E3G response to the European Investment Bank consultation on Energy Sector Lending Policy

About E3G

E3G is an independent not-for-profit organisation, established in 2004, that works in the public interest to accelerate the global transition to sustainable development.

We build coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G founders had been working together and developing their shared thinking for several years before the organisation was constituted in 2004.

Initially undertaking high-level diplomatic activities linked to the personal experience and influence of its founders, E3G has since been gently growing its portfolio of activities. E3G now has four strategic programmes, twelve additional members of staff, and an extensive network of aligned individuals and organisations.

Submitted to the EIB on 20th December 2012. For more information on the points raised in this consultation, please contact Ingrid Holmes: Ingrid.Holmes@e3g.org

Key summary points

- With every passing year the impacts of climate change are becoming more visible, and responses within the environment showing themselves to at the more extreme end of the spectrum of possible outcomes. Against this scientific backdrop it is increasingly likely that the political response of the European Union (EU) will be to implement an economy-wide policy of at least 80% greenhouse gas emission reductions by 2050. The EIB should consider how its revised Energy Lending Policy will fit with the accompanying likely changes the legislative framework for energy infrastructure and controls on greenhouse gas (GHG) emissions.

- To meet the challenge of both driving growth and decarbonising the European economy at acceptable cost there will need to be a very significant scale up in the amount of energy efficiency financing across Europe. Thus this should become the highest priority area of focus for the EIB in its revised Energy Lending Policy.

- There is additional value beyond short-term economic gain to supporting investment in renewable energy and energy efficiency. This value comes from providing financing to technologies that risk-manage the transition a low carbon European economy effectively. As such this value should be reflected in EIB technology support decisions. This value can and should be quantified at both country and project level and should form part of a revised EIB approach to economic assessments of projects.
- The delivery of supporting enabling infrastructure and emerging technology solutions is critical to keeping transition costs down and to managing other systemic risks such as increased energy demand. As such a focus on early investment in carbon capture and storage, smart grid and demand-side innovations should also be a key focus of revised EIB Energy Lending Policy

Introduction

As noted in the Consultation Document, Energy Lending currently comprises around 20% of the EIB’s overall activities (with €10.8bn in lending within the EU and €2.8bn external to the EU). Of this, a substantive proportion of lending is to sustainable energy technologies. This is the result of two key drivers:

- A decision taken by the EIB in 2006 to provide more support for sustainable technologies;
- The financial crisis and shortage of affordable debt finance for renewables and other low carbon technology options.

The initial driver for a new focus for the EIB on ‘promoting a more sustainable and diverse energy mix’ was set out in the (2006) EIB Energy Review and led the EIB to start providing financing for renewables for the first time. This in turn reflected the European Commission’s Green Paper on ‘A European Strategy for Sustainable, Competitive and Secure Energy’ and anticipated the first 2008 European Climate and Energy Package – which set out the 20-20-20 targets\(^1\). This is an important point in the context of the current Energy Lending Consultation – which precedes a second Climate and Energy Package, the political context for which is discussed later.

In addition, in the wake of disruption of the financial system as we know it, due to the 2007 financial crash, and wider economic problems in the Eurozone, there has been a rolling back in the availability of affordable and long-term bank debt for renewables. This reflects the commercial banks’ collective response to Basel III regulation, which requires them to deleverage, but also increasing concerns about the stability of political support for low carbon investments and renewables especially. Development banks, including the EIB, have stepped into the void left by commercial banks and have increased their support. EIB lending has grown on average around 30% year-on-year since 2006, and of energy lending activity undertaken in 2011, 70% went to renewables. The EIB is now a critical player in this sector – and in 2011 was the single biggest development bank lender to renewables, at $4.8bn\(^2\). This need to provide finance to strong projects when the private sector is unable or unwilling to do so at scale is also an important point in the context of the current Energy Lending Consultation, and will also be discussed in more detail as part of this consultation response.

In addition, the EIB has played a critical role in monetising the EUAs made available under the NER300 Programme to support carbon capture and storage (CCS) and innovative renewable energy demonstrations in the EU – with the first tranche of EUA sales completed in October 2012.

\(^1\) 20% renewables energy, 20% greenhouse gas reductions by 2020.
All the above-mentioned low carbon-focused activities should be acknowledged and applauded. However, more needs to be done to support the climate change mitigation agenda – including a clear break with the past in terms of financing investments that are very harmful to the environment, such as unabated coal plant. As the bank charged with furthering the EU’s policy objectives, the EIB is ideally positioned to take a stronger lead in signalling the need to further develop the EU’s low carbon markets. In an era of limited sources of public finance to support the low carbon transition the EIB must work to more rigorously prioritise lending toward low carbon investments – which are in the EU’s collective interests to deliver and are facing the greatest challenges with respect to securing financing. This should be reflected in a substantively revised Energy Lending Policy that precludes investment in assets that lock-in high carbon emissions and in doing so is focused on delivering a zero-emission European power system in 2050.

1. General energy and economic context

(i) Particularly in the current economic climate, is there a trade-off between promoting a competitive and secure energy supply and one which is environmentally sustainable? Where should the balance lie and what implications does this have for energy sector investments?

Managing the trade-offs: EU context

There are clearly trade-offs around the three pillars of current EU energy policy – competitiveness, security and environmental sustainability. This is manifest most clearly in the debate about the future of coal and lignite-fired power generation in the European Union. On the one hand coal – if produced within national boundaries – has local energy security benefits and is cheap to build and operated. On the other hand without CCS, coal-fired power generation has very negative environmental impacts. If CCS is fitted, this will mitigate climate impacts – but also has significant cost implications. Similarly, gas-fired generation is currently considered cost-competitive – but there are concerns over its affordability in the medium term as global demand for gas increases, especially from China, and will in turn increase operational costs. Renewables are framed in some debates as non-cost-competitive – but they do offer energy security benefits and are environmentally beneficial. In addition, the debate around the high costs of renewables usually does not tell the whole story – with comparative high carbon cost analyses neglecting to factor in the substantive government subsidies provided along the fossil fuel supply chain. The 2012 World Energy outlook notes that in 2011 fossil fuel subsidies outweighed subsidies for renewables by a factor of almost 6.

Since the EIB’s last Energy Policy document was published in 2006 the science of climate change has become more stark. One report published Science in November 2012 shows that

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the world’s massive ice sheets are currently losing 344 billion tons of ice a year, three times the rate of two decades ago. Greenland's ice sheet is the most fragile — shrinking at five times the 1990s rate and accounting for most of the ice loss. Together, melting ice sheets account for about 20 percent of current sea-level rise, the glaciologists found. "Some ice sheets", a summary of the study warns, "are disconcertingly sensitive to warming". Another published in Environmental Research Letters, calculated that the sea-levels are rising 60 percent faster than the UN’s Intergovernmental Panel on Climate Change predicted in 2007, when the panel issued its last comprehensive climate report.

This has been acknowledged, at a high level at least, by the EU. In June 2012 the European Council discussed the European Commission’s DG Ener Energy Roadmap 2050, which set out options for the EU to achieve its goal to cut carbon emissions by 80% by 2050. 26 of 27 member states endorsed the conclusions. The veto imposed by Poland has thrown doubt the legal status of Council decision-making, since it could preclude the Commission bringing forward a set of proposals dubbed ‘the second energy and climate package’ for implementing the Roadmaps.

This unprecedented event has throw up a legal challenge. After an information request by WWF, the EU Council of Ministers (General Affairs) has formally confirmed that it is "unable to identify" any written basis for agreeing Council conclusions. By contrast, the EU treaties state that the Council "shall act by a qualified majority" both for general measures. The legal wrangle will continue, but this doesn’t change the fact that 26 of 27 Member States endorse further action — a fact which has been interpreted by President of the European Commission as sufficient support for the Commission to move forward with developing proposals for implementation. DG Clima and DG Ener are now collaborating on a Green Paper on Roadmap implementation that will be published in H1 2013, and which will be followed by a Communication by the end of 2013. The intention is to have an in principle decision to be taken the European Council in early 2014 to give a mandate for the Commission to prepare legislation for H1 2015.

These timings are designed to coincide with upcoming international climate negotiation deadlines. At the Durban 2011 UNFCCC climate negotiations, the EU committed along with other countries to agreeing a new comprehensive global legal agreement for the 2020–2030 period in 2015. This will necessitate a renewed and increased commitment to tackling carbon emissions within the EU.

On balance, therefore, it seems opposition from Poland is very likely to be overturned and the EU will be proceeding with a second energy and climate package focused on reducing carbon emissions by 2050 by 80%–95% and from the power sector in particular by 100% by

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2050 at the latest. Thus the primary consideration for the EIB’s forward energy lending policy should be to ensure it supports – and doesn’t undermine – delivery of these EU objectives.

Managing the trade-offs: Member State context
Beneath this over-arching objective it is feasible for governments to develop energy policies that will go some way to reconcile the three pillars. For example, it may well be possible to balance competitiveness through focused efforts to deploy energy efficiency a scale – this would balance out the higher costs of some of the supply side low carbon options (renewables etc). High carbon fossils could have a significant role in the future energy mix, but only if CCS is demonstrated successfully and steps are taken to deploy it across the system by 2050. These factors should be taken into consideration as the EIB draws up its new Energy Lending Policy.

Prioritising EIB lending to sectors least able to secure financing from the private sector
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 alone7. 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).

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. This task of shifting investors’ preferences is made more difficult in the current economic climate – when banks are deleveraging and affordable long-term debt is in short supply from commercial providers, especially for low carbon investments that are dependent on government incentives to be financially viable.

Thus at the current time, public banks such as the EIB should be prioritising lending to low carbon projects and business – which are finding it more difficult to secure affordable debt – than high carbon projects and businesses. This point is underscored by the recent news that

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7 For example Green Investment Bank analysis of the UK’s Round 3 offshore wind investment requirements shows that he two biggest projects – Dogger Bank and Norfolk Bank – are bigger than the market cap of the UK’s largest energy company Centrica. Similarly the top 7 projects by capital requirement are bigger than the FTSE 100 market cap threshold.
even in these straightened times the Carrington Power Ltd 880MW CCGT plant (owned by ESB and due to be commissioned by 2016) reached financial close in September 2012, with debt financing provided by a syndicate of commercial banks. Contrast this to the experience of sponsors of a 354 MW onshore wind project (ENEOP 2 phase 2). In late 2011 they decided to drop the commercial bank tranche in the project financing, inject more equity and continue with reduced debt financing from the EIB. The remaining commercial banks in the deal had requested margins starting at 400bp: this was prohibitively expensive for the sponsors.

(ii) How does investment in the energy sector contribute to growth and employment? Are investments in all energy sub-sectors equally valuable? And how does investment in the energy sector rank relative to other investments in the economy which support growth and employment?

In a ground-breaking 2012 report by the Confederation of British Industry it was noted that in 2010/11, the UK’s green business (i.e. looking beyond simply the energy sector) grew in real terms by 2.3% outstripping the global green business growth rate to carve out a £122 billion share of a world market worth £3.3 trillion. This growth translates into investment and jobs on the ground, with the latest government figures showing that around 940,000 people were employed in green business in the UK in 2010/2011. This is not driving growth in isolation, but is becoming mainstreamed across all sectors and region so that a third of the UK’s economic growth is likely to have come from green business in 2011/12.

Beyond this country-focused analysis, there are also strong data linking investment in infrastructure and especially energy efficiency to GDP increases. However, the overall contribution to GDP made by such investments is contingent on where the supply chain is located. For example, while wind farms may bring energy security and environmental benefits and provide substantive employment to mobile teams of construction engineers, they may often leave a limited legacy of long-term job creation.

This is increasingly being recognised as an issue in countries where supply chains are not well-established. It follows that there needs to be a stronger focus among national governments on innovation policy, including the provision of effective support for SMEs to enable supply chain scale up. This was one of the main points made by the above-mentioned Confederation of British Industry report. Innovation and SME support are already two key pillars of the EIB’s work – and are likely to need a stronger ‘green’ focus going forward.

> http://gastopowerjournal.com/projectsafinance/item/942-esb-reaches-financial-close-on-880-mw-carrington-power-plant-project

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


For example the proposed Druim Bra wind farm in Scotland proposes 69MW installed capacity would create 975 full time equivalent job years over the lifetime of the wind farm project. However it will create only two full time permanent roles: these are linked to maintaining recreational access to the land, which is provided as a community benefit.
Some Governments – notably Germany and Denmark – have already understood these issues. Germany in particular provides strong support for innovation and future growth which help it to remain ahead of EU rivals. Others have been slower to respond, but opportunities still abound and while not every European country will become a leading green technology innovator, they may obtain spillover benefits from those that do. Examination of the Vestas wind turbine supply chain shows that, while production is centred in Denmark, significant components of the generator, blades, control systems and towers are sourced from elsewhere in Europe\(^{12}\).

Demand side investment in energy efficiency improvements have notable substantial and diverse local job creation potential. This is because improvements can be implemented wherever energy is consumed in the production process: it can include improvements to major infrastructure, residential and commercial buildings, equipment used in residential and corporate buildings, and transport required for logistical purposes. Installation of energy efficiency improvements tends to be implemented on a localised basis, by engineering, construction and installation companies.

Of 27 member states, 16 have experienced a 5 per cent or more rise in their unemployment rates between 2007 and 2011 – four of which experienced greater than 20 per cent rises. Enhanced energy efficiency investment – with its ability to create jobs locally – is an especially attractive way to tackle the high levels of cyclical unemployment occurring since the onset of the global financial crisis. Using the long-term average unemployment rate as a crude proxy for the natural rate of unemployment in the European economy, unemployment rates in the European economy are currently above their estimated natural rate. Energy efficiency cannot reduce the natural rate of unemployment but during economic busts governments often implement economic stimuli to increase economic growth and domestic employment. This can take the form of a monetary stimulus – reducing interest rates\(^{13}\) – or a fiscal stimulus – increasing government spending and/or reducing tax. Traditionally, fiscal stimuli involve road-building programmes\(^ {14} \) because the construction sector of most economies is the first and worst sector to be hit by economic crises\(^ {15}\). Instead of implementing a high-carbon fiscal stimulus like road building, a low-carbon fiscal stimulus that is focused on improving economy-wide energy efficiency has the potential to create favourable conditions for more economically and environmentally sustainable economic growth\(^{16,17}\).

\(^{13}\) This also has the effect of devaluing the domestic currency to make exports cheaper and more attractive
\(^{15}\) [http://go.worldbank.org/9ZKOLN000](http://go.worldbank.org/9ZKOLN000)
In some cases jobs related to implementing energy efficiency improvements are more labour intensive – i.e. less productive – than alternatives and this might reduce whole economy output. However, in the current demand-deficit environment this is not an issue – and may actually generate an advantage in terms of job creation and boosting income\(^\text{18}\). It should be noted also that many jobs in this sector involve the deployment of innovative technologies – including high-tech industrial process technology; district heating and combined heat and power systems; smart meters and smart grid; advanced heat pumps; laser measurement technologies; and infrared technologies to assess thermal loss from buildings – that enhance productivity and so should be encouraged. In parallel to running programmes focused on retrofitting for energy efficiency improvement, therefore, EU economies should focus on driving innovation and growth in higher productivity sectors to avoid low-skill and low growth lock-in. The ability to retain such high productivity sectors within the economy again depends on successful industrial policy.

Theoretically, energy efficiency improvements have the potential to reduce ‘frictional unemployment’ (i.e. temporary unemployment as workers move between jobs\(^\text{19}\)) because energy efficiency improvements can be implemented with a wide geographic spread and jobs tend to be localised\(^\text{20}\). Given that one of the key factors determining the length of time that people are between jobs is the ability/inability of individuals to search for jobs that match their skills and geographic location\(^\text{21}\), energy efficiency improvement programmes increase the likelihood that blue-collar (construction/installation workers, electricians, plumbers and so on) and white-collar (engineers, surveyors and so on) workers will be able to find work.

\(^{17}\) It should be noted, however, that as with almost all fiscal stimuli, there would be a lag between the establishment of a new policy and realised job creation. This is generally the time taken to scale-up the financial, skills base (education and training) and institutional capacity and time for technology to diffuse through the economy. See I. Holmes (2012) Financing the Decarbonisation of European Infrastructure: 30 percent and beyond. See http://www.e3g.org/images/uploads/E3G_Financing_the_decarbonisation_of_Europe_February_2012.pdf.

\(^{18}\) D. Zenghelis (2011) A macroeconomic plan for a green recovery, Grantham Research Institute on Climate Change and the Environment Policy Paper

\(^{19}\) There are many reasons why workers may look for new jobs, including redundancy, the desire for higher wages, the desire to simply do something different. The length of time that people are between jobs is broadly a shaped by their ability to match their skills and geographic location to available jobs – but it can also be related to the amount of unemployment benefits that can be claimed, emotional or physical problems and so on


\(^{21}\) Many European economies are extensively driven by the services sector – retail, financial, consultancy, management and so on – which are geographically concentrated within urban and semi-urban areas. This can isolate employment opportunities in such sectors to urban- and semi-urban-dwelling segments of the population
There is a theoretical risk that shifting the European economy to become more efficient (and more generally a shift from a high to a low carbon focus) could create structural unemployment, reflecting a mismatch of skills in a changing economy, because it represents a distinct shift in overall employment demand in the economy. In economies operating near capacity economy-wide this means jobs created through energy efficiency and other low carbon policies will crowd out alternative jobs and investment through competitive pressures for staff and capital in tight markets. However in the current demand-deficit environment this is not an issue because there is currently a high level of cyclical (i.e. demand-deficient) unemployment.

Overall the number of fossil fuel-related jobs lost are likely to have limited impact on European unemployment totals because the EU-27’s imports of primary energy exceeded exports by some 952.3 mt in 2010, with more than half of energy imports coming from countries outside the EU. For example only 14.8 percent of crude oil and 37.6 percent of gas consumed in the EU was actually produced within the EU in 2010. In addition, 24 out of 27 EU Member States (including Poland) were coal importers in 2010 – with data from 2011 showing total EU-27 coal consumption exceeded coal production by 189 Mt. These data suggest that the majority of job losses in the fossil fuels industry will likely be borne by non-EU member states such as the OPEC nations, the Russian Federation and others and the main coal-exporting nations such as Colombia, USA, Australia, Indonesia and South Africa. Regardless of the crowding-out effects, as finite fossil fuel stocks – notably that of oil but also gas in the future – decline, job losses in the fossil fuels sector are inevitable.

In terms of new jobs, there are several estimates of the employment creation potential of energy efficiency investment programmes. The EU Energy Efficiency Plan states that 2 million jobs will be created in the EU buildings sector by 2020 if EU targets are achieved. An analysis by the European Trade Union Confederation estimates that up to 2.59 million jobs could be created in the EU buildings sector by 2030. These estimates include the direct employment effects – those blue-collar jobs created within the buildings retrofit installation sector – as well as the indirect employment effects – those manufacturing and white-collar jobs created along the buildings retrofit supply chain. An illustration of potential job creation and loss in energy efficiency improvements in the buildings sector is presented in Figure 1.

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22 Structural unemployment occurs as a result of shifts in overall demand in the economy. These could be driven by factors such as technological innovation attracts demand to new sectors or policy changes that demote attractiveness of particular sectors
The creation of a new energy efficiency improvement installation sector also offers a new source of tax revenue for governments. This includes revenue from direct taxes such as corporation and income taxation but also indirect taxation such as value-added tax (VAT) on construction and installation services. Research by KfW Bankengruppe shows that for every €1 of public funds spent on its Energy-efficient Construction and Refurbishment programme in Germany in 2010, the Federal Government received €5 in tax revenue\textsuperscript{27}. In total, the programme produced €5.4 billion in direct tax revenue from companies and employees in 2010. Additionally, the 340,000 jobs created by the programme in the same year reduced government spending on unemployment welfare payments, saving €1.8 billion in 2010. KfW Bankengruppe’s Energy-efficient Construction and Refurbishment programme offered €8.9 billion in promotional loans, which crowded-in further private sector investments worth €21.5 billion in 2010. The programme achieved returns of 12.5 percent on investment, which enabled KfW Bankengruppe to offer 1 percent subsidies on their loan interest rates.

This example illustrates the potential for energy efficiency programmes to generate substantial revenue for governments – a particularly attractive opportunity for economies that are currently operating under capacity. However, it will be important to consider revenue losses that may arise elsewhere as a result of structural change to the economy –

an effect that is likely to be more pronounced in economies running at near optimal capacity.

(iii) What impact do you consider the current economic crisis will have on the energy sector (demand, policies, supply)?

Policies

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 has created huge uncertainty with respect to forward investment in the energy sector. Fiscal austerity combined with concerns about overly generous technology support in the face of falling costs means that in many Member States support for renewable technologies has been lowered – sometimes retroactively, which is especially damaging to investor confidence. While some market adjustment should have been expected as deployment of key technologies such as solar and onshore wind start to achieve scale and mainstream, in many cases the messaging an implementation of adjustment to incentives has been very poorly handled.

However, slowing down the pace of EU decarbonisation is a strategic 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 barrel28, 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 elsewhere29. 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 GDP30.

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

28 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.

29 http://www.ft.com/cms/s/0/2610abd2-0b8a-11e1-9a61-00144feabdc0.html#ixzz1dPKJ5czG

30 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
has now adopted for GHG reduction. Europe is now clearly off-track to reach its 2050 GHG reduction goals, and delaying action to get back on track 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 growth31, 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 economy32. In addition, and reflecting lowered output from the European economy as a result of the recession, the European Commission expects that, for example, a move from a 20 percent to a 30 percent target would cost only 0.2 percent to 0.3 percent of GDP33.

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 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 201534. 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

31 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 1, pp. 23–28; 31–34.
33 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 $105bbl (Bloomberg, ibid).
about 10 percent by 205035. It is therefore a false economy to reduce expenditure in these areas while fossil fuel imports continue to cost the European economy hundreds of billions of US dollars per year36.

Thus the focus of governments now needs to 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.

The damage done to investor confidence through retroactive adjustment of FiTs etc will have to be effectively addressed going forward – and makes parri passu public coinvestment ever more important in the process of rebuilding confidence. But in addition, multilateral development banks such as the EIB also have a critical role in achieving the scale of finance needed – the majority of which must come from the private sector.

Impact on finance available for supply and demand-side measures

On the financing side, the combination of constrained utility balance sheets; the huge amount of investment needed; rating agency treatment of project debt as being on balance sheet; constrained debt long term debt markets; and – in the case of renewable energy – sceptical equity markets and the historic underperformance of wind projects in particular means questions are increasingly being asked about how the scale of finance necessary can be achieved.

New solutions are emerging with examples of energy companies working directly with institutional investors to share risk and in so doing securing direct investment in projects37. This is already happening in other areas of infrastructure38. The UK’s Green Investment Bank is looking at options around accelerating capital recycling – i.e. facilitating the refinancing of operational projects to long-term investors. Some are even talking about the eventual disintermediation of the banks from the energy – while this is unlikely to happen across the board it is possible that as technologies mature institutional investors increasingly become involved in financing of both projects in construction and operational projects, as they search for long-dated assets that provide yield to match their long-dated liabilities.

Public banks, including the EIB, therefore have a key role to play in accelerating this process through acting as an ‘honest broker’, sharing risk and reducing costs to accelerate

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36 In 2010, a year of record oil prices, the EU spent a total of $297 billion on crude oil imported from outside the EU.
37 Walney UK offshore Windfarms Ltd, the company behind the construction of Walney 1 and Walney 2 both (total capacity 367.2MW) is jointly owned by Dong Energy, SSE and OPW – which is jointly owned by Dutch Pension Fund PGGM and Ampere Equity Fund.
38 Omers acquired the UK HS1 rail network in the UK for £2.1bn in 2010 via its infrastructure investment arm Borealis Infrastructure.
investment into and evolution of financing structures for low carbon energy technologies both on the supply and the demand side.

2. Renewable energy

(i) The Bank’s economic justification for supporting emerging renewable energy technologies, whose cost is significantly above that of conventional and mature renewable energy technologies, is that continued investments in these technologies will eventually lead to cost reductions and will ultimately be the least-cost approach to meeting the EU’s renewable energy targets. Do you agree with this approach? Is there an alternative approach to the economic justification of these technologies which you consider more appropriate?

The cost resilience of consistent and steady deployment of renewable technologies is a valuable asset in risk-managing cost and price volatility within the power system. Analysis recently undertaken by E3G looked at the risks and costs of power sector decarbonisation through different technology pathways in key European markets, Germany, Poland and the UK with a view to 2030. Overall, continued technology support for renewables enabled a more predictable and resilient power sector decarbonisation of the case study countries in 2030. For example, in the UK a renewables-heavy electricity mix would cost British consumers and industry more than a gas-heavy one, but it would carry a much lower risk of price shocks and policy delivery.

Therefore, it is more appropriate to think of renewables deployment in terms of their role in risk managing potential structural failures and price uncertainties. The future costs of many key low carbon technologies remain uncertain and, for some technologies, events might make costs extremely high or even prevent the deployment of the technology. For example, CCS is a potentially very significant technology but faces significant challenges for large scale deployment in the next decade. Similarly, the output from nuclear power plant is at risk from strict safety regulations that might follow an accident and/or increase in public concern. In the meantime, some renewable technologies are nearly cost-competitive with traditional fossil-fuel generation (e.g. onshore wind) while others (e.g. offshore wind) are expected to remain relatively expensive in the foreseeable future. Nevertheless, least-cost approach as commonly referred to is generally an output of static analysis. E3G analysis shows that there is no absolute least cost option and it depends on a set of underpinning and largely uncertain circumstances. For example in the UK, if CCS technology fails or no new nuclear is built, a renewables-based electricity system would be cheaper than a gas-heavy one.

Also, renewables involve a family of different technologies at different levels of maturity. Therefore, a portfolio of renewable technologies would be needed to manage overall

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delivery risks. Further support for Research & Development and Demonstration (RD&D) and innovation will be critical for reducing the cost of some key renewable technologies.

The analysis undertaken by E3G demonstrates that the value that comes for supporting technologies that assist in risk-managing the transition can be quantified through modelling. We would welcome the opportunity to discuss with the EIB how this approach could be incorporated into future economic assessments of energy projects.

3. Energy efficiency

Very significant scale up in the amount of investment in energy efficiency is critical to driving sustainable growth but also to risk-managing the transition to a low carbon European economy and in managing costs to end-users. As such it should be considered a priority area of focus for EIB activities going forward.

(i) What do you think are the main barriers to energy efficiency investments? What might be done to overcome these?

Addressing the gap between potential and realised energy efficiency investment represents a key element of successfully risk managing the EU’s transition to a low carbon economy. It is a core part of enabling the EU to meet its binding 2020 and indicative 2050 emission reduction targets in a cost-effective and timely fashion. Failure to do this will mean the gap must be filled instead with higher cost supply side solutions. E3G power sector analysis showed that electricity demand was consistently the most critical uncertainty affecting the costs and risks of policy delivery in case study countries. Delivering electrical efficiency emerges as a key ‘risk reducer’. For example, In the UK, failing to deliver electrical efficiency, could result in a 14–44% increase in costs to consumers.

One of the difficulties in assessing the energy efficiency gap is that – unlike building power stations – the opportunities for efficiency improvements are fragmented and often hidden. That said, there is no doubt that energy efficiency represents the largest untapped opportunity for emissions reduction in the EU and could deliver up to 33 percent emission reductions across the EU economy by 2020. Buildings alone account for 40 percent of the EU’s final energy consumption and have been identified by the European Commission as a substantive opportunity to deliver greenhouse gas (GHG) cuts. 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 target. Looking beyond 2020, analysis by DG Clima estimates €4.25 trillion is needed for energy efficiency investment across the economy between 2011 and 2050 in order to meet an 80 percent EU greenhouse gas reduction.

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A study by Fraunhofer et al estimated that the potential reduction from the EU27 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.

Fraunhofer ISI and Ecofys (2011) The upfront investments required to double energy savings in the European Union in 2020
target\textsuperscript{42}. DG Clima’s analysis states €759 billion needs to be invested between 2011 and 2020 – and a steady increase in investment is assumed over the following decades to peak at €1.38 trillion between 2041 and 2050.

Yet despite the undoubted huge potential, energy efficiency continues to rank at the lower end of the spectrum of realised sustainable energy investment opportunities. The abundance of the investment potential and – according to the Marginal Abatement Cost (MAC) Curve by McKinsey & Co\textsuperscript{43} – the supposed modest costs of energy efficiency compared to power generation investments indicates that there are very significant barriers realising the potential of energy efficiency.

The high level barriers to energy efficiency investment are numerous and have been well-documented. For a good summary refer to the IEA’s report “Mind the Gap\textsuperscript{44}”. Many of the barriers are most effectively addressed within a national political/legislative context – for example provision of information on energy use/management and technology choices; split incentives (which can be addressed through regulation\textsuperscript{45}); the opportunity cost of capital (which can be addressed through the use of incentives and/or regulation\textsuperscript{46}); weak price signals (which can be addressed through the removal of fossil fuel subsidies and a stronger carbon price\textsuperscript{47}). However the EIB has got a significant role to play in one very significant

\textsuperscript{42} This DG Clima estimate is based on a scenario in which there is effective (scalable) and widely accepted (diffused) clean technology, fragmented global efforts to address climate change and are high fossil fuel prices. The report identifies that the majority of climate action in residential, services and transport sector of the EU will be in the form of energy efficiency improvements. In light of the lack of specific data on required investments in energy efficiency improvements in the EU and on the basis of the former statement, it is assumed that required investment in energy efficiency is equivalent to the required investment in the residential, services and transport sector of the EU i.e. €4.25 trillion between 2011 and 2050. European Commission (2011) A Roadmap for moving to a competitive low carbon economy in 2050: Impact Assessment, p120–124. See \url{http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri =SEC:2011:0288:FIN:EN:PDF}


\textsuperscript{44} \url{http://www.iea.org/publications/freepublications/publication/name,3747,en.html}

\textsuperscript{45} For example requiring the retrofit of buildings that fall below a minimum expected energy performance standard. Under new legislation in the UK, for example, private landlords will be required from 2018 to improve the efficiency of dwellings rated F or G.

\textsuperscript{46} Incentives includes cashbacks, grants, subsidised interest rates etc.

\textsuperscript{47} It has been well documented that some EU countries subsidise fossil fuel energy production and distribution, although some efforts are being made across the EU to phase them out. In March 2012 EU Climate Commissioner Connie Hedegaard joined a long line of individuals and institutions calling for the phase out of such subsidies ahead of the June 2012 Rio+20 Summit. But in addition, in several Member States – for example Spain and Estonia – consumer energy tariffs are set below the cost of production. Artificially low energy prices are a key driver for inaction on energy efficiency since they inherently weaken the economic case for investment. They also undermine the prices signals that the carbon price was meant to deliver to the market.

When the EUETS was introduced in 2005 it placed a price on carbon by setting a limit on the amount that can be emitted within the traded sectors. It was hoped that as well as limiting future fossil fuel investments the carbon price would drive up electricity unit costs and so incentivise investment in
market barrier: access to affordable capital to address high upfront costs. It can also, with an ongoing source of donor funds, play a role in addressing information barriers through the provision of subsidised energy audits.

With the passing of the Energy Efficiency Directive (due to come into force on 4 December 2012), there is now a stronger focus on delivering energy efficiency across Europe and this should be reflected in EIB priorities and capital allocation to this sector.

(ii) What role can Energy Service Companies (ESCOs) play in developing energy efficiency investments?
ESCOs, as providers of energy management services and systems, have the potential to address barriers around access to information about the most appropriate technology solutions. Through providing energy service contracts they can also address concerns about energy cost savings being delivered. They have been very successful providers in the US market and their use is growing in the EU market. However they are not a ‘silver bullet’ for solving all delivery and financing issues. When considering their ability to deliver in the European context, the following points should be borne in mind.

Access to a pipeline of large projects that can be transacted on the reasonably standardised basis – A large majority (>80%) of the projects implemented in the US by ESCOs occur in the municipality-university-school-hospital (MUSH) market. This is because of the lower transaction costs stemming from larger deal size (typically greater than $5 million) and more standardized procurement procedures that MUSH institutions have used for decades compared to companies occupying commercial properties and/or industrial facilities. Thus they are likely to be most useful for improving the energy efficiency of public buildings compared to other building stock.

Financing does not need to be provided as part of the package – One of the primary reasons ESCOs have been so eager to engage with this sector has been the capacity and willingness of customers to self-finance the capital investments without the ESCOs needing to risk their own funds. Institutions in the US MUSH market can frequently draw on their endowments, capital budgets or operating budgets to pay for such capital investments or even tap funds for deferred maintenance or additional reserve accounts slated for energy efficiency projects. In so doing, the institution essentially takes equity ownership in the project—ownership that may be either complete or partial and supplemented by an additional external financing strategy such as a capital lease or debt mechanism provided by

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least-cost energy efficiency reductions. However, to date it has not impacted sufficiently on energy prices to drive the scale of energy efficiency investments that might have been expected in a rational market. In part this is because carbon prices, and so fossil fuel-generated energy prices, have been much lower than expected. In turn this is due to the initial over-allocation of permits but also the ongoing economic recession, which has lowered output. It is expected that more investment in energy efficiency will occur as carbon prices rise in response to a tightened cap.

a financial institution familiar with ESCO contracting in the MUSH market. An alternative
self-financing approach used in the MUSH market is a revolving fund structure. In this
model, the institution earmarks a specific sum of money for a capital pool that is lent out to
different groups and/or building occupants applying for energy efficiency project funding. As
the projects begin to recover operational cost-savings, those resources return to the capital
pool and can be redeployed to fund new projects.

There is currently (for the most part) not a culture of creating revolving funds that can be
drawn down to support ESCO-led investment in the EU. The scale of ESCO success will
depend on whether and how this is addressed. The EIB will continue to have a role to play
(for example through provision of facilities such as JESSICA) but scaling the market will rely
on new capital providers emerging – both national public banks and private sector investors.
In addition, because of the long-term nature of the investments, steps will need to be taken
by governments and public institutions such as the EIB to kick-start secondary markets for
such loans to catalyse the recycling of capital into new investments (through loan
securitisation for example).

The Energy Efficiency Directive coming into force on 4 December 2012 may well accelerate
this process: Article 5 requires 3% refurbishment of the publicly owned and occupied
national building stock in all Member States. This will be a challenging target – but one that
would seem to well suit the ESCO market, providing that governments can help develop
sources of capital to underpin those investment requirements.

(iii) What is the potential for energy efficiency outside Europe?
As set out on the IEA’s 2012 World Energy Outlook, there is very significant potential for
global improvements in energy efficiency; however only a small part of its economic
potential has exploited thus far. Additional investment of $3.8tr to improve energy efficiency
in end-use sectors is needed over 2012–2035, an average of $158bn per year. Yet of the
$19.2bn spent globally on clean energy in 2011, less than 7% went to energy efficiency.\(^\text{50}\)
Moreover, this investment was focused mainly on corporate research and development,
venture capital and private equity, indicating that investment in renovation projects in the
real economy were limited. Much stronger policies are needed to realise its full potential
and deliver significant economic, environmental and energy security gains.

(iv) Do you consider the criteria used by the Bank to categorise projects as Energy
Efficiency projects appropriate (see Annex 1)? What alternative would you propose?
The Bank currently requires projects to be able to demonstrate that they will reduce energy
consumption by at least 20% compared to the situation before their implementation, or
ensure that energy savings resulting from the project account for at least 50% of the
investment cost over the projects life.

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for public action
The market for energy efficiency is at a much earlier stage than that for supply side options. This is reflected in the relatively low levels of EIB lending to energy efficiency projects to date, which have around one-third of the volumes of lending to renewable energy. This should be set to change with a combination of an increased focus by Governments in creating demand and facilitating financing (driven by a need to implement the EED and the increased availability of funding through the Structural Funds – of which 20% is currently ear-marked for climate and energy) combined with rising energy prices stimulating greater interest in loans. However the pipeline is not there yet. As such the current requirement for projects to reduce energy consumption by at least 20% compared to the situation before their implementation – or ensure that energy savings resulting from the project account for at least 50% of the investment cost over the projects life – should be retained with the following caveats:

- Unabated coal and lignite plant – including CHP projects – should be excluded entirely on the grounds they represent a risk of high carbon lock-in.
- In the event that a strong pipeline of energy efficiency projects for financing emerges that, an additional public value test should be developed and applied that prioritises investment in transformational rather than incremental projects (i.e. significant energy savings well beyond the current 20% threshold).

4. Security of supply

(i) Is the traditional model for electricity transmission and distribution changing? What implications does this have for future investments in electricity networks?

The role of electricity networks is changing substantially as a result both of the transition towards a low carbon power system and of new European market arrangements. This places new demands on transmission and distribution systems: investments in networks are sought not only to ensure security of supply, but also to enable European power market integration and to serve as a system flexibility resource in response to the integration of variable renewable power sources. This can occur both by linking neighbouring markets (in the case of transmission) and by enabling demand-side participation through ‘smart grid’ distribution-level investments51.

As a result large quantities of electricity network investment are foreseen across Europe in coming years. The DG Clima Roadmap 2050 suggests that rates of overall grid investment would need to double by 2025 and triple by 2040. Electricity TSOs are currently planning to increase their rate of investment by 70% out to 202052. However, while the overall cost of the upgrades remain minor relative to generation investment requirements, this would nevertheless require large amounts of capital investment, in the range of €114bn–€184bn by 203053. The DG ENER decarbonisation scenarios point to between €273bn and €420bn of transmission investment out to 2050.

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51 IEA ‘Harnessing Variable Renewables’
52 Roland Berger 2010
53 ECF Power Perspectives 2030
(ii) What is the future role of smart grids, offshore grids and energy storage solutions?

‘Smart grid’ investments at the distribution level are particularly important for enabling decentralised generation. Investments requirements for distribution grids are several times larger than transmission grids and could exceed €700bn by 2030 and €1.4trn by 2050\(^5\).

‘Offshore grids’ are needed both to connect offshore wind farms to shore and to help to manage variability through interconnecting power markets around the North and Baltic Seas region, and there may be particular value from integrated projects that can fulfil both of these functions. A 2010 assessment by KEMA for the European Commission suggested that €32.8bn of investment in ‘offshore wind power network infrastructure’ would be required by 2020 and up to €99.8bn by 2030 in the high RES case. ENTSO-E projects up to 8000 km of high voltage offshore transmission lines in the North Seas region over the next 10 years.

However such investments will need to take place in the context of challenging new financial, regulatory, operational and delivery environment and major changes are needed. Most existing regulatory regimes for electricity network investment were designed in a different era in which infrastructure investment was predominantly national rather than European; grid technologies were less flexible; power flows were more predictable and unidirectional; and transmission was expected to be developed incrementally rather than rapidly.

By contrast, the new regulatory environment will need to be address new specific challenges including:

- **Scale, speed, deliverability:** The pace of electricity infrastructure development foreseen considerably outstrips recent build rates and puts pressure on delivery systems. This is particularly challenging for new infrastructure types such as smart grids, electricity highways and integrated offshore grids, where new infrastructure systems will need to be created over relatively short timeframes – an issue not only of physical construction but also of developing governance and system planning regimes and delivery frameworks.

- **Predictability and uncertainty:** While the overall importance of infrastructure is clear, there are large differences in infrastructure requirements between different decarbonisation pathways, and major risks and uncertainties facing investment in specific projects. However electricity networks often take longer to develop than generation assets, often requiring a degree of anticipatory investment.

- **Consistency:** Differences in approach between jurisdictions (e.g. EU vs member states, or between member states) and between infrastructure types (e.g. electricity vs gas vs CO2) further clouds the picture of what infrastructure is needed and forms a potential barrier to delivery.

There is a role for public finance sources and institutions such as the EIB in managing each of these challenges. These include:

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\(^5\) DG ENER Roadmap 2050
• Using public sources of funding to leverage higher volumes of private capital into this space, thereby addressing market capacity limits, for example through the use of EU Project Bonds;
• Helping to address future uncertainty triggered by policy risk through coinvestment; and
• Working as an ‘honest broker’ to overcome the specific risks and challenges associated with cross-border collaboration, for example through instruments such as the Connecting Europe Facility providing incentives to projects where the benefits are primarily regional rather than national.

5. Fossil fuel

(i) Gas is an important bridging fuel source in the transition to a low carbon economy: to what extent and under what conditions should gas-fired generation be supported?

The December 2011 European Commission Energy Roadmap 2050 identified the need for CCS to be deployed on both coal and gas. Roadmap scenarios set out an anticipated significant ramp up of gas power with CCS and indicated it will be of greater importance than coal CCS within two decades. However there are multiple hurdles to CCS deployment, creating risks of ‘carbon lock-in’ or ‘stranded assets’ for unabated gas power plant. Chief among these is the current absence of a clear business case for investment in gas CCS, given uncertainties around technology, carbon prices and potential load factors. Another hurdle is the absence of robust economic incentives to support the additional high capital and operating costs associated with CCS. In addition, practical challenges could limit the deployment of gas CCS. In particular, it must be practical to capture CO2 at individual gas plants, and transport it to storage sites with sufficient capacity.

E3G analysis55 showed that the policy delivery risks were very different in the three countries investigated, due to different levels of emphasis on their power sector and opportunities for significant abatement materialising at different times due to different capital stock and retirement plans. Both in Poland and Germany, there remains significant potential for delivering policy objectives through coal to gas switching alongside steady renewables deployment.

However the analysis also highlights that there may be potentially larger risks to industry and consumers under a gas-heavy compared to a renewables-heavy decarbonisation pathway. The availability and subsequent deployment of CCS on gas at commercial scale was identified as a key enabling technology if significant levels of gas generating capacity is to be compatible with decreasing carbon budgets. Of the three countries analysed by E3G, the UK power system seems to be more vulnerable to gas overinvestment than Germany and Poland, and carries a significant risk of stranded assets. In the UK, coal to gas switching is not sufficient to deliver the 2030 decarbonisation policy objectives – and so significant investment in new low carbon assets is needed. The analysis also showed that in the UK, under central assumptions, power sector costs in a gas-heavy pathway are lower, but there

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55 Zorlu, Skillings, Mabey and Littlecott (2012)
are higher cost and policy delivery risks compared to a renewables-based pathway\textsuperscript{56}. The analysis included scenarios where power sector costs increased by up to 98\% by 2030 driven by very high carbon prices. Similarly, costs to consumers also tend to be more subject to asymmetric risks in a gas-heavy electricity system. The study modelled scenarios where wholesale costs more than doubled in more extreme cases. In comparison, where technology specific support to renewables continued, power sector costs were more predictable with a maximum increase of 8\%. The analysis also showed large uncertainties as to the level of gas demand under a carbon price approach, raising questions of the level of investment required in gas infrastructure.

Therefore, the key challenge is to ensure that countries have long term strategies for delivering decarbonisation and other policy objectives. Given the future is uncertain, effective decarbonisation strategies must involve identification of the key delivery risks and plans to manage these risks.

Given the Energy Roadmap 2050 stipulates a move to 80\% carbon emission reductions by 2050, the principle risk with respect to investment in gas infrastructure is the risk that CCS technology does not work at all or is not proven to be commercially viable for gas plant, resulting in stranded assets as a consequence of requirements being imposed to accelerate the retirement of gas plant and replace them with alternative low carbon energy sources and/or increased energy efficiency improvements (discussed in more detail later). It follows therefore that when considering investment in gas-fired plant, the EIB should undertake an assessment of carbon capture readiness that includes assessing the potential to apply CCS to the site but also whether that site provides access to CO2 transportation and storage infrastructure. Annex 1 gives an example of a meaningful CCS-readiness assessment.

While different Member States will have different power sector decarbonisation trajectories, it is a prudent early step to consider the risks of lock-in of gas generating and transmission infrastructure to locations that are unsuitable for the deployment of CCS. Such an approach would thereby aid the identification of appropriate locations for proposed gas-fired (and also coal and lignite-fired plant) and should be included in the selection criteria.

Analysis undertaken by Element Energy\textsuperscript{57} on the practical potential for gas CCS in 2030 identified that over 60 per cent of the likely European gas power plant fleet will either not have been assessed for capture readiness or will face difficulties in accessing CO2 storage. The research also highlights that there is a large gap between the conditions that define minimal and meaningful capture readiness of gas plant currently. These issues highlight the risk of new investments locking in generating plant to locations unsuitable for CCS and increasing the future costs of decarbonisation.

\textsuperscript{56} When tested against a set of uncertainties such as higher electricity demand (for example, due to failure in delivering electrical efficiency improvements).

Finally, since key enablers for CCS (on both power plant and industrial emitters) are the availability of CO2 infrastructure and the early characterisation of CO2 storage, the EIB should consider playing a more significant role facilitating the development of CO2 networks.

(ii) What role will coal and lignite fired generation have in the EU power system in the medium term, with or without CCS, and how is this consistent with the EU’s Climate Action goals and its security of supply objectives?

Coal- and lignite-fired generation will have no role without CCS – and should not be supported by the EIB. With CCS there is more scope for such plant, which can also make a contribution to security of supply objectives, including through the production of hydrogen which can be used for energy storage.

(iii) What will be the role of local coal supplies as input for highly efficient CHPs?

Given plant lifetimes, it is increasingly difficult to justify coal-fired CHP without CCS.

(iv) What evaluation criteria should the Bank use to assess the economic, environmental and financial viability of coal and lignite fired generation?

The existing EIB criteria for financing coal and lignite plants are that projects are only eligible if they:

- Replace existing coal/lignite plant and involve a decrease of at least 20% in the carbon intensity of power generation; and
- Use Best Available Technology; and
- Are carbon capture ready.

Since 2007, the EIB has disbursed €1.88bn in funding to coal-fired plant including the following projects:

- Advanced Coal-Power Plant Du-Walsum in Germany, €397m (2007);
- PPC Environment in Greece, €80m (2007)
- Enel Energia Rinnovabile & Ambiente in Italy, €90m (2007)
- TES - THERMAL Power Plant Sostanj in Slovenia, €110m (2007)
- Power Plant Karlsruhe in Germany, €500m (2008)
- Fortum CHP And E-Metering in Poland, €100m (2009)
- SE Power Plant And Forest Industry R&D, Poland €65m (2010)
- TES - Thermal Power Plant Sostanj B, Slovenia €440m (2010)
- South Poland CHP in Poland, €68.1m (2011)
- Paroseni Power Plant in Romania, €32.7m (2011)
- TES - Thermal Power Plant Sostanj B, Slovenia €440m (EIB financing secured pending state loan guarantee, which was put in place on 6 December 2012)

As noted previously, since the last Energy Policy document was written in 2006 the science of climate change is stark and this has been reflected in the political and policy debate about how best to respond to climate change. On balance therefore, it seems likely that the EU will
go ahead with implementing a second energy and climate package aiming to deliver a zero emission power sector by 2050.

This indicates that EIB’s coal policies need to be considerably tightened up. The default position for the EIB should be that when assessing investment opportunities, if it cannot be proven that the investment will not lead to lock-into a high carbon trajectory in a specific member state or accession country, the investment should not go ahead. This is because the changing political landscape presents financial risks to the EIB if consideration is not given to the carbon emissions from assets over their lifetime and against declining European carbon targets.

More specifically it means that the EIB should no longer fund unabated coal and lignite-fired plant. The exception would be if such plant were proposed as part of a CCS demonstration package – which could be considered for financing as part of the R&D tranche of the EIB’s work.

(v) What is the scope for development of shale gas resources in the EU?
Advances in upstream technology have led to a surge in the production of shale gas in North America in recent years, holding out the prospect of further increases in production there and the emergence of a large-scale shale gas industry in other parts of the world, including within the EU. The boost that this would give to gas supply would bring a number of benefits in the form of greater energy diversity and more secure supply in those countries that rely on imports to meet their gas needs, as well as global benefits in the form of reduced energy costs. However, a bright future for unconventional gas is far from assured: numerous hurdles need to be overcome, not least the social and environmental concerns associated with its extraction.

Producing unconventional gas is an intensive industrial process, generally imposing a larger environmental footprint than conventional gas development. More wells are often needed and techniques such as hydraulic fracturing are usually required to boost the flow of gas from the well. The scale of development can have major implications for local communities, land use and water resources. Serious hazards, including the potential for air pollution and for contamination of surface and groundwater, must be successfully addressed. Greenhouse-gas emissions must be minimised both at the point of production and throughout the entire natural gas supply chain. Improperly addressed, these concerns threaten to curb, if not halt, the development of unconventional resources.

According to a recent IEA report, the technologies and know-how exist for unconventional gas to be produced in a way that satisfactorily meets these challenges, but a continuous drive from governments and industry to improve performance is required if public confidence is to be maintained or earned. The industry needs to commit to apply the highest practicable environmental and social standards at all stages of the development process. Governments need to devise appropriate regulatory regimes, based on sound science and high-quality data, with sufficient compliance staff and guaranteed public access to
information. Although there is a range of other factors that will affect the development of unconventional gas resources, varying between different countries, our judgement is that there is a critical link between the way that governments and industry respond to these social and environmental challenges and the prospects for unconventional gas production\textsuperscript{58}.

\textbf{(vi) Given the large uncertainty on future gas demand, what is the risk that investment in natural gas infrastructure may be stranded?}

Gas infrastructure has many dimensions. New transmission pipes may be required to meet perceived increases in bulk gas consumption. Local gas networks might need to be reinforced to cope with increases in local gas usage – say for space heating in residential properties. Investments to improve the ability of the network to cope with fluctuating demand for gas, such as storage, might also be required.

All of these investments might be required but it is difficult to imagine scenarios in which they are all utilised efficiently. This infrastructure challenge is common to power networks as well. Policy makers and regulators will need to decide whether to pick a narrow band of possible futures and invest to facilitate these outcomes or cover a wider range of scenarios and risk stranding assets. Note, however, that in most circumstances, the regulatory framework would mean that it is the customer, rather than the investor, that bears the majority of the costs of stranding.

One interesting scenario relates to the potential increase in the role of gas for power generation and the associated need for new delivery infrastructure. It is often argued that the development of carbon capture and storage (CCS) technology will ensure that this infrastructure does not risk being stranded since gas power plant, appropriately retrofitted, can continue generating as part of a low carbon energy mix. Apart from the obvious risk that CCS may not be proven commercially at scale in the required timescales, this infrastructure remains at risk of high gas prices. In these circumstances, it would be cheaper to build or retrofit coal plant with CCS (or build other low carbon plant) and the unabated gas plant would no longer be required. It therefore follows that the EIB should support the development of local or regional approaches to the development of renewable gas or hydrogen supplies, as a means of extending the lifetimes of existing assets, in preference to investments in long-distance gas pipeline infrastructure which would lock-in high carbon assets for a longer timeframe than would be consistent with decarbonisation objectives.

\section*{6. Nuclear}
\textit{(i) What role do you expect nuclear power to play in the European energy market?}

The role for nuclear power remains highly uncertain. It is capable of providing large amounts of low carbon electricity but it remains vulnerable to technical concerns or political interventions that eliminate this potential. Those countries that are considering the further development of nuclear energy must recognise and manage these policy delivery risk characteristics. In the absence of clear policies focused on achieving this, nuclear energy’s role in the future energy market is highly uncertain.

7. RDI
(i) Should financial support be spread across a large number of small research projects or be selective and concentrated on a few promising large research projects?

The EIB’s forward RDI policy review should be undertaken in the context of the likely forward outlook for European energy and climate policy – and a focus placed on investing in the critical path technologies that need to be demonstrated and the scaled outcomes required. For example, neither carbon capture storage nor smart grid will happen without scaled demonstrations in place, yet both are critical to ensuring a decarbonised power sector in 2050, through managing emissions from existing fossil fuels – especially gas – and through managing renewables intermittency. Similarly energy efficiency – critical to ensuring that decarbonisation is delivered in a way that minimises costs for end-users – faces market failures around aggregating and scaling investments.

These areas suffer from different market failures that need to be addressed by different R&D-focused interventions aimed at getting large promising technologies across the ‘valley of death’ to scaled demonstration and on developing a portfolio of bundled small scale projects to address the aggregation issues with energy efficiency and with smaller ‘orphan’ technologies – especially in the waste to energy sector. This focus on creating strategic value from EIB RDI investment is critical to ensuring the EU maintains a focus on long-term 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 time. 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.

8. EIB external and Cotonou mandates

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(i) In a developing market context, where should the balance lie between meeting local energy needs at least cost and reducing global greenhouse gas emissions – the trade-off between affordable energy for all and sustainable energy for all?

Most developing countries have or are in the process of developing climate change strategies and plans which include a focus on the energy sector. In this context the EIB should extend its remit to engage external client Governments in a policy dialogue. Such dialogue will help to identify potential trade-offs and balancing of competing objectives. When considering access to energy, this dialogue should be underpinned by analysis that demonstrates benefits of low carbon distributed energy services to the local economy (reduced reliance on fossil fuel imports and improved energy security, avoided costs of investment in transmission networks, job creation and improved air quality).

Ideally, the EIB should have country specific investment strategies that are developed in close consultation with client Governments, civil society and private sector stakeholders. The EIB can play a valuable role in sharing European experience and expertise on creating markets for sustainable energy and the opportunities and benefits of such investments.

(ii) What should be the role of the EIB in promoting new technology and helping to transfer existing technologies to new markets? (iii) Where can sources of low-cost finance be used more effectively by the private sector to develop energy projects? (iv) What are the main barriers to developing sustainable energy sources in developing markets?

The key barrier to investment in sustainable energy is the lack of a supportive policy, regulatory and financing frameworks. Engaging in policy dialogue, which also allows relevant EU experience to be shared with external Governments, is an important step towards overcoming barriers to investment in sustainable energy. As within the EU, delivering scaled-up investment in sustainable energy will need to be achieved through institutional change and arrangements that facilitates appropriate sharing of risks between the public and the private sector in a way that reduces the overall costs of such investments.

Delivering such activities will require use of grant funding for technical assistance to client Governments. The EIB could establish an initiative dedicated towards developing institutional capacity for mobilising private sector investment in low carbon energy options. Climate finance available in the form of grants or on concessional terms provides opportunity for the EIB to prototype innovative public-private financing instruments for low carbon energy. Such climate finance can be used to cover the additional costs and/or risks of such investments that clients may be unlikely to cover themselves. The EIB can play an important role in demonstrating what is required to deliver transformational change within the energy sector, and jointly with EU bilateral development agencies, share and communicate lessons between the EU and external clients so that successes can be scaled-up and/or replicated.
Annex 1. CCS guidelines: Essential requirements of a CCSR facility

The essential requirements set out below represent the minimum criteria that should be met before a gas facility can be considered CCSR. The project developer should:

- Carry out a site-specific study in sufficient engineering detail to ensure the facility is technically capable of being fully retrofitted for CO₂ capture, using one or more choices of technology which are proven or whose performance can be reliably estimated as being suitable.
- Demonstrate that retrofitted capture equipment can be connected to the existing equipment effectively and without an excessive outage period and that there will be sufficient space available to construct and safely operate additional capture and compression facilities.
- Identify realistic pipeline or other route(s) to storage of CO₂.
- Identify one or more potential storage areas which have been appropriately assessed and found likely to be suitable for safe geological storage of projected full lifetime volumes and rates of captured CO₂.
- Identify other known factors, including any additional water requirements that could prevent installation and operation of CO₂ capture, transport and storage, and identify credible ways in which they could be overcome.
- Estimate the likely costs of retrofitting capture, transport and storage.
- Engage in appropriate public engagement and consideration of health, safety and environmental issues.

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61 As advised by the Global CCS Institute. See http://www.globalccsinstitute.com/insights/authors/christophershort/2010/11/03/definition-ccs-ready