reduced and led to a boom in installation in the German market of around 4.9 GW in 2010⁶⁷, bringing PV costs close to grid parity. This gave the German Government updated information on the costs of PV production and installation. It also generated a significant public backlash against the cost of subsidising PV via consumer tariffs. Armed with this information the German Government cut FITs in July 2010 and again in October 2010. In order to create transparency over future levels of support, amendments were introduced to the Renewable Energy Sources Act (EEG) so that there would be a 9 percent drop in FIT levels if <3.5 GW is installed and a 13 percent drop if >3.5 GW is installed. Announcing reductions in this way fits with Germany's legal principle of the protection of legitimate expectations⁶⁸ and in doing so acts to reduce uncertainty for investors as well as enabling the market to adjust. In Germany, the expectation is that technology providers will drop their prices, future PV investments can be re-priced with lower capital costs and investors continue to get sufficient returns on capital deployed into such assets.

Legislation has a key role to play in providing certainty. However, given recent actions by Member State governments, increasingly the strongest way therefore to signal policy stability is through the alignment of public and private financial interests, which means co-investment by public banking institutions.

67 Ernst & Young (2010) Renewable energy country attractiveness indices.

68 Under this principle individuals and companies who made investment decisions that complied with law in the past should not be adversely affected if that law is changed later.

5.3 Driving regulated investment

Development of new and upgraded energy networks including transmission and distribution networks, smart grids and an enabling infrastructure to support electric vehicles are key to the long-term decarbonisation of the power sector. But these investments are not only critical to delivering GHG reductions, they are critical to delivering market integration and security of supply. Smart grids in particular are a prerequisite to efficient balancing of intermittency from renewables and management of the forecast increased load from electric vehicles.

The scale of investment required to deliver these outcomes is significant. The European Commission estimates that by 2020 €140 billion will need to be spent on electricity transmission, smart grids and storage⁶⁹. This comes against a context of declining cross-border interconnector capacity and falling rates of construction of new power transmission lines⁷⁰. At the same time, energy utilities responsible for delivering this investment are facing unprecedented challenges to their balance sheets as a result of the financial crisis and the availability of project-based finance is in sharp decline⁷¹. Scaling up investment in critical grid infrastructure will require smarter regulation – regulation that factors in payment for innovation (including effectively managing the risks of sunk costs), incentivises cross-border investment, and facilitates access to new sources of capital.

In Europe, power networks tend to be operated as regulated

69 European Commission (2011) Proposal for a regulation of the European Parliament and of the Council on guidelines for trans-European energy infrastructure.

70 Zachmann, G. (2010) Power to the People of Europe. Bruegel Policy Brief 2010/04.

71 Eurelectric (2010) The financial situation of the electricity industry – a view to the future challenges.

monopolies. This means that infrastructure investment and operating costs are recouped through regulated tariffs charged to electricity users. Regulators determine the level of the tariffs and allowable expenditure on the basis of ensuring security of supply, driving cost efficiency and ensuring network operators can achieve a fair rate of return on investment. In general, even though network operators must recoup their investment over long timescales, the regulated tariff model is perceived as relatively low-risk, which means capital can be raised at relative low cost.

However, many of the regulatory rules and structures that govern infrastructure investment were designed in an era in which network innovation was gradual, electricity systems were predominately national and power flows were uni-directional and more predictable. The rate of technological change (including use of information and communication technology in grid management) plus the speed of transition of the power sector for both decarbonisation and market integration means these conditions no longer apply, and financing the required infrastructure is becoming increasingly challenging.

5.3.1 Paying for innovation

Smart grids – defined functionally as the combination of instrumentation, communications and analytics that allows power network infrastructure to be operated in a dynamic and efficient manner – will help to reduce the overall system costs of the power sector and may help to reduce the overall amount of new infrastructure required. Developing smart grids will however require substantial up-front capital expenditure, greater ongoing operational costs than ‘fit and forget’ solutions as well as deployment of riskier, less proven technologies. This creates a financing challenge under traditional incentive regulation systems because risk and return profiles may be different

from conventional distribution networks⁷². The public benefit of smart grids – including carbon reduction and system security benefits as well as increasing network capacity – are not reflected in the returns accruing to the network operator, which can make smart grids hard to finance.

In future, smart grids may become platforms for new markets based on new energy retail offers and on demand-side participation in providing balancing and system stability services. In the long run, these new markets may be used to fund smart grid infrastructure. However the scope and potential of these new markets are not yet fully understood so interim financing solutions must be found.

First, the regulatory rules that govern investment must become more ‘smart grid friendly’ by taking into account outcomes and operational cost as well as efficiencies in capital expenditure. Several European countries are already moving towards such a model of outcome-focused regulation. Second, targeted public funding is necessary to support technological innovation in smart grid networks. The European Electricity Grid Initiative under the SET Plan has identified the need for €2 billion⁷³ to be spent on RD&D in electricity networks, however not all of these funds have been forthcoming.

5.3.2 Sharing costs and mobilising new investment

Integrating Europe’s power markets, ensuring security of supply

72 Eurelectric (2011) Smart regulation for smart grids.

73 The European Electricity Grid Initiative (EEGI) Roadmap 2010-18 and Detailed Implementation Plan 2010-12, 25 May 2010, proposes a 9-year RD&D programme for electricity networks covering the expected participation of regulated networks, market players, research centres and universities. It does not cover the costs of deploying the solutions across Europe.

and supporting low carbon generation will require a significant increase in electricity transmission, including long-distance power lines and new cross-border interconnectors.

Currently, most interconnectors are built on the basis of regulated investment following agreement between Transmission System Operators and regulators on both sides of a border. International transmission lines can also be built through the ‘merchant interconnector’ model, in which operators may profit from the difference in electricity prices between countries.

Difficulties arise with both models. Under the merchant approach, there may be implicit incentives for investors to undersize new interconnectors to maximise congestion revenues. In addition, as European power markets integrate, prices will converge and this may make further development of merchant interconnectors increasingly unviable.

The regulated tariff model may run into challenges where:

- regulatory rules vary between countries or regulators are unable to agree;
- benefits are more regional than national, or where a link between two countries primarily benefits a third country;
- long-distance lines (e.g. HVDC cables) cross several national borders.

Mobilising sufficient investment in infrastructure will require addressing the barriers to both models. In its proposed infrastructure regulation, the European Commission suggests overcoming the challenges of the regulated approach by establishing a formal methodology for cost allocation – with a

stronger role for the newly-created Agency for the Cooperation of Energy Regulators (ACER) where national regulators disagree.

New approaches will also be needed to incentivise new independent investment in grid infrastructure while avoiding the problems associated with the traditional merchant investment model. Rates of investment in transmission will need to double over the next decade, and it may be challenging for Transmission System Operators to finance the required investment on their own. New models for attracting new investment include the 'cap and floor' regime (which resembles a hybrid between merchant and regulated investment) and the 'contestable approach', which allows independent investors to compete in a reverse auction to develop new infrastructure and access regulated returns⁷⁴. Such models may help to lower overall costs as well as to facilitate access to new investment sources.

5.3.3 Managing the risks of sunk assets

While the majority of new network investment will occur under the regulated tariff system, public financing support will also be needed to accelerate investment in strategic infrastructure. Networks tend to take considerably longer to build than generation assets, with new interconnectors taking on average seven years and many taking considerably longer⁷⁵. Regulators, however, have traditionally been averse to the risk of stranded assets and rarely allow 'anticipatory investment' or investment ahead of need.

74 Regulatory Assistance Project. 2011. Policy Brief: Securing Grids for a Sustainable Future. <http://www.raponline.org/document/download/id/4694>

75 PWC/PIK/IIASA. 2010. 100 percent renewable electricity: A roadmap to 2050 for Europe and North Africa. http://www.supersmartgrid.net/wp-content/uploads/2010/03/100-renewable_electricity-roadmap.pdf

In some circumstances, such as the development of the North Sea Offshore Grid, new networks can open up new options for making best use of Europe's low carbon energy resources and therefore have a high public value. However uncertainties over the future location, type and volume of generation and the challenging nature of the project as the North Sea Offshore Grid means that such critical assets may not be built with private sector capital alone as risks are too high. The public value arising from the development of key network infrastructure justifies the use of targeted public investment to ensure such projects go ahead⁷⁶. The European Commission's proposed 'Connecting Europe Facility' has a key role to play in accelerating investment in strategic grid infrastructure. However, it will need to be reoriented towards electricity infrastructure investment to support decarbonisation and away from infrastructure such as oil and gas pipelines that increase lock-in to a higher carbon energy system.

Recommendation 5: The risk of underinvestment in network infrastructure is higher than the risk of overinvestment. A shift from a short-term to a long-term focus on incentivising investment in grid infrastructure is needed. The Connecting Europe Facility is essential, but it needs to be reoriented towards the strategic investments required for decarbonisation. Regulatory reform is also required to enable anticipatory investment in key lines and increase the 'smartness' of network investment.

5.4 Addressing the aggregation challenge

Ensuring sufficient finance flows to small and medium-sized projects – such as energy efficiency, community energy and waste infrastructure – is a particular challenge. Often investments are too small for project finance⁷⁷ or too big either

individually or cumulatively to finance on company balance sheets. Yet such investments represent a significant proportion of the EU's investment needs: for example analysis of the UK market indicates around 50 percent of energy-related investments (£225 billion) will need to be in energy efficiency⁷⁸. Three key sets of barriers must be addressed to ensure sufficient financial flows to smaller-scale infrastructure:

- Policy frameworks must be created to ensure large enough 'pipelines' of projects are developed to be of interest to the long-term investment community.
- Efforts must be made to ensure legal documentation around such project pipelines are as consistent as possible ('boilerplated') to facilitate aggregation.
- Public banks must, if no private sector actors are forthcoming, play a role in facilitating aggregation and/or securitisation of bundled investments to the bond market.

With these key elements in place, a framework is created to enable the aggregation of relatively small investments to a size suitable for bond issuances – and at an ongoing volume (and so liquidity) to attract institutional investors. In providing visibility and thus an 'exit' from investments, the initial upfront providers of capital will be forthcoming.

Achieving the scale and liquidity needed by institutional investors will require governments to put in place policy frameworks to ensure a sufficient number of projects from comparatively diffuse sources is forthcoming. However, it is much harder to design effective policies to drive demand for relatively small-scale projects such as community energy or energy efficiency retrofits, compared to investment in large

scale power plant. This is because there are a slew of barriers, not least access to low cost capital and creation of institutional capacity to deliver, and because success is contingent on incentivising action by millions of individuals – not just the relative ‘handful’ of senior executives required to drive action by large-scale utilities for example. Some examples of approaches are set out below.

5.4.1 Driving scaled investment in energy efficiency

Energy efficiency represents the largest untapped opportunity for emissions reduction in the EU, and could deliver up to 33 percent emissions reductions across the EU economy⁷⁹. Buildings alone account for 40 percent of the EU’s final energy consumption and are a substantive opportunity to deliver GHG cuts. While there are no official data on the value of investments, Fraunhofer ISI and Ecofys analysis indicates that up to €65 billion needs to be invested in building retrofits each year to 2020 to meet the 20 percent energy efficiency target⁸⁰. Yet energy efficiency ranks at the lower end of scale in financial

76 Existing sources of public funding, discussed elsewhere in this paper, include TEN-E, EEPR/Marguerite fund, Structural funds, The European Neighbourhood and Partnership Instrument, Framework Programme funding for RD&D. However these instruments have in the past been poorly targeted, and are insufficient compared to the overall scale of investment required.

77 Projects requiring debt of €25m or less involve the same transaction costs and due diligence costs as larger projects, thus banks and equity investors tend not focus limited resources on them. The exceptions are commercial banks such as the Cooperative Bank that take a ‘triple bottom line’ view of returns and public sector financial institutions.

78 Ernst & Young (2010) Capitalising the Green Investment Bank.

79 A study by Fraunhofer et al estimated that the potential reduction from the EU-27 versus existing policies, ranged from 15 percent to 22 percent depending on the level of policy intensity. 33 percent was estimated to be technically possible.

80 Fraunhofer ISI and Ecofys (2011) The upfront investments required to double energy savings in the European Union in 2020.

industry assessments of the climate change investment space. Even though commercial investors have woken up to the economic potential for energy efficiency investments⁸¹, tangible project-based large-scale investment opportunities are limited. Nearly €8 billion of EU Cohesion Funds set aside for energy efficiency was unspent as of December 2010⁸². The abundance of the investment potential and the supposed modest costs involved indicates there are very significant barriers to mobilising large amounts of capital in this area.

These barriers have been well documented and include:

- For new purchases – split incentives (technology producers don't benefit from the energy savings) and relatively low energy prices, which mean consumers often don't value energy efficiency;
- For retrofits – split incentives (misaligned benefits for building owners and tenants); the lack of tangibility of the energy saving opportunity; high upfront costs and long payback times; the highly fragmented nature of the opportunity; high transaction costs relative to capital investments; and the hassle factor⁸³.

To deliver energy efficiency at scale, more sophisticated and robust policy frameworks will be needed to overcome these multiple barriers and to galvanise the mass change in attitudes

81 Discussion with BILLIONEF analysts.

82 http://www.euractiv.com/en/energy-efficiency/nearly-8-billion-eu-energy-savings-fund-lies-unclaimed-news-500849?utm_source=EurActiv+Newsletter&utm_campaign=5ce8b77d29-my_google_analytics_key&utm_medium=email

83 Mind the Gap: Quantifying Principal-Agent Problems in Energy Efficiency, OECD/IEA, 2007

to energy efficiency – at consumer and corporate levels – that will be needed to tackle energy efficiency at scale. A push/pull approach to policy-making is needed.

- The ‘push’ needs to come from Member State regulation (i.e. standards) to support EU level regulation that creates a tangible and long-term financial value for energy efficiency and sends a signal to supply chains to gear up. This is a particular issue for buildings: Member State governments must in time introduce minimum retrofitting standards for buildings at the point of sale or letting to drive the market at scale.
- The ‘pull’ is required to drive demand while energy prices remain relatively low. In the household and SME sector this can be provided in the form of financial incentives to improve the economics of projects, better labelling, guarantees for products and workmanship and focused marketing and communications efforts to promote clearly the benefits of energy efficiency.

Because different Member States have different regulatory structures and societal cultures, a ‘one-size-fits-all’ approach to driving demand for energy efficiency is unlikely to work. EU interventions are required and should focus on creating political will in Member States to generate market opportunities. At Member State level there should be a focus on creating market frameworks for scaling up energy efficiency, including ensuring institutional frameworks are in place, to better leverage EU and National Budget Funds.

Creating political will to generate new market opportunities

Binding targets for energy efficiency combined with EU-wide minimum rolling energy standards could be used to signal expected market size to investors, just as happened for renewable energy, and create new investment opportunities⁸⁴. These should be set for both 2020 and beyond to give a sense of how the market is expected to grow and give supply chains the opportunity to scale up accordingly. The Energy Efficiency Directive, due to be agreed in 2012, is the ideal opportunity to do this. For new products that are traded across the EU, such as cars and appliances, higher minimum standards should be set through revision of the appropriate Directives e.g. EcoDesign Directive for appliance standards and the Directive on emissions from passenger cars⁸⁵. For the industrial and commercial sector, a requirement for energy audits (such as that proposed in the Energy Efficiency Directive) will significantly help drive demand, but this should be backed by a requirement to invest, should returns exceed a prescribed hurdle rate of perhaps 15 percent⁸⁶. Public funding is critical to kick-start and scale energy efficiency markets. Funding will need to come from both the EU Budget 2014–2020 and Member State Budgets. The Commission's proposals to earmark 20 percent of the European Regional Development Fund (ERDF) to energy efficiency and renewable energy is

84 Targets are mentioned in the proposed Energy Efficiency Directive 2011/0172 (COD), but these are not binding. It is suggested that progress should be reviewed, perhaps in 2013, and a shift to mandatory targets made should this prove necessary.

85 Regulation (EC) No 443/2009 of 23 April 2009, setting emissions performance standards for new passenger cars as part of the Community's integrated approach to reduce CO₂ emissions from light-duty vehicles

86 These investments, while attractive are often not taken up. For many industrial and commercial operations, energy may not be a significant proportion of the cost base, so alternative core business-related investments are often prioritised.

laudable⁸⁷. Given the macroeconomic importance of this sector – which is under-invested across much of the EU economy – this 20 percent earmarking should be endorsed and combined with a mandatory element of prioritised spending of these funds.

Ensuring institutional frameworks and agreements are in place for enabling better leverage of EU and Member State Budget Funds and catalysing private sector investment

Because returns tend to be fairly modest for smaller scale investment, in large part due to transaction costs, energy efficiency can often be of limited interest to the private sector. If there is no or little commercial return for the additional cost involved in delivering such investments, the private sector will need inducements in the form of subsidies, technical assistance or risk-sharing through equity investment for example to move into this space. This is particularly an issue for energy efficiency investments, which are intangible assets⁸⁸ – meaning value is hard to measure and to quantify so that investments are often deemed to be too risky for the returns they might offer. These issues are reflected by the fact that in many Member States financing for energy efficiency retrofits in buildings and businesses is sourced from public financing institutions and disbursed at reduced interest rates to drive demand. **Where Member States do not already have financing facilities dedicated to promoting energy efficiency investments, these should be set up. These financing facilities should play a role coordinating financing,**

87 Proposal for a Regulation of the European Parliament and of the Council on Specific Provisions Concerning the European Regional Development Fund and the Investment for Growth and Jobs Goal and Repealing Regulation (EC) No 1080/2006. 2011/0275 (COD)

88 Compared to for example a windfarm – which can be seized in the event of default.

including managing delivery of portfolios of projects and disbursing subsidies in a manner that maximises social outcomes as well as the amount of private capital leveraged. In addition, the capacity must be established to deliver sufficient expertise for auditing, monitoring and evaluation of energy efficiency programmes; developing best practice in financing investments through PPPs; supporting accreditation of suppliers; and so on.

For example, since 2003 KredEx (Estonia's public financing institution) has supported energy efficiency through a grant scheme that provided up to 50 percent of the costs of energy audits/technical advice. During 2003–2007 3,800 buildings benefitted and €1.4 million in grants was awarded. Grants were also provided for up to 10 percent of the costs of renovation and supported 3,200 buildings with €11 million disbursed. However funding was limited, only available for single works and the grant only came after payments were made.

In 2010, Estonia became the first country to successfully channel Structural Funds into the renovation of apartment buildings and scale up the impact of its retrofit programme. The Structural Funds supplied €17 million and an additional €32 million was provided by the State via a guarantee. This created a fund valued €49 million that was used to provide low interest loans via two commercial banks – Swedbank and SEB Estonia. Loans from the fund to the banks last for 20 years, with credit risk taken by the banks. Typically loans are used to finance investment in insulation and heating systems. A mandatory energy audit is prerequisite for obtaining the loan to finance the renovations.

In successfully blending European and Member State Budget and in bringing in commercial banks to disburse loans, Estonia

has significantly scaled up the impact of its retrofit programme. But Estonia is the exception not the rule – now the precedent is in place, other Member States should follow suit. In time, as such schemes become established and build a track record, there should be increasing opportunities for the private sector to step in and provide co-financing.

5.4.2 Driving greater investment in community/ municipal scale projects

Many waste infrastructure or community energy projects fail to get funding because, while economic, they do not deliver high enough returns for most private sector investors. In these instances public financing institutions have a role to play. With their ‘triple bottom line’ mandate, focused on economic, social and environmental outcomes, Member State public finance facilities/financial institutions can accept lower returns on investments compared to the private sector. For example, in the UK, the London Waste Management and Recycling Board is a public fund that provides lower cost debt or equity to critical projects that have some private sector finance backing to ensure they get ‘over the line’.

But the problem is not always access to finance – sometimes it is about technical expertise. This is a Europe-wide issue. For example in the UK the Cooperative Bank, has committed more than £400 million for investment in renewable energy and low carbon energy technologies including combined heat and power (CHP) plants and district heating schemes⁸⁹, and has a £1 billion-plus pipeline of community energy projects it could potentially provide debt to. However, this is being hampered

⁸⁹ Written evidence submitted to the Environmental Audit Committee (regarding the Green Investment Bank) by The Cooperative Group Link: <http://www.publications.parliament.uk/pa/cm201011/cmselect/cmenvaud/memo/greeninvest/wrev04.htm>

because business plans need further development, pre-planning feasibility studies (which may cost several €100,000s) are missing or equity is missing⁹⁰. This is similarly an issue for BO Bank in Poland, which provides debt to community renewable energy projects, but is facing a shortage of projects with high quality business plans. Public banks could address these issues by providing equity, through a dedicated fund structure, as well as debt – but also combine this with technical assistance to help project sponsors to take investments through to planning – much as the EIB’s Jessica, Jasper and Elena facilities currently do but on a smaller community-based scale⁹¹.

Once Member State Governments have put in place policy frameworks that successfully deliver a sufficient pipeline of energy efficiency, community energy or waste infrastructure deals that can be financed, those finance providers – particularly those in the private sector – will be looking to refinance. Traditionally the cheapest source of finance has been the debt capital market, however individual investments must be aggregated into a bundle to reach a size suitable for bond issuance

90 Cooperative Financial Services & Grant Thornton (2011) Funding Small Scale Green Energy projects through the green Investment Bank.

91 ELENA is a €30m European initiative that helps public institutions in Member States by offering technical support to implement projects including retrofitting of public and private buildings, district heating and cooling networks and environmentally-friendly transport networks. As well as technical support the facility may facilitate access to EIB finance as well as private finance. It is expected to support more than €1 billion of energy efficiency and renewables projects. JASPER is a joint EIB, European Commission, EBRD and KfW initiative that provides technical support for project preparation for large infrastructure schemes in the 12 Central and Eastern EU Member States, which receive finance from the Structural and Cohesion Funds. Jaspers estimated budget for 2009 was €32 million. JESSICA is an initiative developed by the European Commission and the European Investment Bank, in collaboration with the Council of Europe Development Bank (CEB). Member States have the option to use some of their Structural Funds to make repayable investments in projects related to sustainable urban development. These can take the form of equity, loans and guarantees which can be disbursed through the EIB, which also provides technical advice.

(likely to be >€150 million to €250 million⁹²). However, currently small scale community and energy efficiency investments are financed on a bespoke project-by-project basis. This makes it difficult to bundle them up into one attractive security because the different contracts may carry different risk characteristics.

Public banks can help in two ways. First by developing standardised 'boilerplate' documentation to keep transaction costs down but also facilitate bundling for small projects into a size suitable for bond issuances. Second, by playing a role in refinancing smaller scale investments once they are operational. Public banks could act as a warehouse, offer credit enhancements or take junior tranches of securitised packages of assets to build confidence in these new products, as set out in Section 5.1.

Recommendation 6: Energy efficiency must be given a higher priority in the EU's decarbonisation plans, with binding targets agreed within the Energy Efficiency Directive. Member States should ensure energy efficiency financing facilities are in place and make greater efforts to blend EU and National Budget funds. At EU level, the proposed 20 percent earmarking of the European Regional Development Funds for investment in energy efficiency and renewable energy must be endorsed by the European Parliament and Council of Europe and combined with a requirement for release of the other 80 percent of funds to each Member State being contingent on funding first being allocated to finance investment programmes in these areas.

92 Unlocking Investment to Deliver Britain's Low Carbon Future, Green Investment Bank Commission, June 2010

5.5 Scaling up support for development and deployment of innovative technologies

Building a sustainable global low carbon economy will require a step change in innovation and diffusion. The diffusion time for new energy technologies is currently about 24 years on average; this will need to be halved by 2025 to have a realistic chance of meeting global climate goals⁹³. The EU is one of a number of significant global geographies wanting to capture the growth and jobs that could come from the supply of such technologies.

Member States have a key role to play in driving innovation – as of 2007 80 percent of public investment into R&D was provided by Member States rather than the EU⁹⁴. Much of the support for R&D has been delivered via public financing institutions, which has led to issues with State Aid and thus a collective bloc-based approach may be more effective⁹⁵.

5.5.1 A collective approach to supporting development

The SET Plan is an EU public/private initiative aimed at capturing the benefit of a move to a low carbon economy – it aims to accelerate commercialisation of nine key energy technologies before 2020. It represents a collaboration between the

93 Lee et al. (2009) *Who Owns Our Low Carbon Future: Intellectual Property and Energy Technologies*. Chatham House.

94 CION SET Plan memo.

95 Because investment in specific companies or projects may lead to State Aid issues finance may have to be provided via independent subsidiaries of public banks. KfW was required to split IPEX-Bank into a legally independent institution for these reasons as it was deemed to be in competition with the private sector. IPEX supports domestic infrastructure investments as well as international project and export finance. Alternatively, specific public organisations can be set up for this purpose such as the Carbon Trust in the UK.

European Commission and energy technology stakeholders, who collectively estimate €67.5 billion to €80.5 billion of funding is needed by 2020 to commercialise hydrogen/fuel cells; wind; solar PV/concentrated solar thermal; CCS; biofuels; electricity grids; smart cities; European Energy Research Alliance; and nuclear fission⁹⁶. Costs include research, technological development, demonstration and early market take-up but exclude the cost of deployment and market-based incentives such as FITs.

However, as of 2007, investment in SET plan priorities was only €3.3 billion (€2.38 billion excluding nuclear). This was below 2 percent of GDP, compared to 2.6 percent in the US and 3.4 percent in Japan⁹⁷. In March 2010, the European Council adopted an R&D target of 3 percent of GDP by 2020 (around €8 billion per year⁹⁸), which would put the EU on track to achieve the SET plan's goals – but no solutions on how this should be financed. The expectation is that the majority of the funding gap will need to be filled by public sources (70 percent of investment came from private sources in 2007)⁹⁹, but there are questions about how this will be sourced and also allocated according to technology.

Some money has already been allocated by the EU for the SET Plan. This includes €6.4 billion for the 7th Framework Programme (FP7 is the largest to date) and the NER300 Fund, estimated to be worth €4.5 billion but expected to fund 34 renewable energy projects and 8 CCS demonstration projects.

96 Public support for the Financing of RD&D Activities in New Clean Energy Technologies

97 CION SET Plan memo

98 This is substantively lower than IEA estimates, which are put as 2x–5x by 2020. Global Gaps in Clean Energy RD&D: Update and recommendations for international collaborations, IEA, 2010

99 CION SET Plan memo

However the sums likely to be allocated to individual projects are small compared to capital costs and associated risks and will need to be matched by Member State public support if projects are to go forward. The Innovation Union strategy of October 2010 aims to steer European structural funds and public procurement towards innovation and remove bottlenecks. The European Commission is likely to encourage Member States to set aside funds for smart grid deployment in its imminent infrastructure package – however further clarity is needed on how this will work.

While the debate rumbles on, the EU is falling further behind in the global decarbonisation race. New players are emerging and while European companies have, through R&D investment, developed a strong global market share of 30–50 percent across many clean technology sectors¹⁰⁰, they now represent only 5 percent of the top 20 innovators (as measured by patent holdings) across the major clean energy technologies: solar PV, wind, biomass, clean coal, CCS, and concentrated solar power¹⁰¹. Currently Japanese, German and US companies lead as the top patent owners¹⁰².

At the same time the SET-Plan is absent from the priority list for funding in the EU Budget from 2014. This needs to

100 European Commission COM (March 2010) *Europe 2020: A European strategy for smart, sustainable and inclusive growth*, Brussels.

101 Lee et al. (2009) *Who Owns Our Low Carbon Future: Intellectual Property and Energy Technologies*. Chatham House.

102 While Europe currently leads in clean energy investment globally accounting for 44 percent of the world's financial investment in 2009 (\$43.7 billion), it is followed very closely by Asia – driven primarily by strong growth in China. For the first time, China overtook the US in clean investment – and in its 12th Five Year Plan has announced it will be spending ~5 trillion Yuan (€54 billion) on supporting innovation. From E3G (2010) *The case for moving to 30 percent: Global low carbon technology race and international cooperation*.

be addressed: neither FP7/FP8 nor the Innovation Union can fill the funding gap. Major SET-Plan projects remain beyond the means of any one Member State or company to support.

Recommendation 7: There must be a renewed political focus on the European energy and innovation agenda framed around the economic benefits accruing to Europe in securing a significant share of global low carbon technology markets. Solutions must be put in place to ensure sufficient additional public funding – estimated at €31 billion both in the current pre-2014 EU Budget period and in the post-2014 period¹⁰³ – is secured.

Governments as well as the EU also have a role to play in providing support for early stage development of strategically significant and ‘disruptive’ clean technologies – either through providing financial support to research institutions or dedicated grant-based schemes¹⁰⁴. But while development capital is essential to bringing forward critical new technologies – such technologies face an additional challenge once development is complete. The ‘valley of death’ investment gap is a gap in the markets for capital dedicated to funding unproven technologies with a required high capex for

103 €31 billion would achieve the goal of a 50:50 public:private spending ratio (correcting the existing 30:70 ratio) between 2010 and 2020. If SET-Plan funding of €20 billion between 2014 and 2020 can be found within the EU Budget, possible sources of additional pre-2014 funding are €75 billion of Structural and Cohesion Fund underspend or EU ETS auction revenues.

104 For example France’s €400 million Demonstrator Fund supports the development of new energy technologies including renewable energy, CCS, low carbon transport, zero-emission buildings and smart grids. From Energy Policies of IEA Countries: France 2009 Review, International Energy Agency, 2010. The UK Government’s Office for Low Emission Vehicles has £400m to drive faster uptake of the next generation of ultra-low emission vehicles including electric, plug-in hybrid and hydrogen cars. See <http://www.dft.gov.uk/pgr/sustainable/olev/>

demonstration¹⁰⁵. Currently there is a shortage in EU not only of development capital but also capital to help key technologies overcome this Valley of Death. Both these issues must be addressed.

5.5.2 Supporting demonstration and accelerating deployment

A route to market is critical to incentivise private companies to invest in R&D at scale. The first step is technology demonstration, which is especially an issue for high capex investments with no track record, such as CCS. Expansion of the EIB Risk Sharing Finance Facility, where the European Commission provides additional risk capital to the EIB to cover potential losses up to a fixed ceiling, will allow the EIB to expand funding for research and innovation. Examples of projects funded by this initiative include two new 50 MW concentrated solar thermal power plants in Andusol Spain, and various projects to improve automotive efficiency. Initiatives such as the EU's multi-national public-private equity fund Marguerite Fund are also helpful¹⁰⁶. The Marguerite Fund is focused on developing new transport, energy and renewables

105 Technologies get caught in the "valley of death", where later stage low carbon investments are often considered too capital intensive for a venture capitalist (who finance development), but the technological or execution risk is too high for private equity and project finance investors (who finance diffusion). For example, carbon capture and storage, energy efficiency finance and second generation biomass are traditionally indentified as sitting in this space. It is arguable that the same could be said for the first few GW of UK deep offshore wind projects. See discussion in *Commodities Now* (23 June 2009) Valley of death for low carbon technologies is widening <http://www.commodities-now.com/news/environmental-markets/190-valley-of-death-for-low-carbon-technologies-is-widening.html>

106 The fund has a target of €1.5 billion before close in late 2011. It will invest over the next 4 years for a term of 20 years. It was established by 6 major public financial institutions: the EIB, Caisse des Dépôts, Cassa Depositi e Prestiti, Instituto de Credito Oficial, KfW and PKO Bank Polski. The sponsors provided €600 million and an additional €100 million has been committed from other parties.

infrastructure – with a special focus on trans-European networks. It will purchase equity stakes in companies but in general will not take majority positions. The sponsors and other institutions also aim to provide additional co-finance of up to €5 billion for projects in which they take a stake. However, given that there are a number of such critical path projects in the coming 10 years including €2.6 billion required for CCS pipelines, €140 billion for electricity transmission grids and storage and an additional €32 billion to support offshore wind¹⁰⁷, consideration should be given to replicating and scaling up this approach if successful.

Once technologies are demonstrated, complementary market pull measures can also be used to drive demand and provide an incentive for investment in their deployment. Such measures could be introduced by regulatory and policy changes, for example introducing standards e.g. on network performance, smart meters can be very effective drivers of investment. Similarly, policies on public procurement can be effective in providing an initial market for the deployment of innovative technologies e.g. in the case of demand for low emissions vehicles.

107 Impact Assessment accompanying A Roadmap for moving to a competitive low carbon economy in 2050, SEC(2011) 288 final, European Commission, 8 March 2011.

6 Conclusions

Financing decarbonisation of European infrastructure is beyond the scope of the public purse alone. With fears that Europe will again tip into recession, public finances are constrained and many Member States are focused on reducing overall budget deficits. Despite this, well designed programmes and policies based around public infrastructure investment can deliver growth, energy security and keep Europe on a cost-effective low carbon trajectory¹⁰⁸. As outlined in the European Commission's 'Budget for Europe 2020' tackling these key challenges is one of the core objectives of the Europe 2020 strategy. To be successful the goal of policy-makers should be to ensure that sufficient private finance is shifted into low carbon assets – as this is the only way that the required levels of investment can be achieved. To achieve this, EU and Member State strategies need to be complementary, focus on leveraging a maximised amount of private funds and, for technologies, accelerate time to commercialisation and market maturity.

The targeted use of public financing can maximise the leverage of private investment through the use of instruments that reduce risk in particular, building confidence and enabling larger volumes of lower cost capital to flow. Without this public support, private finance will continue to be invested in sectors that offer higher risk-adjusted returns but have a higher carbon impact. In the short-term, public financing should be directed towards prioritising the most macro-economically beneficial investments: low carbon infrastructure that insulates the EU from future systemic risks such as fossil fuel price shocks, improves energy security and pays high dividends in

108 E3G (2010) Building a sustainable and low carbon European recovery: How moving to a 30 percent emissions target is in the European interest.

terms of job creation, growth and competitiveness.

The EU Budget is an important tool for delivering the EU's low carbon transformation. While there is not likely to be an increase in the overall Budget cap, the MFF is an opportunity to bring about genuine Budget reform. **In June 2011 the European Commission Communication 'A Budget for 2020' proposed €1.025 trillion be allocated through the MFF covering 2013–2020. Of this total it is proposed €50 billion be allocated to the new 'Connecting Europe Facility' – of this €9.1 billion going to energy infrastructure (grids) – the rest will go to ICT/digital (€9.2 billion) and to transport (€21.7 billion). This is a substantive uplift from the previous infrastructure programme TEN-E (which was worth €155 million) and Member States should formally support the Commission's proposals.**

The balance of public financing must be met by other sources of European funds such as Cohesion Funds, national budgets, public banks and targeted consumer charges. At EU level this can be achieved by refocusing spending to ensure that climate and energy security objectives are met through placing conditionality on the spending of Budget funds – prioritising where possible spending on renewable energy, energy efficiency and small and the medium-sized enterprises that will drive innovation and future competitiveness. In addition to this there must be the judicious use of public financing institutions and policy frameworks to support investment in infrastructure that creates the greatest long-term macroeconomic benefits.

Some of the ideas around refocusing the EU Budget are reflected in the June 2011 European Commission's Communication on the 2020 EU Budget, but there are still some significant gaps – including how the SET Plan funding gap will

be filled. There is also much more scope for greening European Budget Funds, through prioritising low carbon investments (such as energy efficiency) where greatest potential for EU value-added lies; creating coherence between climate change objectives and other objectives; and setting out climate-related performance criteria for project selection.

The proposed EU Project Bonds, which form part of the wider MFF debate, represent a potentially interesting example of how innovative financial instruments could be targeted at lifting market capacity constraints. However, as currently framed they may have only a very limited impact on improving financial flows to the low carbon infrastructure needed to achieve 2020 and 2050 decarbonisation goals. The focus of EU Project Bonds should be made consistent with these goals. Their use should also be coordinated where possible with a full range of EU and Member State financial instruments aimed at managing risk. In this way transformational low carbon infrastructure investment in renewables, energy efficiency and innovative grid infrastructure (smart grids and electric vehicle charging infrastructure) would be prioritised and then delivered in line with a move to a 30 percent GHG reduction target by 2020. Conversely, eligibility criteria for Project Bonds should explicitly exclude funding for any projects that run counter to the EU's 2020 targets for GHG emissions cuts and energy efficiency.

On wider infrastructure financing, investors see the upcoming decision on whether the EU should move to a 30 percent GHG reduction target as a 'litmus test' of the EU's commitment to longer term infrastructure decarbonisation. As the global competition for private capital intensifies, Europe is in danger of losing out to more attractive emerging market opportunities driven by strong policy and financial backing from emerging economy Governments. For example China's 12th Five Year

Plan will see 2.2 percent of GDP focused on public innovation spending and renewable energy growth set to match EU installed capacity by 2015 as low carbon and clean energy industries are placed at the heart of China's forward growth strategy¹⁰⁹. South Korea expects to invest \$4 billion in renewables in 2011 alone¹¹⁰, backed by nearly \$1 billion in public investment.

Some of the biggest challenges, however, will involve addressing market capacity limits and keeping costs of capital down. Capital will only flow at scale if clear, credible, integrated and long-term EU and Member State policy and regulatory frameworks of 'investment grade' are put in place that shift the balance in favour of low carbon investment opportunities. This will require appropriate incentives to invest but also sufficient scale to both reduce technology unit costs and address risk as well as enabling the required expertise in the development and deployment of technologies to be gained. Policies must be clear, transparent and of appropriate duration. Member State governments must avoid retroactivity, but of course retain the ability to reduce support as technology costs come down. The manner in which this incentive support is tapered will be critical to maintaining investor confidence.

Ensuring financial regulation helps not hinders infrastructure investment is also crucial – and current plans for Insurance and Pension Fund regulation should be reviewed urgently to ensure they are fit for purpose over the long-term.

Finally, public banks also have a key role to play in order to build

109 This includes €570 billion of Government investment in the new energy industry and €340 billion in the energy saving and environmental protection industries. From Ng & Mabey (2011) Chinese Challenge or Low Carbon Opportunity. E3G.

110 <http://af.reuters.com/article/energyOilNews/idAFTOE70001R20110125>

confidence among institutional investors because they represent a clear alignment of financial interests between the public and private sectors. In addition, by sharing risk they can bring down the overall costs of financing projects but also drive innovation in the market – for example by acting as an aggregator of smaller scale investments or as a trusted broker of pioneering innovative financial instruments such as Project Bonds.

Historically public banks have often played a role in the transformation of economies. For example, the Sparkassen (public savings banks) in Germany helped bankroll the industrial revolution and Caisse des Dépôts et Consignations in France was founded to reorganise the French financial system after the fall of Napoleon. Like Europe's newest public bank – the UK's Green Investment Bank, whose goal is the help 'green' the UK economy – public financing institutions now have a key role to play in transforming the wider European economy. Their financial expertise and public interest mandate can act as another check and balance in the system to ensure that Member State governments effectively target scarce public money to maximise the leveraging of private capital. They can also help build confidence – by ensuring governments have 'skin in the game'.

As the UK's Green Investment Bank Commission noted in 2010: "Some argue that good government policies and waiting for the financial market to return to 'normal' after the credit crunch will be enough to deliver the necessary investment. We disagree. Even a return to the 'old normal', which is not likely, would not accommodate the unprecedented scale, urgency and nature of the challenge. The only sensible plan given the conclusion of the Stern Review is to act now to facilitate the required investment needed to safeguard our future."



E3G

In the wake of the global financial crisis there have been calls to slow European decarbonisation because it is seen as too costly. This would be a mistake. The EU, once a leader in the low carbon race, is quickly losing ground to the likes of China and South Korea and struggling to compete at a time of economic crisis. The EU is caught in a cycle from which it seems unable to escape: investment in low carbon infrastructure is needed to drive growth but European countries are unable to access the money needed to make the investment.

New analysis from E3G shows how smart use of public financial resources can help overcome these challenges. The new report, *Financing the Decarbonisation of European Infrastructure: 30 percent and beyond*, sets out a detailed analysis of the state of the problem. Then by joining together the dots of various existing policy instruments with new ideas designed to stimulate the necessary financial flows, the report presents a concrete set of proposals offering policy makers practical ways out of their current dilemma.

Recommendations include:

- Requiring the European Investment Bank to double the level of its financial activity focused on low carbon investment by 2020, combined with a presumption against high carbon investments unless they can be proven not to lead to lock-in of a high carbon trajectory.
- Ensuring financial regulation is fit for purpose and recommending an immediate review of current Solvency II and pension industry-related proposals to ensure they do not penalise long term investment in low carbon infrastructure.
- Provision of €465 to €712 billion public financing over the next 10 years to catalyse the private investment in infrastructure and deliver a 30 percent emission reduction and put Europe on a pathway to 80 percent reductions by 2050.
- Greater investment in energy efficiency – driven through effective regulation and targeted public investment.
- Adopting in 2012 a 30 percent greenhouse gas emissions reduction target by 2020 followed by a commitment to set challenging targets for 2030.