



# European Investment Bank

## Energy Lending Criteria

EIB and Energy: Delivering Growth, Security and Sustainability -  
EIB's Screening and Assessment Criteria for Energy Projects



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## Executive Summary

### **EIB and energy in challenging times**

1. A secure, competitive and sustainable energy supply is central to economic growth and social progress. Despite impressive reductions in energy intensity in nearly all EU Member States, high and increasing energy costs are a concern especially in the context of a deep and protracted economic downturn as these directly affect the international competitiveness of EU industry and the living standards of millions of households. Fuel combustion also accounts for some 90% of EU CO<sub>2</sub> emissions<sup>1</sup>, and the sector has a major role to play in combatting climate change and achieving the EU's climate policy targets.
2. Outside the EU, lack of access to affordable modern energy continues to be a drag on economic and social development with 57% of Africa's population without access to electricity and 18% in developing Asia<sup>2</sup>. Similarly, traditional biomass sources for cooking with their attendant negative environmental, social and economic development impacts are estimated to account for 68% of the supply in Africa and 51% in developing Asian countries.
3. But as much as energy is critical to EU and world growth and development, energy markets are global and subject to uncontrollable and unpredictable factors, including weather, conflicts and geopolitics. This creates price volatility and supply uncertainty and when such complex markets come to operate in disrupted economies – like today's EU – then judicious actions and decisions need to be made to guide and support their development. In short, energy considerations today are at the heart of the interplay between economic growth in the North, sustainable development in the South and the environmental challenge of climate change.
4. EIB's shareholders, the EU Member States, increased EIB's paid-in capital in 2013 specifically to give it the means to increase its support for projects across all sectors which target growth and jobs in the EU. The EIB is committed to working with national authorities, public investors, private business and civil society to ensure effective use of its resources across all Member States and to unlock significant private investment for projects. In this context, targeted investments in the energy sector offer important opportunities to achieve the objectives set for EIB.

### **A transparent review of today's investment needs**

5. At the time of the Bank's last energy sector review in 2007, global economic growth was buoyant and the key energy sector challenge for many policy makers was adapting their economies to the realities of climate change. Today policy makers face additional economic challenges, just as pressing, which together are the backdrop for this review.
6. Against this setting, a review of developments in EU energy policy, and world and EU energy markets is one way in which the Bank can ensure that its activities remain relevant, consistent with EU policies; focussed on sectors with the greatest investment needs and highest policy priorities; and where EIB can have the highest value added. This ensures that the EIB's activities remain strategically important for all stakeholders.

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<sup>1</sup> EU Energy in figures, Statistical Pocketbook 2012

<sup>2</sup> IEA World Energy Outlook 2012, <http://www.worldenergyoutlook.org/publications/weo-2012/>

7. The Bank has committed in its transparency policy to be open on how it makes decisions, operates and implements EU policies. In this context periodically reviewing its activities in certain sectors based on its own analysis and the comments of external parties is an important part of implementing the Bank's Transparency Policy. Engaging with parties external to the Bank during the process of the review<sup>3</sup> also enables the Bank to communicate more effectively its priorities and the rationale for its activities.

8. This 2013 Energy Review redefines EIB's priorities in the energy sector and sets out the criteria to be used to screen and assess energy projects. This document will be periodically updated in response to major developments in EU policies, energy and financial markets.

### **From EU policies to investments**

9. The Bank's activities are primarily guided by EU policies in energy, climate change, and external affairs and development. In addition, certain areas of energy policy are decided by individual Member States. The EIB takes all these into account together with the other objectives in the EIB's business plan in setting its screening and assessment criteria for energy projects.

10. Overall, the achievement of EU energy objectives – i.e. cheap, clean and secure energy – will require a substantial increase in energy investments. It is estimated that three sectors – energy efficiency (EE), renewable energy (RES) and energy networks – will account for roughly 90% of total investment needs (EUR 200billion per year) in the EU and the majority of EIB's investments in the EU energy sector over coming years. Lending to these three sectors will also continue to be a substantial component of Bank financing for developing countries outside the EU.

11. Faced with such investment demands, EIB will continue to explore options for alternative financing structures as well as how new financial instruments may be developed to extend the reach and enhance the efficacy of the Bank's financial interventions.

### **EU priorities in light of global market shifts**

12. Global and European energy trade is undergoing profound changes. Energy demand is increasingly driven by economic growth and urbanisation in non-OECD countries whose combined share of world demand is expected to reach 63% by 2030 (from 46% in 1990). On the supply side, unconventional gas and oil developments in the US have the potential to fundamentally change the dynamics of world energy markets over the coming years with increasing US indigenous production possibly leading to the US becoming a net oil exporter by as early as 2030<sup>4</sup>. This could significantly improve the US's competitive position and affect hitherto long established energy supply structures in the rest of the world.

13. Over the same period, energy demand in the EU is expected to increase only modestly and indigenous production of oil and gas is expected to decline with oil imports increasing to 95% of EU demand by 2030 and gas imports from 63% of demand in 2010 to 80% by 2030. As a consequence, the EU will become increasingly dependent on fossil fuel imports, competing with emerging economies for energy supplies at a time when its relative importance in world markets will be declining.

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<sup>3</sup> The energy review was formally launched in October 2012 and a public meeting held in December 2012. The Bank subsequently received 87 written responses to the consultation paper.

<sup>4</sup> World Energy Outlook 2012, International Energy Agency, Paris 2012

14. A further unexpected impact of the US shale gas boom on EU energy markets is the significant increase in coal-fired energy produced in the EU in 2011 and 2012. This arises inter alia from the combination of low coal prices and the current very low price of carbon on the EU ETS (Emissions Trading System). This short term increase in production is not expected however to alter the medium to long term trend of increasing carbon prices in the EU leading to declining profitability and production from unabated coal fired plants.

### **Significant climate challenges**

15. The continuing dominant position of fossil fuels in the world's primary energy mix means that carbon emissions are expected to continue to rise. Without significant further action by all countries this will put the world on a path towards a long-term average global temperature increase of 3-5°C above pre-industrial levels. This is above the 2°C limit established by the IPCC and agreed by EU and world governments as the level above which global temperature rises are expected to lead to impacts that would exceed the adaptive capacity of many systems and present an increasing and unacceptably high risk of large scale irreversible effects. Limiting the environmental impacts of the energy sector therefore remains a key objective of the EU.

### **Renewable energy to break fossil fuel dependence**

16. Although fossil fuels will remain the dominant fuel in primary energy consumption, at a global and EU level renewable energy sources (RES) have been established as an essential part of power production. This trend is expected to continue with renewables becoming the world's second largest source of power generation by 2015 and accounting for a third of production by 2030.

17. Renewable energy thus has the potential to reduce further the dependency of the EU and the world on fossil fuels and break the long standing link between economic growth and carbon dioxide emissions. Investments in RES also enhance security of energy supply.

18. In the context of the current economic crisis, the key challenges for the EU as a whole in renewable energy over the coming years will be to:

- increase investment levels to meet the 2020 EU energy objectives<sup>5</sup>;
- integrate RES fully into energy markets through energy network development; and
- improve the affordability of RES for governments and final consumers by reducing the cost of RES production.

19. EIB's continued prioritisation of RES projects is therefore fully justified. Over the medium term the goal is that RES costs will continue to fall and become increasingly financially competitive with fossil fuels. The Bank will continue to focus on the economic justification of RES projects to ensure that the projects it finances are viable in the long term and do not become an unreasonable burden on future electricity consumers. This analysis takes into account the long term cost of carbon, the expected generation profile of the project and the full system costs associated with the project.

### **Competitive renewables outside the EU**

20. Many of the countries in which the Bank operates outside the EU have abundant renewable energy resources - high irradiation, hydro potential, good geothermal resources in East Africa and wind. These can often be developed at economic costs at or close to the costs of alternatives – which in many cases are highly polluting diesel units. One of the barriers to RES development in

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<sup>5</sup> 20% RES share in final energy consumption

these markets however remains fossil fuel subsidies, which distort markets and reduce investment potential, and access to capital.

21. The Bank will continue to strongly support RES projects in its operations outside the EU in the context of its lending mandate and climate action objectives, and as part of the EU's response to the UN's sustainable energy for all initiative (SE4all)<sup>6</sup>.

### Efficiency investments for affordable energy

22. Investing to reduce energy consumption remains the most cost-effective way for the EU to meet its energy and climate objectives: it increases security of energy supply, improves competitiveness; reduces carbon intensity and increases the environmental sustainability of the EU economy. It also has the potential to reduce energy costs for industry, commerce and households, and increase employment – particularly important during the current economic recession.

23. Even with the supportive policy background a significant share of the overall potential in energy efficiency<sup>7</sup> remains untapped. Energy Efficiency investments remain therefore a high priority for the EU and the EIB will aim to increase its activity in this area to further support EU and Member State policy initiatives.

24. In contrast to the other energy sub-sectors covered in this review, energy efficiency investments cut across traditional sectoral boundaries and the Bank will therefore seek to continuously adapt its approach to energy efficiency by developing products and project selection screening better adapted to :

- The specific **policy objectives** of the three key markets in which the majority of energy efficiency investments are expected to be made: namely buildings, transport and industry.
- Overcome the **barriers** commonly associated with energy efficiency investments, namely: small projects, the limited capacity to develop projects, and limited incentives.

### Research, development and innovation for a low carbon economy

25. Investing in clean efficient energy makes economic sense: the accelerated deployment of efficient and low-carbon technologies can help cut energy bills, reduce energy import dependency and lower emissions. Studies<sup>8</sup> show that every additional investment can generate three times as much in future fuel savings by 2050. Still, many low carbon technologies are expensive; research, development and innovation (RDI) can help to significantly reduce their costs. This in turn would have a large positive impact on the overall cost of energy and hence on quality of life and industrial competitiveness. Unfortunately many technologies that hold potential for improved energy efficiency and reduced CO<sub>2</sub> emissions are failing to meet the deployment objectives needed to achieve the necessary transition to a low-carbon economy with some of the technologies with the largest potential are showing the least progress.

26. Investing in complex, long term research, development and innovation projects is often risky. The EIB will continue to work with promoters and public bodies to develop appropriate financial and non-financial instruments to facilitate investment that will boost competitiveness, growth and job creation.

<sup>6</sup> <http://www.sustainableenergyforall.org/>

<sup>7</sup> According to the available studies, the bulk of the energy savings potential by 2020 lies within the building sector too, with estimated savings of up to 35%, followed by transport (26%) and industry (25%), respectively.

<sup>8</sup> "Energy Technology Perspectives 2012", International Energy Agency



### Stringent screening criteria for fossil fuels generation

27. Fossil fuel based electricity and heat generation plants represent a decreasing but still important part of the EU electricity (and heating) system, providing secure and dispatchable energy complementing renewable energy sources and accounting for 52% of EU electricity production in 2010. However, if the EU is to meet its climate targets, CO<sub>2</sub> emissions from the electricity sector will need to decline. This needs to take account of the fact that electricity plants constructed over the next five years will be producing electricity for the next 20 years or more.

28. EU energy policy leaves the choice of the best mix of technologies to meet the EU's climate and energy objectives to Member States. The Bank also takes the same "technology neutral" approach to the financing of fossil fuel electricity generation projects but will adopt a "no regrets" approach to ensure that fossil fuel projects financed by it do not "lock in" carbon emissions above the level consistent with EU climate targets.

29. More specifically, EIB will screen out projects whose carbon footprint benchmark – or the emission performance standard (EPS) in g/kWh – is above a threshold level. This threshold is set at a level which reflects the EU's and EU Member States' existing commitments to limit EU carbon emissions as established in current energy and climate legislation, though should the commitments become more restrictive, adjustments to the EPS will be made. Exceptions may be made to the EPS in limited circumstances for projects which contribute to the security of supply of isolated energy systems such as small islands with no feasible mainland energy connection and only where there is no economically viable alternative.

30. Fossil fuel plant operators will also need to demonstrate that they comply with the CCS Directive. The Bank will continue to support projects in research, development and deployment of clean fossil fuel technologies, including CCS demonstration projects.

31. In the absence of binding global emission targets, EU efforts are centred on raising the ambition level of carbon emission reductions worldwide. Consistent with this, the same EPS threshold will be used for the Bank's operations outside the EU. However to reconcile the right to economic development of hundreds of millions with no access or unreliable access to electricity and low per-capita emissions - as enshrined in Art. 3 of the UNFCCC - with the universal commitment to keep atmospheric greenhouse gas concentrations within safe limits, recognized in Art. 2, exceptions will be made in limited circumstances in the poorest countries<sup>9</sup> outside the EU where it can be demonstrated that projects with carbon emissions above the threshold will have a significant and material positive impact on poverty alleviation and economic development.

### The case for investment in hydrocarbons

32. Based on current trends, EU domestic production of hydrocarbons – that is oil and gas – is expected to decline. As a consequence, even under scenarios of weak or negative consumption growth, EU hydrocarbon import dependency is expected to increase with gas imports forecast to reach 80% of demand in 2030 from 45% in 1990. This will be the case even under the EU's 2050 energy roadmap. Given this context, unconventional hydrocarbons – in particular shale gas – may have a noticeable impact on EU energy markets. US gas exports could directly and indirectly increase

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<sup>9</sup> Least developed countries (see <http://www.unohrls.org/en/ldc/25/>) and those formally identified by the World Bank as Low Income countries (<http://data.worldbank.org/income-level/LIC>).

the EU's security of supply and influence gas prices by reinforcing the trend for increased decoupling of oil and gas prices in the EU.

33. Ensuring access to secure supplies of oil and gas at competitive prices is an important EU objective and underpins the continuing role for EIB investments in gas networks and indigenous hydrocarbon production and refining. The potential for EU unconventional hydrocarbon production depends on the development of appropriate and acceptable environmental and operational safeguards which are currently under discussion or preparation by the EC and Member States, and on these reserves being economically recoverable. If circumstances are right, the Bank will consider investment in this segment of the market.

### **Nuclear: a large scale low-carbon option**

34. Nuclear energy accounts for one third of all electricity produced in the EU and two thirds of its low-carbon generation. Although an abundant low carbon energy source it is also one of the most potentially harmful sources of energy and its social acceptability remains an issue, particularly after the Fukushima accident. EU energy policy<sup>10</sup> acknowledges the right of individual Member States to determine their energy mix and to use nuclear energy as part of their strategy to reduce CO<sub>2</sub> emissions and to enhance energy security. In this context, the Bank adopts a technology neutral approach towards nuclear energy in line with the EU energy policy.

35. The Bank takes a cautious approach to the sector and in addition to the normal screening criteria for large thermal power plants the Bank uses additional nuclear appraisal guidelines to address specific issues related to nuclear projects, such as safety regulations, radioactive waste management, plant decommissioning, technology aspects and promoter capabilities.

### **Flexible and interconnected energy networks**

36. Electricity networks are critical to achieving the EU's energy and climate change objectives. Network operators are faced with unprecedented changes in their systems as they adjust to accommodate major changes in patterns of electricity generation – from a few large dispatchable power stations to smaller, increasingly decentralised and intermittent renewable energy electricity generation. Similarly, they must manage changes in electricity demand profiles as households and other final consumers make increasing use of electricity for heat and transport. This highlights the need to complete cross border interconnections, develop energy storage and for other balancing technologies such as those affecting the demand side to be implemented to better match supply and demand, and also ensure competitive energy supply.

37. Similarly, developing gas transmission and network infrastructures (including LNG plants) increases physical market integration, making the internal EU gas market more liquid and competitive, and enhancing supply diversification and security of energy supply. In the medium term, substituting coal with gas is expected to help the EU achieve its climate policy objectives and hence is considered critical for the transition of the EU energy system towards a low-carbon economy. In this context, EIB also considers gas transmission system projects, especially interconnections, as critical investments.

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<sup>10</sup> The main piece of legislation framing the EU nuclear sector is the Euratom Treaty. Through the Treaty, the Commission furthers the nuclear safety and security framework, helping to set a level playing field for investments in Member States willing to keep the nuclear option in their energy mix

38. Energy networks are therefore at a “pivotal point”<sup>11</sup>. The estimated financial needs of the sector are substantial – at EUR 60 billion per year in the EU to 2020 and the Bank is already a major funder of network projects. Financing the increased investments needed over the next ten years is a major challenge for utilities and governments and doing this at least cost will be important to minimise the impact on energy costs. The Bank will therefore continue to provide substantial financial support to this sector.

39. Outside the EU the Bank will prioritise network projects which are in line with its respective mandates, notably: (a) support the EU’s external energy policies, in particular the diversification of energy supply through physical interconnection in both electricity and gas networks; (b) increase the rational use of energy and economic development through regional integration; (c) enhance the reliability and security of energy supply; and (d) increase access to affordable energy.

#### **Transparent criteria for focused EIB investments**

40. The public consultation has allowed EIB to engage with a wide range of stakeholders in its review of energy markets, EU policies, and global and EU energy trends. With better defined criteria and updated context, the Energy Review provides a clear rationale for the EIB’s investment decisions in the context of EU policies (both within and outside the EU) and Member State actions to ensure secure, sustainable and growth biased projects. These criteria will be subject to periodic review to reflect EU policy developments and market evolution.

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<sup>11</sup> European network of transmission system operators <https://www.entsoe.eu/publications/position-papers/>



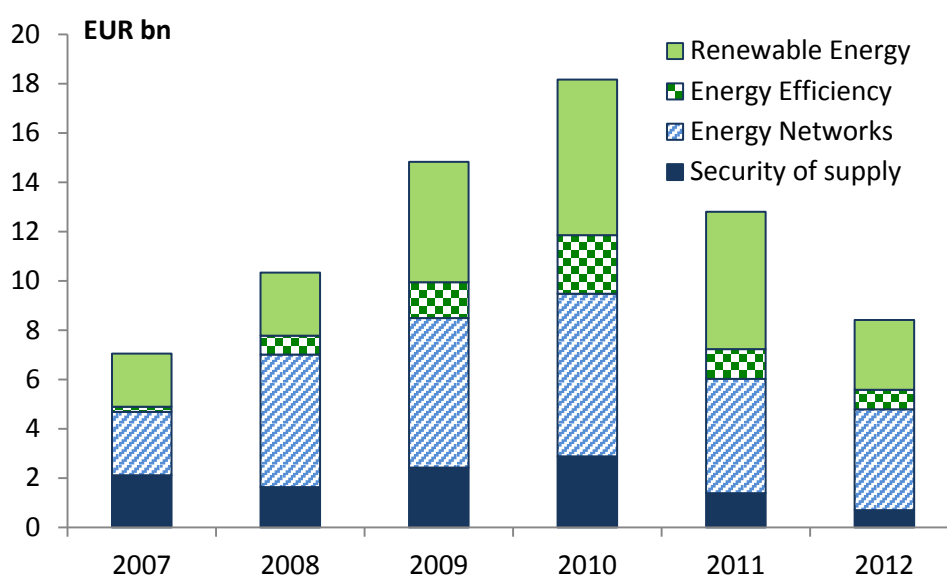
## Context

### INTRODUCTION

#### EIB - the EU's Bank

1. The European Investment Bank is the European Union's Bank and its shareholders are the 28 EU Member States. Within the EU the Bank provides financing, and technical and financial assistance to projects which support EU policy objectives across a number of sectors, including energy. Outside the EU, the Bank is active in over 150 countries where it supports projects which contribute to the EU's external cooperation and development policies. In 2012, some 90% of the EIB's total financing of EUR 52 billion was for projects located in the EU.
2. The Bank is a major funder of energy projects which in turn account for a significant part of the Bank's activity. In 2012 16% of the Bank's financing was for energy sector projects: EUR 7.2bn within the EU and EUR 1.2bn outside. Fuel combustion also accounts for some 90% of EU CO<sub>2</sub> emissions<sup>12</sup> and over half of the Bank's energy sector projects reduced CO<sub>2</sub> emissions, significantly contributing to the Bank's Climate Action target<sup>13</sup>.
3. Given the protracted economic downturn, in 2013 EIB's shareholders, the EU Member States, increased the Bank's capital by EUR 10bn. They expect the Bank to increase its support for projects which support EU resource efficiency, strategic infrastructure, SMEs and innovation and which have a positive impact on economic growth. Challenging lending targets have been established for the period 2013-2015 and to which the energy sector is expected to be make an important contribution.

**Figure 1.** EIB lending to the Energy Sector, 2007-2012



<sup>12</sup> EU Energy in figures, Statistical Pocketbook 2012

<sup>13</sup> The Bank's annual climate action target is currently set at 25% of total Bank lending based on a clearly defined set of eligible sectors and projects. Over the last few years, renewable energy and energy efficiency projects constitute approximately one half of the Bank's climate action projects, equivalent to around 40 percent of total climate action lending.

## Guiding principles and project selection criteria

4. Article 16 of the EIB's statute (2009), together with related provisions in the Treaty of Lisbon, mandate the Bank to grant loans and guarantees within the EU for economically productive investment projects in three areas: (i) projects in less-developed regions of the EU; (ii) projects for modernising or converting undertakings or for developing fresh activities called for by the progressive establishment of the common market; and (iii) projects of common interest to several Member States.

5. Similarly outside the Union, the Bank operates under mandates agreed with its shareholders, the European Commission and partner governments. The mandates' objectives reflect the particular needs of the regions to which they relate – for example poverty alleviation and economic development under the Cotonou<sup>14</sup> mandate.

6. In line with its mandates inside and outside the EU, the Bank's Corporate Operational Plan (COP)<sup>15</sup> establishes the Bank's priority lending objectives and key performance indicators on the basis of a rolling three year strategy which is reviewed and updated by the Bank's Board of Directors on an annual basis. This strategy identifies three indicators for assessing the effectiveness of individual financing operations:

- **Soundness:** the quality of the project based on the economic and environmental sustainability of the operation;
- **Relevance:** the project's contribution to EU policies and relevant mandate objectives;
- **EIB contribution:** the financial and non-financial contribution of the Bank to the project.

7. This paper focuses on the first two indicators. It sets out the screening and assessment criteria used to establish a project's economic and environmental sustainability (soundness) and the priorities for Bank activity in the energy sector (relevance to EU policies and mandates).

## Screening and assessment criteria for Energy projects

8. The bank has sector specific criteria and general screening criteria. The general criteria which apply to all projects financed by the Bank are:

- The Bank's borrowers must be capable of repaying the loan and must provide adequate financial security, satisfy the Bank's due diligence and documentation standards and all projects must be formally approved by EIB's decision making bodies;
- Projects must comply with the Bank's other policies particularly on procurement<sup>16</sup>, Environmental and Social Principles and Standards<sup>17</sup> and anti-fraud; and
- The Bank does not lend to certain excluded sectors (e.g. munitions).

The Bank also examines the GHG impact of all projects above a threshold - which is publicly available - using EIB's Carbon Footprint methodology<sup>18</sup>.

9. In the energy sector projects it finances, the Bank undertakes a cost benefit analysis (CBA) applying methods drawing on international best practice, as described in the handbook "The

<sup>14</sup> <http://www.eib.org/projects/regions/acp/acps-octs/index.htm>

<sup>15</sup> <http://www.eib.org/infocentre/publications/all/operational-plan-2013-2015.htm>

<sup>16</sup> Available at <http://www.eib.org/projects/cycle/procurement/index.htm>

<sup>17</sup> Available at <http://www.eib.org/about/news/eib-statement-of-environmental-and-social-principlesand-standards.htm>

<sup>18</sup> A summary of the current carbon footprint methodology is available at: <http://www.eib.org/about/documents/footprint-summary-of-themethodologies.htm?lang=en>

Economic Appraisal of Investment Projects at the EIB"<sup>19</sup>. The CBA relies on a number of sources, including documentation provided by promoters – such as feasibility studies, widely available statistical tools and information, and the Bank's own expertise and databases. The CBA includes, wherever quantifiable, expected environmental externalities, namely the cost of carbon emissions and other non-greenhouse gas pollutants, as well as other externalities such as the costs/benefits of security of energy supply.

10. For those projects meeting the generic and sub-sector specific quality criteria outlined above, the EIB may still condition disbursement of an approved loan on the promoter performing certain additional tasks. Such conditions may typically be attached to completion of pending project preparation activities (e.g. satisfactory completion of stakeholders' consultation) as well as implementation and operating arrangements. Projects with significant environmental or social impacts will be subject to additional monitoring and reporting obligations, including where necessary independent oversight of such activities.

### **Financial and technical assistance instruments**

11. The EIB offers a range of products and services to clients in the energy sector. The Bank's main product is long term lending for viable capital spending projects in both the public and private sectors; counterparties range from large corporations to municipalities and small and medium-sized enterprises. The Bank also has a major role in energy project finance structures (where the lending is secured by the project's revenues) and such structures are increasingly important as a result of the balance sheet constraints facing utilities, banks and corporates.

12. To increase the Bank's value added, the Bank also helps to ensure that promoters have access to relevant technical assistance where necessary, including helping promoters to access grant funds where available. Specific technical assistance (TA) facilities such as JASPERS<sup>20</sup> and ELENA<sup>21</sup> are available to support project development and implementation within the EU. There are several TA facilities to support projects outside the EU.

13. The Bank provides risk capital through a number of specialised lending instruments. Under its Special Activities window it provides capital to support funding to sub-investment grade risks, including equity investment through infrastructure funds. Alongside this the Risk-Sharing Finance Facility has been created in conjunction with the European Commission to increase the Bank's ability to provide higher-risk financing for innovative projects in the sectors of technology platforms and research, development and demonstration.

14. The Bank is also involved in a number of initiatives often involving grants from the EU Commission and EU/EFTA MS, such as the European Energy Efficiency Fund (EEEF), the Energy Efficiency Finance Facility (EEFF) and, outside the EU, the Green for Growth SE Europe Fund (GGF) and the Global Energy Efficiency and Renewable Energy Facility (GEEREF).

15. Other specialised tools supported by the Bank are carbon funds which aim to harness carbon credit revenues for project investment purposes. In collaboration with public financial institutions (EBRD, World Bank, KfW, CDC, NIB, ICO) the Bank initially sought to develop the linkage with the ETS

<sup>19</sup> Available at <http://www.eib.org/infocentre/publications/all/economic-appraisal-of-investment-projects.htm>

<sup>20</sup> JASPERS (Joint Assistance to Support Projects in European Regions) assists the 12 Central and Eastern EU Member States in the preparation of major projects to be submitted for grant financing under the Structural and Cohesion Funds.

<sup>21</sup> European Local Energy Assistance (ELENA), a technical assistance facility that facilitates the mobilization of funds for investments in sustainable energy at local level, established by the European Commission and the European Investment Bank.

compliance market for carbon, but is now engaging with private sector investors in limited, demonstration models relying on the voluntary market.

### **Scope and purpose of this document**

16. The 2013 EIB Energy Review reflects on the substantial changes that have occurred in energy markets since the previous review and the evolution of European policies. It incorporates views on future EU energy policy developments, including new Directives under preparation and the transition paths to a low carbon economy discussed in the Energy Roadmap 2050 platform. The document is also informed by the results of an extensive stakeholder consultation undertaken by the Bank as part of the process of updating the Review.

17. The purpose of the document is to inform the EIB's stakeholders - shareholders, borrowers, promoters, partners and civil society organisations - as well as the wider public on: (i) what types of energy projects are consistent with the Bank's objectives; (ii) how energy projects will be assessed and prioritised by the Bank and (iii) how the Bank supports EU energy policy .

18. This document presents EIB's review of major developments in relevant EU policies, and world and EU energy markets and sets out its priorities, screening and assessment criteria in the energy sector over the coming years. These criteria are designed to ensure that the Bank's activities remain relevant, consistent with EU policies and focussed on sectors with the greatest investments needs or where EIB can have the highest value added or which have the highest policy priority.



## Key energy market trends and policies

19. This section reviews the key long-term trends in energy markets and EU policies that will have a significant impact on the energy sector and substantial implications for EIB energy financing both within and outside the EU. This analysis draws on a wide range of sources, but in particular the International Energy Agency's World Energy Outlook<sup>22</sup> and the European Commission's (EC) Energy Roadmap 2050.

### **Growth in world energy demand is slowing but emerging markets are becoming more important**

20. Rising incomes and population are pushing the world's primary energy needs higher. Demand could increase by up to 30% between 2010 and 2030, or 1.3% per year on average. This is a sharp slowdown in the consumption growth observed over the past 20 years, when the yearly increase was on average 1.9%. This projected growth in energy demand is primarily driven by emerging countries, reflecting their faster population growth rates, higher levels of economic activity, increasing urbanisation and industrial production. The share of global energy demand in non-OECD countries, which had already increased from 46% in 1990 to 55% in 2010, is expected to reach 63% in 2030.

21. This relatively high growth in energy demand has been accompanied by a persistent failure to provide universal energy access to the world's poor. The IEA's latest estimate is that currently almost 1.3 billion people lack access to electricity, while 2.6 billion people rely on traditional biomass for cooking. More than 95% of these people are in either sub-Saharan Africa or developing Asia

### **US developments have far-reaching impacts on industrial competitiveness and energy markets**

22. It is likely that the effect of US energy developments, particularly the rebound in US oil and gas production, will be felt well beyond North America and will not be limited to the energy sector. The evolution of the energy sector is stimulating economic activity; with cheaper gas and electricity prices giving US industry a competitive edge and expanding the role of North America in the global energy trade. The IEA expects that by around 2020, the United States will become the largest global oil producer at the same time as new fuel-efficiency measures in transport occur. The net result is a continued fall in US oil imports, to the extent that the US becomes a net oil exporter around 2030, a dramatic reversal of the trend seen in most other energy importing countries.

### **Fossil fuels will still meet most of the energy needs, emissions continue to rise**

23. Fossil fuels, which represented 81% of the global primary fuel mix in 2010, are expected to remain the dominant energy sources through 2030, reducing their share only slightly to 77% in 2030. Therefore, GHG emissions continue to rise, putting the world on a path that is consistent with a long-term average global temperature increase of 3.6 °C above levels that prevailed at the start of the industrial era. This is above the 2°C limit established by the IPCC and agreed by EU and world governments as the level above which global temperature rises are expected to lead to impacts that would exceed the adaptive capacity of many systems and present an increasing and unacceptably high risk of large scale irreversible effects. Limiting the environmental impacts of the energy sector therefore remains a key objective of the EU.

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<sup>22</sup> The World Energy Outlook (WEO) 2012. Quoted forecast data is from the New Policies Scenario (NPS), which incorporates "broad policy commitments and plans announced by countries to address energy security, climate change and local pollution, and other pressing energy-related challenges".

### **Energy efficiency is an option with high economic potential – under-exploited worldwide**

24. In a period of economic uncertainty and high energy prices, where energy bills are expected to rise and climate to worsen, energy efficiency is a cost effective and core policy objective. By curbing demand growth energy-importing countries can reduce energy imports or at least slow their rate of growth, putting downward pressure on energy prices and mitigating pollution. Ultimately, it can play a role in stimulating economic growth and employment.

25. The European Union is not alone in trying to exploit the huge potential of energy efficiency. Over the past few years major energy-consuming countries have announced new energy efficiency measures: China is targeting a 16% reduction in energy intensity by 2015; the US has adopted new fuel economy standards; and Japan aims to cut 10% from electricity consumption by 2030. But even with these and other new policies in place, a significant share of the global potential to improve energy efficiency (i.e. 80% of the potential in buildings and more than half in industry) still remains untapped.

### **Renewables are a core part of the energy mix**

26. Renewables have grown to become an essential component of energy supply, largely in the wake of a steady increase in hydropower and the rapid expansion of wind and solar power, but their rate of expansion and importance varies markedly across regions. Renewables are expected to become the world's second-largest source of power generation by 2015 (roughly half that of coal) and, by 2030, to account for almost one-third of the world electricity output.

27. The EU is making progress towards meeting its 2020 target of 20% renewable sources energy in gross final energy consumption. In 2010, the renewables share in the EU was 12.7% compared to 8.5% in 2005. However, the continued expansion of the sector is now facing a number of challenges and investment has declined sharply since peaking in 2011, in the wake of growing regulatory uncertainty and a deteriorated economic climate. Investment will need to increase if the 2020 targets are to be achieved.

28. On a positive note, the investment cost for many renewable technologies continues to fall, and this lowers the level of investment needed to reach the 2020 objectives. The EU is currently considering whether additional policy measures are needed to achieve its climate and energy goals and the recently published EU Commission Green Paper "A 2030 framework for climate and energy policies", highlights the need to facilitate RES participation in the market and to ensure a level playing field for all generation technologies in terms of contributing to system stability.

### **EU energy consumption marginally declines, but the energy mix shifts significantly**

29. Primary energy demand in the European Union is likely to remain overall largely unchanged for the next decade and beyond. However, energy and carbon prices, together with the Union's energy policies, could result in a major shift in the EU energy mix. Coal demand is expected to fall by almost half, with most of the decline occurring in the power sector, where the economics of coal are expected to deteriorate as carbon emission costs increase. Similarly oil demand is projected to fall with improvements in fuel economy and growing use of biofuels.

30. Future demand for natural gas is less clear and depends largely on energy demand which itself depends on the effectiveness of energy efficiency measures and the speed with which coal is substituted by natural gas and is in turn substituted by RES – which itself depends on carbon prices

and RES targets. The IEA forecasts an increase of 10% through 2030 - with most of the growth in the power sector – with demand in the EC stable or slightly declining.

31. Nuclear's share of total generation is projected to fall by 20%, as the number of new stations is more than offset by aging plants under decommissioning and by countries progressively opting out of nuclear. RES electricity is in contrast forecast to increase, with wind generating 20% more electricity than coal by 2030.

### **Energy import dependency grows in the EU**

32. EU dependence on energy imports is expected to grow as indigenous production of oil and gas declines, with oil imports increasing to 95% of EU demand by 2030 and gas imports from 63% of demand in 2010 to 80% by 2030. In consequence the EU, despite muted demand growth, will become increasingly dependent on fossil fuel imports, competing with emerging economies for energy supplies at a time when its relative importance in world markets will be declining.

### **Recent developments in EU Energy and Climate Policies**

33. The current focus of EU energy and climate policy is completing the internal energy market; enhancing the EU's security of supply; promoting a sustainable and diverse energy mix; and achieving the 2020 targets. This has underpinned EIB lending priorities since 2007 in particular increased support to the development of the renewable energy and energy efficiency projects and the restrictive approach to coal and lignite power stations.

34. Last year the European Commission set out plans to meet the long-term target of reducing domestic GHG emissions by 80 to 95% by 2050 which was agreed by European Heads of State and governments in the context of action by developed countries as a group. This led to the preparation of several sector Roadmaps which analysed possible pathways towards a low-carbon economy in 2050, including the Energy Roadmap 2050<sup>23</sup>.

35. The Commission's recent Green Paper "A 2030 framework for climate and energy policies" looks at this longer term perspective and discusses potential additional measures that could be taken in the context of a potential international agreement on climate change in 2015. In particular the paper explores measures which could provide certainty and reduce regulatory risk for investors to mobilise the required funding; to support progress towards a competitive economy and a secure energy system; and to establish the EU's 2030 target level for greenhouse gas reductions. The paper therefore foresees a continued strengthening of the existing core objectives of EU energy and climate policy.

36. Finally energy policy was the focus of the May 22<sup>nd</sup> 2013 European Council meeting, which reaffirmed in the context of current economic developments the importance of:

- security of supply for households and companies at affordable and competitive prices and costs, in a safe and sustainable manner.
- completing the internal energy market and developing interconnections so as to put an end to any isolation of Member State;
- diversifying Europe's energy supply and developing indigenous energy resources to ensure security of supply, reduce the EU's external energy dependency and stimulate economic growth;

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<sup>23</sup> COM (2011) 112 Roadmap for moving to a competitive low-carbon economy in 2050

- continuing the deployment of renewable energy sources while ensuring their cost effectiveness, further market integration and grid stability;
- implementing energy efficiency as a significant contribution to reversing current trends in energy prices and costs.

37. It is against this background that EIB has reviewed its screening criteria and priorities. The remainder of this document summarises the result of this review for each energy sub-sector.

## Renewable Energy

### BACKGROUND

38. Whilst fossil fuels remain the EU's primary energy source, the use of renewable energy in energy production has increased by 21% since 2007<sup>24</sup>, and by 2011, represented 13% of EU gross final energy consumption (9.1% in 2007). This growth was even more marked in electricity sector where the share of RES in electricity generation reached 20% in 2011 from 14% in 2006.

39. This growth is driven by the EU's energy and climate targets, in particular the commitment by Member States for renewable energy sources (RES) to represent 20% of EU gross final energy consumption by 2020 and 10% of energy consumption in transport (including renewables in electric vehicles). The Member States' plans to achieve these targets are set out in their National Renewable Energy Action Plans which foresee that RES in electricity (the RES-E target) to increase to 36% by 2020 (from 16% in 2005), RES in heating and cooling (the RES-H&C target) to 23% from 10% in 2005 and RES in transport the (the RES-T target) to 11% from 1% in 2005.

### Progress against targets

40. Good progress has been made towards achieving the overall RES targets, with some Member States already in 2010, at or close to their 2020 RES in final consumption and only two Member States below their interim targets. Of more concern however the RES-T target was not met at the EU-27 level - with 22 Member States below RES-T target, and although the interim target for RES-E was met at EU-27 level, 15 Member States were below the 2010 interim target. In the heating and cooling sector, where no interim targets were agreed, the Commission estimate that the share of RES in heating and cooling may actually have declined.

41. Given that the trajectory towards the 2020 target, as agreed between Member States, steepens as 2020 approaches, it is estimated that the pace of investments would need to increase significantly to achieve the 2020 targets – for example it is estimated that the growth in RES in electricity needing to almost double from 3.4% per year to 6.7% to 2020.

### Investment challenge

42. Although there is a strong need to increase investments, it is evident that there has been a recent slowdown in RES investment with total EU investment falling to an estimated EUR 50 billion in 2012 from a peak of EUR 74 billion<sup>25</sup> in 2011. Although the investment needed to reach the 2020 target is difficult to estimate, due mainly to uncertainties in the future costs of different renewable technologies and the RE technology mix, the EC estimates that annual expenditure of around EUR 50 billion to EUR 70 billion a year up to 2020 will be needed<sup>26</sup>. This implies that the current level of investment will need to increase to meet the 2020 targets. In addition, large investments are needed to integrate renewables into the energy networks particularly in electricity grids and storage (see also the section on Energy Networks).

<sup>24</sup> Eurostat, <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ten00081&plugin=1>

<sup>25</sup> Bloomberg New Energy Finance data

<sup>26</sup> See for example, Ecofys, Financing Renewable Energy. The actual investment needs may be less than expected, as a result of substantial cost declines in some technologies, notably PV.

43. The slowdown in the amount of investment in the RES-E sector appears to be principally caused by policy instability, notably the steep reduction in the level of financial support for these projects in a number of countries, particularly those most affected by the economic crisis and which historically accounted for a significant share of RES-E investments. But also lower investment requirements as lower RE capacity is needed (lower energy consumption) and cost declines. These changes, in addition to putting the commercial viability of projects into doubt, have created the perception that the sector is subject to higher political risk than previously thought, and is leading investors to question the financial sustainability of supported projects in a number of countries.

44. Relative to conventional energy, RES projects are especially susceptible to changes in operating revenues as their costs are generally heavily front loaded and therefore inflexible. Once the construction has been completed the cost structure is locked in and there is little capacity to adapt or respond to changes in operating and financing costs or revenue parameters.

45. This highlights the sensitivity of RES-E investments to regulatory regimes. The challenge for policy-makers is to ensure that the support regimes strongly incentivise cost reductions and are affordable whilst at the same time providing sufficiently stable financial support to maintain sufficient investment to meet their RES-E target. In time, as the carbon price on the EU ETS rises towards the social cost of carbon emissions and the cost of renewable energy technologies fall, additional financial support for RES-E projects<sup>27</sup> should not be needed and indeed there are certain combinations of circumstances where this is already the case.

#### **Renewable energy costs - electricity**

46. A core concern of EU policy makers today is growth and employment and there is therefore increased focus on ensuring that the RES targets and the RES-E targets in particular are not an unaffordable burden for industry, householders and businesses. This requires regulators to drive and adapt rapidly to reductions in the production cost of renewable technologies. The evidence suggests that steep cost declines can be expected for technologies in the early part of their learning curve, for example as has been the case for PV, and more moderate for mature technologies, such as on-shore wind. Cost declines result from RDI, scale and learning by doing effects, and require the continued installation of capacity in the sector.

47. This scale effect is clearly illustrated by developments in the costs of PV energy production, where installed capacity in the EU increased from 10 GW in 2008 to over 60 GW last year, and investment costs decreased by more than 50% over the same period. These cost declines are quicker than expected with the average investment cost for large systems at around 1.5 EUR/Wp in early 2013 compared to 2.5 EUR/Wp forecast by the European Strategic Energy Technology Plan (SET-Plan) for 2015.

48. The other key renewable technologies in the early adoption phase are offshore wind and concentrated solar power (CSP). Both technologies are currently at a very early stage of their development, and there is insufficient evidence available at this stage to draw firm conclusions on cost trends. Offshore wind costs have increased since the early farms were developed, as projects have moved farther offshore and into deeper waters with more difficult construction and operating environments. Nevertheless further cost reductions are expected and have been confirmed by

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<sup>27</sup> Hydro and in some cases biomass electricity generation can be competitive with the fossil alternatives and does not require additional financial support above the wholesale generation price.

recent studies<sup>28</sup>. In the CSP sector, there is some evidence of declining costs in projects outside the EU.

### **Renewable energy – system impacts**

49. The large scale penetration of intermittent and distributed generation introduces challenges for network operators in terms of system balancing and stability, monitoring and control. Increasingly networks will need to adapt from a model where flexible generation responds to inflexible demand to one where demand adjusts to a less flexible supply. This will require investments in a combination of electricity storage (pumped or otherwise), fast response plants and network expansion, both internally and between countries.

50. These investments are likely to increase substantially in the EU, particularly post 2020, as the penetration of intermittent renewables increases. Intermittent generation also needs to progressively take on the same responsibilities as conventional generation, including balancing, to ensure that in the longer term RES generation competes on an equal basis with conventional generation technologies and does not distort the market, as highlighted in recent EC communications.

### **RES in Heating and Cooling – EU**

51. Renewable energy for heating and cooling accounts for a substantial part of the renewable energy demand, comprising about 40% of the additional renewable energy required to meet the EU target in the period 2010-20. According to the NREAPs, renewable sources in heating and cooling will increase by more than 50% between 2010 and 2020; the most important source is expected to be biomass (73%), followed by heat pumps (10%), and solar thermal and geothermal energy accounting for some 8%.

52. Investments in RES heating and cooling typically involve small investments at household or public building level. The largest single potential investments in RES heating and cooling are likely to be in district heating and there is potential for large scale conversion from fossil fuel sources to biomass co-firing and geothermal in Central and Eastern Europe. The substantial expansion foreseen for renewables in this sector seems challenging, considering the poor progress to date.

53. The barriers impeding the development of renewable heating and cooling technologies are similar to those for energy efficiency - small projects, lack of awareness, and split incentives – and strong public support in the initial phase of the market development and technical assistance is needed to develop the sector. Examples of successful public programmes include increasing biomass use in district heating in Sweden and solar thermal heating in Cyprus and Greece. Such programmes could be replicated in other jurisdictions to boost investment in the sector.

### **RES in Transport - EU**

54. Private transport is almost entirely dependent on oil consumption today<sup>29</sup>. In the EU transport accounts for some 25% of the total energy consumption and 27% of the total CO<sub>2</sub> production. Based on the NREAPs the renewable energy in transport will account for 16% of the additional RES production in 2010-20 – nearly all of which will be met from biofuels - as the contribution from

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<sup>28</sup> Crown Estate *Offshore Wind Cost Reduction Pathways Study*

<sup>29</sup> Electrification in rail has not yet materially changed this. According to EC Transport Statistical pocketbook 2011, across EU-27 in 2009, share of rail/metro in pass-km equals 7.6 per cent; share of rail in tonne-km freight is 10 per cent.

electrical vehicles is expected to be limited. This is equivalent of around 333.5 TWh [28675 ktoe] of biofuels in 2020, compared with 2010 consumption of 154.4 TWh [13273 ktoe ](75% biodiesel), of which 20% were imported<sup>30</sup>.

55. 1st generation biofuels from EU resources have the potential to meet about 3.1% of final consumption in transport<sup>31</sup>. Very few new investments are expected in Europe in 1st generation bioethanol projects and close to none in conventional FAME<sup>32</sup> biodiesel<sup>33</sup>. The market potential for 2nd generation biofuels is much higher, but requires further improvements in their manufacturing processes. 2nd generation biofuels are slowly emerging from the pure R&D phase and the first industrial production plants are anticipated to be operational within the EU in the next 1-4 years. It is likely that the rapid deployment of these projects will require adequate EU or Member State support schemes<sup>34</sup>.

## Renewable energy outside the EU

### - Electricity

56. The reduction in renewable investment in the EU is being partly offset by continued growth outside the EU, particularly in emerging Asian and Latin American markets. A number of the countries in which EIB operates outside the EU already have significant RES markets for new technologies (China, India and Brazil in particular), or are in the process of launching RES programmes (e.g. South Africa). In many cases decentralised renewable projects can be developed on a commercial basis and can be expanded in a number of regions (PV in rural Africa and India for example).

57. One of the barriers to the development of RES electricity in these markets is the high energy and fossil fuel subsidies which can create significant obstacles to both improving energy efficiency and developing renewable energy. According to the latest IEA reports, developing countries account for 85% of energy subsidies and fossil fuel consumption subsidies were estimated to amount to USD 409 billion in 2010, with oil subsidies accounting for half of this amount, followed by electricity and gas.

58. Other non-economic obstacles also hold back RES development, including legislative gaps, inconsistent licensing and administrative procedures, political and regulatory risks, critically grid access issues. These barriers are being slowly tackled by policy makers and this will lead to increased opportunities outside the EU in the coming years. The Bank can often play a substantial catalytic role, in particular by mitigating some of the political risks.

59. In contrast to within the EU, there remains significant hydro potential in a number of countries in which the Bank operates, particularly in Africa and Latin America, and these projects are often the lowest cost electricity expansion option available in the country. They also have the potential to be an important source of electricity for neighbouring countries with limited natural resources and help

<sup>30</sup> EU Transport in figures – Statistical pocket book 2012; EC

<sup>31</sup> Ecofys 2011, Financing Renewable Energy in the European Energy Market

<sup>32</sup> The molecules in biodiesel are primarily Fatty acid methyl ester (FAMES), usually obtained from vegetable oils by transesterification

<sup>33</sup> An exception has been diesel equivalent biofuels produced via hydrogenation from vegetable oils which renders high value fossil biodiesel or bio-jet fuel that can be mixed in any proportion. Due to their characteristics they seem to have a better market opportunity than traditional FAME and several big industrial plants have been recently commissioned.

<sup>34</sup> It is worthwhile to mention the European Biofuels flight path joint initiative between the EC-DG ENER, the air industry and the supply sector that has set a target of reaching a bio-kerosene production and use of 2 million tons per year by 2020 in Europe.



to develop regional markets. A regional approach to energy markets carries a number of significant advantages over the alternative national approach in relation to security of supply, competitiveness and the environment. Such projects can however present a number of safety, environmental and social challenges, for example in terms of involuntary resettlement and impacts on indigenous people and other vulnerable groups, which require careful analysis and monitoring.

- **Heating and Cooling**

60. Outside the EU traditional biomass accounts for a significant portion of total energy demand. The challenge is to modernise it as traditional practices can be unsustainable and have health implications. There is significant potential to introduce new technologies<sup>35</sup>, and meeting this need requires a similar approach as for energy efficiency and an appropriate policy framework is a necessary precondition to accelerate their development.

## **EIB ACTION**

61. EIB lending to renewables has increased substantially since 2006 when renewable energy became a priority lending objective of the EIB. The Bank finances the full range of renewable energy activities both inside and outside the EU. Wind has accounted for over a third of Bank financing, followed by solar, and hydro (primarily outside the EU). The Bank has played a significant role in the start-up phase of some emerging technologies, notably CSP and offshore wind where the Bank has financed approximately 75% and 50% respectively of these sectors.

62. The EIB finances projects that are economically viable, technically sound and in line with EU policy objects. Given the very substantial investment needs in the sector, the Bank will continue to support this sector as a high priority, in particular projects which:

- Contribute to Member States achieving their renewable energy targets particular in less developed renewable energy markets in the EU
- Contribute to the development and deployment of renewables in transport and innovative renewable energy technologies with good long-term prospects.

## **SCREENING AND ASSESSMENT CRITERIA**

63. The Bank supports a broad range of technologies across the renewable segments – power, heating & cooling and transport. Given the different development stages that these technologies are at (RDI, early market penetration and maturity), the Bank has divided commercially proven technologies into mature and emerging categories, with a separate economic rationale for supporting each. RDI projects are also eligible and discussed separately later in this document.

### **Mature Renewables**

64. Mature technologies are those such as onshore wind where costs are not expected to decline significantly – although they are expected to decline more rapidly than conventional alternatives. These technologies can be competitive against the least cost fossil fuel alternative in good locations. Mature sectors include onshore wind farms, hydropower, conventional geothermal and biomass for energy. Similarly, 1st generation biofuels projects can produce fuels competitive with hydrocarbons

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<sup>35</sup> For example, solar thermal heating could be increased substantially in India where there are currently only 3.5 GWth installed. This is in contrast to China with 138 GWth installed.

depending on the price of oil products and the cost of the raw materials which directly relates to their location.

65. In its economic analysis of mature renewable projects the Bank includes the costs of environmental externalities associated with CO<sub>2</sub> and other pollutants in the cost of the fossil fuel alternative and a security of supply benefit<sup>36</sup>. The Bank will continue to use its high carbon price scenario in its analysis of mature renewables<sup>37</sup>.

66. The Bank also includes the network costs associated with connecting RES to the grid. Further network investments are needed in most EU electricity systems today to accommodate new RES and costs are expected to rise as RES penetration increases. Furthermore, the costs of managing intermittency and the risks of curtailment are also considered in the analysis.

67. For some biomass projects additional benefits are also included, for example fire prevention, rural development. Where biofuels are concerned, due consideration is given to the lifecycle analysis, including CO<sub>2</sub> savings associated with their use, food competition and land use change.

68. By carefully assessing these costs and benefits, the EIB can continue to ensure that it supports economically justified mature renewable generation projects.

### **Emerging Renewables<sup>38</sup>**

69. A different rationale is adopted for emerging renewables which are currently not competitive with the least cost alternative. In these cases the Bank finances technologies which have a prospect of becoming competitive in a reasonable time frame. The Bank's rationale for this approach is the contribution that supporting projects makes to learning by doing and thus future cost declines.

70. This approach is based on the premise that a portfolio of renewable technologies will be needed to substantially reduce GHG emissions in the longer term. Relying only on mature technologies would be sub-optimal, as there is uncertainty about which technologies will be needed to meet the climate targets in the long run. Uncertainty over economies of scale and learning by doing means that some technological failures are inevitable. These failures can still create valuable knowledge, and by reducing potential investment options, increase confidence in other technologies. The need to support their rollout today, rather than wait, is justified on the basis that cost declines occur through learning by doing effects, not exogenously with the passage of time<sup>39</sup>.

71. There is considerable discussion about the cost involved in supporting these technologies and the cost should be proportional to the benefits generated. The Bank will continue to follow closely the development of these technologies to ensure that they continue to have good prospects to become competitive with the alternatives over a reasonable time frame.

72. Since the adoption of this approach, the evidence suggests that some technologies considered emerging are now close to maturity. Globally there is now around 100 GW of solar PV installed, and costs have declined substantially. This decline cannot continue indefinitely and the inflection point in the cost decline curve seems to have been reached. As a result well developed PV projects are now economically competitive in the EU in areas with good solar irradiation. At this point the EIB will

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<sup>36</sup> <http://www.eib.org/infocentre/publications/all/economic-appraisal-of-investment-projects.htm>

<sup>37</sup> See EIB Energy Review 2006 for details.

<sup>38</sup> The Bank considers the following technologies covered by the SET Plan as emerging: Solar (PV and CSP) and offshore wind for power production. Innovative (2<sup>nd</sup> generation) biomass conversion technologies into energy carriers (e.g. biofuels, or biogas).

<sup>39</sup> Stern Review: Economics of Climate Change

continue to screen these projects as emerging renewable technologies, but will follow PV developments closely as this technology may be considered mature in the next few years.

### **Large Hydro**

73. Large hydro generation projects, including those with large dams or reservoirs, can raise sensitive safety, environmental and social issues. Outside the EU, these are normally financed by the EIB in cooperation with other IFIs. These projects need to comply with the Bank's environmental and social standards, notably with regard to concerns related to involuntary resettlement and impacts on indigenous people and other vulnerable groups. For large dams the involvement of an independent panel of experts reviewing the design and site investigation, the construction and commissioning of the dam and reservoir is also required.

### **Renewable Heating & Cooling**

74. Renewables in heating and cooling can be competitive with fossil fuel alternatives in many locations with a good biomass, geothermal or solar thermal resource, but their expansion has been limited to date in most of the EU countries and elsewhere. The Bank's financing of renewables in heating and cooling has been limited, but has expanded recently. The Bank will target support for national and regional initiatives that seek to develop an appropriate framework. TA programmes such as the ELENA facility which address some of the capacity issues affecting the sector could also play a role in supporting the public sector developing renewables in heating and cooling.



## Energy Efficiency

### BACKGROUND

75. Investing to reduce energy consumption remains the most cost-effective way for the EU to meet its energy and climate objectives: it increases security of energy supply, increases competitiveness of EU industry by reducing energy costs and reduces the carbon intensity and increases the environmental sustainability of the EU economy. It also has the potential to increase local employment – particularly important during the current economic recession – and helps ensure that energy costs remain affordable for households in the context of rising primary energy costs and carbon prices.

76. As part of the 2020 energy and climate package, the EU committed to reduce its final energy consumption in 2020 by 20%<sup>40</sup>. In 2011 the EC estimated<sup>41</sup> that based on then current measures the EU was on target to reductions of only 9% against the target. This led to a number of new initiatives which aimed to provide more support for energy efficiency measures, in particular the Energy Efficiency Directive (EED), which, inter alia, requires the public sector to renovate 3% of its building stock every year<sup>42</sup> and engage in energy-efficient purchasing decisions; requires energy suppliers to reduce the energy consumption of its customers by 1.5% per annum; and requires mandatory regular energy audits of companies above a certain size.

### Unlocking the potential in the EU – buildings, transport and industry

77. The greatest potential for energy savings in the EU is in buildings – both space heating and cooling and appliances - which account for nearly 40% of EU final energy consumption, two thirds of which in the housing sector. It is estimated<sup>43</sup> that the EU could reduce its energy consumption in buildings by up to 35% (with an even higher technical potential). A key challenge in this sector however is the relatively low annual new build rate of only 1.5%, hence most energy savings will need to be realised through the renovation of the existing stock of buildings. The measures in the EED related to the building sector were primarily aimed at addressing this issue by introducing mandatory requirements on the renovation rate of existing buildings and incentivising energy suppliers to encourage (and potentially part finance) energy saving measures by final consumers. These complement the energy performance in buildings Directive (EPBD) which introduces the concept of least-cost optimal refurbishment levels, and sets high energy standards for new buildings by requiring all new public buildings to be near zero energy buildings from 2019 and all other new buildings from 2021.

78. The transport sector accounts for 33% of final energy consumption and the EC estimates economically viable efficiency gains of 21% are possible. Developing it means using more efficient transportation technology, a shift in transport modes and reducing the need for transport. Significant energy savings are possible with more efficient transport technology, for example cars, trains and truck using better engines, more efficient tyres, or the development of new more efficient vehicles, such as hybrids or electric solutions. The uptake of new type of vehicles, such as electric vehicles, requires public support to overcome the challenge of high costs in the early market penetration

<sup>40</sup> The targeted saving is 20% of the 2005 forecast of 2020 final energy consumption.

<sup>41</sup> EED impact assessment SEC(2011) 779 final

<sup>42</sup> Defined as buildings above a specified size owned and occupied by central government.

<sup>43</sup> Staff working document accompanying Energy Efficiency Plan 2011 (SEC (2011) 277 final)

phase, and for the provision of suitable charging infrastructure in the case of electrical cars. While these are likely to only play a limited role up to 2020, they will be important in the longer term.

79. Industry accounts for 26% of final energy consumption, but the potential contribution of the sector to achieving the EU savings targets is lower than buildings and transport, and it is estimated that only 13% of economic efficiency gains are possible. This is mostly reflects the substantial commercial incentives for large energy consuming industries to reduce energy costs to remain competitive, and as a result the energy intensity of EU industry is relatively low<sup>44</sup>. Although a large part of the commercially viable energy savings may have been realised for larger consumers, the current low carbon price in the EU ETS may not provide adequate signals or sufficient stability for future economically justified investment.

80. It is estimated that considerable energy saving potential exists in small and medium sized businesses (including in buildings). This sector is more sensitive to prices than households, but still requires policies to incentivise energy efficiency measures. Energy audits can be a very effective tool to identify investment opportunities and the EED encourages Member States to develop programmes to encourage SMEs to undergo and implement energy audits<sup>45</sup>.

81. Energy savings in energy production sector (that is large scale electricity power and heat generation) faces the same commercial incentives to invest as large industry – although whether all economically justified investments are implemented depends, inter alia, on the carbon price reflecting the economic cost of carbon. Reflecting their very high efficiency, the EED enhances the support to high efficient cogeneration requiring new power generation and substantially refurbished facilities to be equipped with high-efficiency cogeneration units to recover waste heat, where commercially viable. In energy transmission and distribution, regulations should encourage energy efficiency, which is not always the case. The widespread introduction of smart meter and smart grid systems, including smart appliances, may further facilitate efficiency gains in electricity and gas networks and for end-consumers, as suggested in the EED.

### **Investment needs**

82. Recent assessments by the EU Commission estimate that overall up to EUR 85 billion a year should be invested in energy efficiency to achieve the targeted 20% reduction by 2020. The largest share of these investments is in the buildings sector, where EUR 60 billion is needed per year in investments in order to realise the economic energy efficiency potential<sup>46</sup>. There is, however, limited reliable information on the actual investment in EE mostly due to the range of actors involved, who frequently make investments from their own funds in a wide range of heterogeneous measures. Anecdotal evidence suggests that the current level of investment is very low in most EU countries and far less than is needed to achieve the objectives. Reporting in the national EE plans is also generally limited, as the impact of the policies is often difficult to judge. This also reflects the limited institutional capacity in many Member States.

### **Barriers**

83. Even in the EU where many policies have been implemented to support investment, the level of investment is below the economically justified level. This is largely related to the substantial and

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<sup>44</sup> The energy efficiency index of industry has improved by 30% over 1990-2008, ODYSSEE Database, [www.odyssee-indicators.org](http://www.odyssee-indicators.org)

<sup>45</sup> They are mandatory for large industry

<sup>46</sup> European Commission (2012), "Financial support for energy efficiency in buildings" consultation paper

varied barriers that prevent the implementation of these investments. Households and other actors face difficulties to get good information to identify energy efficiency investments and to implement them (e.g. through finding a specialised company or access to finance). Split incentives are an important issue for rental buildings. National programmes can play an important role in addressing these barriers.

84. The development of the EE potential often implies implementing a large number of small investments. Depending on the way these projects are implemented, the transaction cost involved may be substantial and affect their profitability negatively. High transaction costs are often significantly related to information and procurement costs. Developing approaches that reduce these transaction cost seems necessary, either by standardising the approach to implement EE measures, regrouping small projects or by reducing the cost of access to information.

85. The product offering of the financial markets as a whole will need to evolve if this market is to be served. EIB endeavours to play its part here, notably through development of the DEEP Green suite of products and support of a range of special purpose products – securitisation, dedicated ESCO financing, private equity – in addition to more conventional structures. The Bank also provides technical assistance directly to project promoters and financial intermediaries to develop project pipelines, including in the public sector, for example, the ELENA<sup>47</sup> initiative which is managed by the Bank in cooperation with the Commission.

## EIB ACTION

86. EIB's aim in this sector is to accelerate and increase energy efficiency investment both within and outside the EU. EIB financing for energy efficiency has increased from 800 MEUR in 2008 to peak at EUR 2.4 billion in 2010 before declining to just under EUR 1 billion in 2012. The majority of the Bank's energy efficiency investments are in buildings (50%), the energy sector, notably CHP (30%) and industry (15%). The Bank's contribution to promoting energy efficiency goes beyond lending for energy efficiency projects:

- Through its “mainstreaming” of energy efficiency the bank ensures that appropriate EE measures have been considered in all the projects it finances.
- It provides support to promoters and financial intermediaries to develop the market for energy efficiency projects by providing technical assistance and developing financial instruments – either on its own behalf or in co-operation with the European Commission. This support reduces the non-financial barriers that prevent the development of EE investments (access to information, technical capacity, regulatory measure, etc.). Examples include ELENA, EEEF<sup>48</sup>, GGF and JESSICA<sup>49</sup>. (EEE-F and JESSICA also target the financial barriers).

## Outside the EU

87. The issues related to the development of EE projects in the countries where the Bank operates outside the EU are generally similar to those encountered in the EU. In contrast to within the EU, there is still a large EE potential in industry and transport, notably related to the development of public transport. However, there are often two significant differences, mainly related to high energy

<sup>47</sup> The ELENA facility provides grants for technical assistance to local and regional authorities for developing energy efficiency and renewable energy investments.

<sup>48</sup> The EEEF combines TA with debt, equity and guarantee instruments to support EE.

<sup>49</sup> JESSICA funds investing in EE total between EUR 600 million and EUR 700 million.

subsidies and the weak institutional context. To develop EE operations, the Bank's involvement at the institutional and policy level is often necessary, generally with in cooperation of other IFIs. The Bank will continue developing new initiatives and expand existing ones (GEEREF, EEFF, GGF or SE4All) to boost EE investment outside the EU. All these initiatives include elements of TA or grant funding and make a contribution to EE objectives by tackling different sectors and regions.

## SCREENING AND ASSESSMENT CRITERIA

88. In general, energy efficiency projects supported by the Bank need to demonstrate that they are economically justified on the basis of a classic cost-benefit analysis – i.e. that the net present cost of the project over its life is less than the net present value of the energy saved, including externalities. In addition, the Bank screens projects with the objective of ensuring that they are motivated by energy efficiency rather than simple replacement.

89. In cases where it is difficult to separate out the investments directly related to energy savings, in order to be considered eligible for Bank finance as an energy efficiency project, energy savings should at least cover 50% of the cost to show EE is a significant element of the project (or the relevant part of the project).

90. In contrast to the other energy sub-sectors covered in this review, energy efficiency investments cut across the traditional sectoral boundaries and the Bank will therefore seek to adapt its approach to energy efficiency by developing products and project selection screening better adapted to:

- Overcome the **barriers** commonly associated with energy efficiency investments, namely: small projects, new markets, new technologies and lack of information.
- Support **sector policy objectives** of the three key markets in which the majority of efficiency investments are expected to be made: namely buildings, transport and industry.

### Addressing investment barriers

#### - Information barriers

91. Limited know-how on implementing energy efficiency measures continues to constrain the development of energy efficiency projects. EIB will continue to contribute to developing best practice standards to implement large EE programmes in the building sector and other sectors. It will work with the Commission and other partners to develop new technical assistance initiatives, such as ELENA, and develop risk sharing and other financial products (such as EEEF) where this is valuable and helps to address identified needs. For example, the Bank is currently actively working to develop financial products to address the energy efficiency market (Deep Green).

#### - Small projects/streamlined co-financing of national programmes

92. A large number of investments in energy efficiency are small and in these cases it can be very difficult and expensive to undertake a cost-benefit analysis on a project by project basis. In the case of EE programmes therefore the Bank will use simplified criteria adapted to the target sector and country. This will be based on the Bank's analysis of those investments and what can typically be expected in terms of energy savings for appropriate cost levels. Typically, these small investments should form part of national (or regional) programmes, where, following an analysis of the proposed schemes to be promoted under the programme (for example loft insulation), economically justified



components would be considered to be acceptable for EIB financing on an ex ante<sup>50</sup> basis – a “white list” approach. The national programmes should include provisions for monitoring and evaluation of the supported individual investments, where they do not the EIB will mandate them. In cases where there are no national programmes, the Bank may with interested regional or local authorities develop similar schemes together with local consultants and financial partners.

- **New markets**

93. When energy efficiency involving existing technology and practices are introduced into new markets their expansion may be slow during the early adoption phase, due to higher costs (because of their small scale), or unwillingness to change from existing practices (which is often the case for buildings). Although these projects may not be economically justified during the early stage of deployment, due to the higher costs of early market penetration, the Bank would nevertheless support such investments to encourage their deployment during the early market penetration phase and only in cases where the initiative can be strongly linked to the EU and national policy priorities. The roll-out of near zero energy buildings, or national programmes to support condensing boilers, are good examples of measures that could benefit from this initiative.

- **New technology**

94. Another challenge is the financing of new and innovative technologies which are expected to become competitive in the future but that are difficult to justify economically as their current cost is high, for example the networks for hybrid and electric cars and micro CHP. As with emerging RES technologies, the cost of these technologies are expected to fall over time and they can be expected to be economically justified as their market share grows. The Bank will where feasible work with Member States and financial intermediaries to support investments in such technologies where they are clearly supported by national and EU policies and they have good prospects to become economic in a reasonable time frame.

**Targeted support to sector policies:**

- **Buildings in the EU**

95. The Bank will support the implementation of the Energy Performance of Buildings Directive, both for existing and new buildings. This is a key sector for the EIB, considering that buildings account for the largest share of the EE improvements and investments in EE in coming years in the EU.

96. The Bank generally limits its financing of energy efficiency projects to the EE component of the investment. This can be very low for projects with multiple objectives, such as for new buildings, where it can be as low as 10-20%. To support the implementation of the EPBD and boost EE investment in near zero energy buildings during their early deployment phase the Bank will finance up to 50% of the cost of the project provided that the cost per m<sup>2</sup> is below a benchmark level. The benchmark will be assessed in the context of the country concerned.

- **Industry and energy**

97. The focus of the EIB action in industry is improving EE in existing industries. The main challenge in industry is the financing of SME investments in EE and the Bank will support through intermediary Banks all investments identified by approved energy audits in SMEs, Mid-Caps and large industry. In addition, the Bank will support the manufacturing of EE technologies, in particular by financing RDI, such as for EE cars or LED lighting. The Bank’s focus in the energy sector will be to support the development of high efficiency CHP and upgrading of district heating systems.

<sup>50</sup> provided they can be justified economically, in line with the general criteria

- **Transport**

98. The Bank is a major funder of public transport infrastructure. This contributes to the quality of the urban environment, but also has a substantial EE dimension. The main specific actions expected are<sup>51</sup>:

- Support the development of transport alternatives to cars, trucks and airplanes.
- Promote the development of hybrids or electrical vehicles to support both EE and the use of RES.
- Promote the use of the most EE solution in the transport projects the Bank finances.

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<sup>51</sup> See EIB Transport Lending Policy for further discussion on transport issues:  
<http://www.eib.org/infocentre/publications/all/eib-transport-lending-policy.htm>

## Research, Development and Innovation in Energy

### BACKGROUND

99. Investing in clean energy makes economic sense: the accelerated deployment of efficient and low-carbon technologies can help cut energy bills, reduce energy import dependency and lower emission. Studies<sup>52</sup> show that every additional investment can generate three times as much in future fuel savings by 2050. Still, many low carbon technologies are expensive; research, development and innovation (RDI) can help reducing significantly their costs. This in turn would have a large positive impact on the overall cost of energy and hence on the quality of life and industrial competitiveness. Unfortunately nine out of ten technologies that hold potential for curbing energy demand and CO<sub>2</sub> emissions are failing to meet the deployment objectives needed to achieve the necessary transition to a low-carbon economy. Some of the technologies with the largest potential are actually showing the least progress.

100. For instance, renewable energy technology patents worldwide increased fourfold from 1999 to 2008, led by solar PV and wind. But while these two technologies have succeeded, patent development has failed to translate into sufficient commercial applications of other technologies (such as enhanced geothermal and marine energy production). Promising renewable energy technologies (such as offshore wind and CSP) and capital-intensive technologies (such as CCS), have significant potential but still face technology and cost challenges, particularly in the demonstration phase.

101. Against this background, governments can play an important role in steering innovation trends over the long term, by creating supportive policy environments and safeguarding the drivers of innovation. The EU SET-Plan does that. It is the core element of the EU policy for RDI in the energy sector, setting measures to streamline RDI activities across national public funding initiatives. It targets key priority sectors including bioenergy, CCS, electricity grids, fuel cells and hydrogen (FCH), nuclear, solar, wind, and energy efficiency through the Smart Cities initiative.

102. Investments in these technologies increased over the period from 2007 to 2010, with the private sector making about 70% of the total RDI investment in SET Plan priorities<sup>53</sup> and Member States and the EC accounting for about 20% and 10%, respectively. However, the EC consider these investments insufficient to achieve all of the EU 2020 and longer term objectives. The financing needs for the SET-Plan priorities range between EUR 58 billion to EUR 72 billion over the period 2010-2020, the majority being in CCS and solar<sup>54</sup> (27% each), followed by nuclear fission (17%), bioenergy (15%) and wind (10%).

103. Aware of these financial needs, EIB supports RDI in the energy sector under the Bank's "Knowledge Economy" agenda. This agenda includes a variety of financial and non-financial products to foster research and development activities, but it also supports the wider area of innovation, such as process/product innovation design to improve or differentiate existing products aiming at reducing cost or extending life of existing product range.

<sup>52</sup> "Energy Technology Perspectives 2012". International Energy Agency

<sup>53</sup> The SET Plan technologies are eligible to receive support through the European Commission's financial instruments, such as the Horizon 2020 program (preceded by the FP7 programme), the EEPR and NER300. In addition, the Intelligent Energy in Europe (IEE) programme has initiated measures to promote market uptake of innovative renewable energy technologies and new energy efficiency business models.

<sup>54</sup> Split between PV and CSP 60/40

## **EIB ACTION, SCREENING AND ASSESSMENT CRITERIA**

104. The EIB finances the full range of RDI activities reflected in the innovation cycle. This includes, research activities focussing on applied research within existing technology boundaries with practical applications in mind, development activities comprising collaborative development within existing industries to produce new or next generation technology; and Innovation involving substantial modification of processes and products designed to modify, improve, differentiate existing products, aiming at reducing cost or extending the life of the existing product range. During the period 2007 to 2011, the Bank supported EUR 2.8 billion in energy RDI activities. This amounts to 5% of the entire RDI financing of the Bank (EUR 54 billion).

105. In future, the Bank will continue its prioritisation of RDI operations in the energy sector. The EIB supports energy RDI activities through a variety of non-financial and financial products. Specific actions will include:

- Increase commitments to energy projects under knowledge economy
- Develop risk-sharing mechanisms for RDI projects in cooperation with the European Commission, for example RSFF.
- Foster the implementation of SET-Plan technologies through other mechanisms developed in cooperation with the European Commission e.g. the NER300 Initiative and ELENA.

## Fossil Fuel Generation

### BACKGROUND

106. Demand for electricity in the EU is expected to rise only moderately over the next two decades. Fossil fuels will decline as a share of total electricity supply and in absolute amount, with the energy mix showing a considerable shift towards renewable energy sources, especially wind. Among fossil fuels, there appears to be increasingly less space for coal fired generation (with oil fired generation already marginal) and gas is expected to become the main fossil fuel in electricity production within the coming ten years. Net additions to the current EU generation park will be very limited.

107. This view is consistent with the 2020 energy strategy of the EU and with the energy roadmap 2050, which recognises gas as a critical transition fuel for the decarbonisation of the energy system – particularly given its high flexibility, which is needed to back up intermittent renewables, and its capability to substitute for coal plant thus reducing emissions with existing, cheaper technologies.

108. But the current and, in all likelihood, future EU energy policy does not prohibit the construction of any new fossil fuel fired power stations. While it aims for a drastic reduction in carbon emissions from fossil fuel generation, for instance through clean technologies like carbon capture and storage (CCS) or biomass co-firing, EU energy policy does not mandate a particular fuel mix and it is for the Member States and utilities to decide on the mix of plant that will be consistent with that Member States 2020 RES targets and compatible with emission limits under the EU Emissions Trading System (ETS).

109. From a legal standpoint, the ETS emission reduction requirements are binding but the European Commission is currently consulting on a possible 2030 GHG target. In addition, the Council has endorsed a GHG reduction by 80-95% by 2050 of 1990 levels, but only in the context of necessary reductions according to the International Panel on Climate change (IPCC) by developed countries as a group. The latest IPCC meeting in Doha failed to reach such an agreement – leaving the EU 2050 GHG reduction target in a grey area.

110. The Bank could screen fossil fuel projects through its usual appraisal methodology, relying solely on the ETS to ensure that fossil projects are consistent with the EU's climate objectives. In current circumstances, however, a combination of low electricity demand and an over-supply of carbon allowances has depressed carbon prices. The Bank therefore proposes to set a carbon footprint benchmark against which fossil fuel projects can be assessed to ensure that they are consistent with both EU's energy and climate targets. This is the rationale for the introduction of an emission performance standard – a technology neutral screening tool which is designed to ensure a “no-regret” approach to the financing of fossil fuel generation.

### EIB ACTION

111. The increased EIB focus – since the previous energy review<sup>55</sup> – on climate action and the consequent reinforced support to energy efficiency and renewable energy projects has partly led to a decline in EIB lending to fossil power plants: financing of fossil fuel generation dropped from 21% of

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<sup>55</sup> “Clean Energy for Europe - A reinforced EIB contribution” (EIB, 2007)

EIB energy lending in 2007 to 6% in 2012<sup>56</sup>. This decline is also in line with more general market developments within the EU, where renewable energy sources are increasingly displacing fossil fuels in power generation.

112. Despite the focus on reducing the use of fossil fuels, it is likely that the world, and the EU, will still need them in large quantities at least in the short to medium term. In order to ensure that the use of fossil fuels in power generation is compatible with the path towards a sustainable energy market, the EIB is reinforcing its project screening criteria such that only the best available, efficient and clean technologies, aimed at supporting a low carbon economy are supported for financing. These criteria – discussed below – would screen out power only coal or lignite fired power stations, but would allow some high efficiency coal and lignite fired CHP, coal and lignite projects fitted with CCS and some coal/lignite stations co-fired with carbon neutral fuel sources (e.g. biomass) and gas fired CCGT power and CHP plants.

### SCREENING AND ASSESSMENT CRITERIA

113. All fossil fuel power plants financed by the Bank:

- Must be economically justified based on a cost benefit analysis – including a carbon price which reflects the marginal damage of each unit harmful emission (e.g. CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>).
- Have CO<sub>2</sub> emissions of less than the EPS (Emission Performance Standard), expressed in gCO<sub>2</sub>/kWh.

114. In addition all projects would have to comply with the principles of EU legislation, including the CCS Directive, the large combustion plant Directive<sup>57</sup>, the industrial emissions Directive, and the ETS Directive, and make use of best available technology.

115. Any fossil fuel power plant with a specific emission in excess of the EPS could only be financed where it contributes to security of supply on isolated energy systems such as small islands with no feasible mainland energy connection - and only where there is no economically viable alternative. This criterion will apply to both greenfield projects and plant refurbishment.

116. In the absence of binding global emission targets, EU efforts are centred on raising the ambition level of carbon emission reductions worldwide. Consistent with this, the same EPS threshold will be used for Bank's operations outside the EU. However to reconcile the right to economic development of hundreds of millions with no access or unreliable access to electricity and low per-capita emissions - as enshrined in Art. 3 of the UNFCCC - with the universal commitment to keep atmospheric greenhouse gas concentrations within safe limits, recognized in Art. 2, exceptions will be made for projects outside the EU located in the poorest countries<sup>58</sup> where it can be demonstrated that projects with carbon emissions above the threshold will have a significant and material positive impact on poverty alleviation and economic development.

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<sup>56</sup> Of the fossil fuel generation projects financed by the Bank since 2007, 70% of total 2007-2012 value of EUR 7.4 billion was combined cycle gas turbines (CCGTs).

<sup>57</sup> Directive 2001/80/EC (Large Combustion Plant Directive) and amendments.

<sup>58</sup> Least developed countries (see <http://www.unohrrls.org/en/ldc/25/>) and those formally identified by the World Bank as Low Income countries (<http://data.worldbank.org/income-level/LIC>).

### Emission Performance Standard

117. The EPS is set at a level<sup>59</sup> designed to ensure that the Bank finances fossil projects whose carbon emissions are consistent with the EU's climate and energy policies. It is a carbon footprint benchmark – expressed in tonnes of CO<sub>2</sub> per kWh – consistent with the total carbon emission pathway<sup>60</sup> defined in the ETS Directive indefinitely in each year from 2005.

118. The EPS threshold is valid for the next five years, however it can be amended at any time to reflect changes in EU climate or energy policy, for example the introduction of 2030 emission targets, and a first review is expected to take place in the second half of 2014. By adopting this approach, the Bank is ensuring that all the projects it finances are at least no worse than the average level consistent with EU climate policy; this is in effect a “no regrets” approach to the sector.

119. Moreover, the EPS threshold is a technology neutral benchmark, as it applies to all power and CHP generation projects without discriminating among fuels, in compliance with EU energy policy which leaves the choice of fuel mix to Member States.

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<sup>59</sup> The methodology for the calculation of the EPS, as well as its proposed level, is published on the Bank website ([http://www.eib.org/attachments/consultations/elp\\_methodology\\_emission\\_performance\\_standard\\_20130624\\_en.pdf](http://www.eib.org/attachments/consultations/elp_methodology_emission_performance_standard_20130624_en.pdf)).

<sup>60</sup> The European Union has endowed itself with GHG emission targets beyond 2020, embedding them in the ETS regulations– under which the total allowable carbon emissions in the EU are perpetually reduced by 1.74% per annum. In 2050 this emission reduction would be circa equivalent to a 70% reduction in carbon emissions compared to 1990.





## Hydrocarbon extraction and petroleum refining

### BACKGROUND

120. Rising hydrocarbon import requirements for the EU and increasing demand from emerging and developing countries call for stronger mechanisms to secure EU consumers' continuous access to these fuels. European hydrocarbon production is declining; the European Commission forecasts domestic conventional oil and gas production to decrease annually by approximately 5% and 4%, respectively, over the next two decades.

121. Within the hydrocarbon extraction sector, there is significant potential for global unconventional hydrocarbon production, particularly shale gas and this could potentially extend and diversify the sources of hydrocarbon supply. The massive development of North American shale gas reserves has impacted gas pricing in certain regions, energy investments, climate change, and environmental sustainability.

122. Although it is still early to confidently predict the impact of this major change in Europe, production of unconventional gas in the EU could help to reduce EU energy import dependency, and increase differentiation and security of supply. Shale gas's future in the EU will partly depend on the quality of the resources, production costs<sup>61</sup>, political decisions at country level and the evolution of the existing legislative frameworks, which are in general adequate for early exploration activities but might in some cases require further development to tackle the potential environmental, safety and health risks associated with extensive hydraulic fracturing ('fracking')<sup>62</sup>. Studies<sup>63</sup> published by the European Commission in 2012 showed that shale gas produced in the EU would lead to slightly more GHG emissions than conventional natural gas produced domestically, but less than imported gas, due to the impacts on emissions from long-distance gas transport; they also showed that extracting shale gas generally imposes a larger environmental footprint than conventional gas development.

123. Safety, health and environmental standards are a general concern associated with hydrocarbon extraction<sup>64</sup>. The explosion of the Deepwater Horizon drilling rig in the Gulf of Mexico in 2010, generated further anxiety in the public opinion regarding hydrocarbon operations. In the wake of that event, the European Commission proposed a new directive<sup>65</sup> to raise EU offshore hydrocarbon production standards to the world's highest levels.

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<sup>61</sup> The extraction of shale gas must be economically and financially profitable; the viability largely depends on the price of natural gas

<sup>62</sup> Although at EU level there is no specific legislation regarding shale gas, the Final Report on Unconventional Gas in Europe, commissioned by DG Energy and published in January 2012, concludes that "an adequate regulatory framework for early exploration (seismic/test drilling) activities exists taking into account all scrutinised laws and regulations. The activities relating to exploration/exploitation of shale gas are already subject to EU and national laws and regulations". At a country level, there is a range of approaches, with France and Bulgaria having banned the application of hydraulic fracturing. In France, the act adopted prohibits all exploration activities by means of hydraulic fracturing, until the impact of hydraulic fracturing on public and environment is properly being assessed.

<sup>63</sup> "Climate impact of potential shale gas production in the EU", DG Clima, July 2012; "Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe", DG Environment, August 2012.

<sup>64</sup> The legal framework concerning oil and gas production in the EU is partly set by the Hydrocarbons Licensing Directive (94/22/EC), which has the objective to improve the security of supply and to ensure a competitive, transparent and non-discriminatory European market.

<sup>65</sup> Com(2011) 688: "Proposal for a Regulation of the European Parliament and of the Council on safety of offshore oil and gas prospecting, exploration and production activities"

124. Despite a decline in demand, the role of oil in the EU energy mix remains important over the next two decades and beyond, mainly as a fuel for the transport sector. The Commission staff working paper on “Refining and the supply of petroleum products in the EU”, published in 2010, highlighted that the EU petroleum product market is a mature market which has more than likely already hit its peak and that processing intensity in refining will increase as a result of more stringent product specifications, in line with the Bank’s expectation. In the Energy Roadmap 2050, the Commission argues that, for security of supply reasons, the EU should maintain its presence in the petroleum refining sector, albeit by upgrading and adapting existing refineries rather than investing in new distillation capacity.

125. In this context, the upgrading and construction of new infrastructure for the security of energy supplies, notably new gas and oil facilities, is a priority area for energy investments in the EU and for the EIB. As well as access to crude oil and natural gas, refining infrastructure is a crucial part of the hydrocarbon supply chain. The Bank adopts a very selective approach to the oil and gas upstream (extraction) and the petroleum refining sector. In particular in the refining sector, the Bank prioritises investments aiming at improving energy efficiency, meeting EU fuel specification requirements to support the development of more fuel efficient engines and increasing the production of such fuels at the expense of lower value products, without increasing the overall refining processing capacity.

## **EIB ACTION**

### **Hydrocarbon extraction**

126. Financing of indigenous hydrocarbon production is driven and justified by the need for security of energy supply. This activity in the EU is currently declining, in line with the observed trends of oil and gas field discoveries in the EU and the fall in oil demand, which reduces the levels needed for compulsory oil stocks.

127. The EIB will finance the extraction of hydrocarbons if opportunities arise, which are technically, financially and economically justified, taking into account environmental and social impacts. As regards in particular unconventional hydrocarbon production, in line with the Bank’s priority lending objective for security and diversification of energy supply, such developments would be eligible for EIB financing, particularly those within the EU. Shale gas present in some EU countries with limited diversification of gas supplies and high coal utilisation, and the potential for gas as a transition fuel may be particularly welcome in such cases. It is worth emphasising that at the point of consumption the gas produced from shale gas reservoirs is the same as the gas that is already used across the EU.

128. For projects outside the EU, financing will be mandate dependent. Priority would be given to projects that aim to supply gas to the EU, support significant local economic development and poverty alleviation or generate climate action or other environmental benefits. In the operations it finances, the EIB will ensure the application of the updated Transparency Directive and Accounting Directive, which build upon the Extractive Industries Transparency Initiative–EITI<sup>66</sup> – endorsed by the EIB since 2008.

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<sup>66</sup> The EU has been working to amend the existing Transparency Directive (2004/109/EC) and Accounting Directive (78/660/EC and 83/349/EC) to specify reporting regulations applicable to EU companies involved in extractive industries. The amendments to the Accounting Directive were approved by Council in April 2013. The amendments to the Transparency Directive have been submitted in May 2013.

## Petroleum refining

129. The total EIB loans approved to refinery projects peaked at EUR 1.2 billion in 2010 and dropped to below EUR 0.1 billion in 2012. It is estimated that the amount of investments that the refining industry in Europe has already committed to spending (in what it calls firm projects) between 2010 and 2020 is in excess of EUR 13 billion<sup>67</sup>. Given the expected trends in product demand/supply and taking into account both direct and indirect CO<sub>2</sub> emissions associated with the refinery projects, the following projects that are supporting important EU objectives have been considered priority (e.g. high value added) projects for the EIB in the refinery sector:

- CCS demonstration projects in refinery (in particular pre-combustion CO<sub>2</sub> capture from the gasification of residuals or petroleum coke)
- Energy Efficiency projects (e.g. CHP)
- Conversion projects that target both the tougher product specifications (such as the international regulations on marine fuels) and the adjustment of the production to changing consumption patterns in the market. For this type of project the downstream CO<sub>2</sub> savings (lower emissions from vehicles) should more than offset the increased emissions at the refineries due to additional processing.

130. Additional crude distillation capacity to cover product demand is not justified over the medium term even for exports to other parts of the world. However, the long-term rationalization of the refining industry may result in the concentration of capacity into larger, more efficient refining sites. Therefore, the EIB may take into consideration the financing of new crude distillation capacity, but only when there is a clear and uncontroversial situation of replacement (combined with enhancements) of existing capacity.

131. Financing outside the EU will be mandate dependent. Priority would be given to projects that increase security of supply for the EU, support significant local economic development or generate climate action benefits or other significant environmental improvements.

## SCREENING AND ASSESSMENT CRITERIA

132. Projects shall make use of best available technology and demonstrate satisfactory financial and economic returns. In particular, projects shall undergo a cost benefit analysis, which quantifies the benefits of exploiting domestic hydrocarbon resources or producing domestically petroleum products rather than importing them, taking into account environmental externalities and security of supply.

133. If an unconventional hydrocarbon project is presented, it would be appraised on its own merits with heightened scrutiny of environmental and water management, and the capability for robust on-going regulatory oversight. The standard EIB structures would probably not allow funding of the early stage 'exploration/appraisal', but all other parts of the chain should be eligible. The current set of EIB procedures for appraisal would continue to be suitable; any possible new EU regulation<sup>68</sup> and other best practice regulation covering unconventional fuel extraction will be applied

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<sup>67</sup> European Commission staff working paper on "Refining and the supply of petroleum products in the EU", COM(2010) 677 final

<sup>68</sup> The European Commission has launched an initiative, led by DG Environment, on "Environmental climate and energy assessment framework to enable safe and secure unconventional hydrocarbon extraction", to examine opportunities to

to projects; it would also be wise to integrate the outcome of the forthcoming US EPA<sup>69</sup> and other studies on the impacts of fracturing and water management.

134. Once a project is approved by the EIB, on-going operational supervision would be the responsibility of the competent authorities along with the usual EIB regular monitoring.

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diversify energy supplies and improve competitiveness, including by production of unconventional gas. The public consultation linked to this initiative finished in March 2013. The Commission is now working on the impact assessment, and based on the outcome, it will decide whether it becomes legislative or a non-legislative proposal. The proposal will be ready by the end of 2013.

<sup>69</sup> EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources, an extensive review which commenced in 2011 and is due to be released for consultation in 2014.

## Nuclear Energy

### BACKGROUND

135. Nuclear energy at present generates approximately one third of the overall electricity consumed in the EU and two thirds of its low-carbon electricity. As a large scale low-carbon option, it is expected to remain in the EU power generation mix with projects planned in a number of EU countries with investment costs in excess of EUR 100 billion over the period to 2030. This is in line with the scenarios developed by the European Commission in the Energy Roadmap 2050, in which nuclear energy is anticipated to contribute to lower system costs and electricity prices. In addition, a number of countries are considering extending the life of existing units.

136. Despite the weight of nuclear power in the energy mix, its social acceptability remains an issue in some Member States, particularly after the Fukushima accident. This catastrophic event led to a review of the safety of nuclear installations worldwide and the decision by a number of member states to close their nuclear power plants. In the EU, the unprecedented nuclear stress tests mandated by the European Council have led to tangible results, in particular they identified significant plant improvements, which are currently being implemented or planned. These developments highlight the value of a robust and well developed regulatory and monitoring framework for nuclear power generation.

137. There are currently over 70 nuclear power units at different stages of decommissioning in the EU and another 35 operating units which will start decommissioning soon either because they will have reached their end of life or because of host Member States' decisions. The Commission estimates nuclear decommissioning costs to be EUR1.4 billion/year until 2025 increasing to EUR 2 billion/year thereafter. Costs are incurred unevenly over long periods - between 15 to 60 years from the start of the decommissioning process - depending on the decommissioning approach. In principle funds for decommissioning should be fully provisioned during the operating life of nuclear power plants. However there could be insufficient funds in case of early closure or inadequate provisioning. External financing could therefore be envisaged in these cases to complement the nuclear decommissioning funds.

138. In this context, the Bank adopts a technology neutral approach in line with the EU's decarbonisation objective and the objectives of ensuring security of energy supply and competitiveness in an environmentally sustainable, cost-efficient, effective, safe and socially acceptable way, which enables diversified technology approaches, taking into account the national energy-mix, preferences, potential and characteristics of each Member State. Financial assistance for decommissioning could be also granted to eligible projects. In addition, the EIB supports R&D in the sector and recognises its role in promoting growth and employment in the EU<sup>70</sup>.

### EIB ACTION

139. The EIB financed numerous nuclear power generation and nuclear fuel cycle projects for about two decades up to the mid-1980s, following the EU policy and the general trend in nuclear investments in the Member States. In 2007, after about two decades of absence, EIB lending

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<sup>70</sup> Nuclear RDI projects are part of the EU energy policy and are included in the framework of Strategic Energy Technology Plan.

operations in the nuclear sector resumed. Over the 2007-2012 period the Bank provided about EUR 1.0 billion to three projects related to uranium enrichment facilities. The investments were dedicated to capacity extension, energy efficiency and safety improvements.

140. Nuclear energy projects shall be eligible for EIB financing, provided that they technically, environmentally, financially and economically justified taking into account lifetime costs associated with the projects and have received the positive opinion of Euratom under Articles 41-43. Eligible projects include power generation, full fuel cycle, waste management, safety upgrade, life time extension, decommissioning and R&D. In addition the Bank assists the European Commission in the evaluation of Euratom loan applications under two Council decisions<sup>71</sup>.

141. The Bank's methodologies in the sector are summarised below.

### SCREENING AND ASSESSMENT CRITERIA

142. The normal EIB criteria for the appraisal of large thermal power plants<sup>72</sup> would be used for nuclear power projects and would include a full economic, financial and technical appraisal of the project. This analysis would be complemented however with additional nuclear appraisal guidelines to address specific issues related to nuclear projects which have been developed with the assistance of internationally reputable consultants. The guidelines cover five key areas:

1. **The legal, regulatory and institutional framework:** The Bank would verify that the legal frameworks in place for the nuclear industry adequately implement the relevant international conventions and treaties and provide an appropriate framework for the nuclear sector in particular in relation to nuclear safety, security, safeguards, licensing, liability for nuclear damage and sector regulation.
2. **Technology and capability:** The design of the Nuclear Power Plant (NPP) including the selection of technologies will be a matter for the Promoter and the regulatory authorities to agree. The Bank will however require promoters to demonstrate that the proposed technology is compliant with their licence obligations (including in relation to their safety and environmental obligations) and the IAEA safety standards; is the best available technology (in line with EIB's normal procedures); and that the promoter has the capability and experience to safely operate the NPPs.
3. **Management of spent fuel and radioactive wastes:** The appraisal of nuclear energy projects will have to address the full fuel cycle, including in some cases re-processing and cross-border transportation of radio-active materials. The Bank will review the promoter's spent fuel and radioactive waste management plans including final disposal solution and assess their compliance with best practices and national and international safeguards.
4. **Economic analysis:** The Bank's economic assessment will include the costs associated with the full fuel and project cycle including waste and spent fuel management as well as decommissioning costs. Although these are difficult to estimate the Bank will also seek to

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<sup>71</sup> Council decision 77/20/Euratom (under this the Bank acts as an agent for Euratom loans in support of new nuclear power stations in the Member States) and Council Decision 94/179/Euratom (under this the Bank acts as financial and economic advisor to Euratom on loans for projects designed to improve the safety and efficiency of nuclear facilities in the neighbouring countries).

<sup>72</sup> Available at <http://www.eib.org/infocentre/publications/all/economic-appraisal-of-investment-projects.htm>

include appropriate contingencies for construction cost overruns and the costs of nuclear accidents in excess of the costs covered by the promoter.

5. **Environmental impact:** Nuclear projects are likely to present particularly complex environmental and social issues in particular because of the wide range of potential impacts and the large number of involved authorities. Projects will be carefully assessed to ensure that they fully comply with relevant international, EU and national legislation and regulations.





## Energy Networks

### ELECTRICITY NETWORKS

#### Background

143. Over the next ten years, the net power generation capacity in the EU will grow by about one quarter, or 250 GW. Almost all the increase is represented by renewable energy developments, although the figure hides the decommissioning of obsolete fossil fuel units – forced out by the Large Combustion Plant Directive – which will be partly replaced by new fossil and nuclear power stations. This new capacity will in large part be located away from the key load centres; moreover, the major shift in the generation mix towards intermittent capacity will also induce more volatile flows, requiring the grid to adapt.

144. The commercial electricity exchange patterns will be modified. Some countries – the UK, Italy, Poland and Baltic states – are expected to remain major importing countries; France and Scandinavia will still cover the role of the largest exporters, as today, but with higher exchanged volumes. Germany and the Iberian Peninsula will generally experience overall balances, but only as a result of higher exchange volumes both for imports and exports.

145. In this context, major efforts are needed to modernise, smarten and expand Europe's energy infrastructure to avoid that the current congestion worsen or new congestion appear. The ultimate goal is to integrate renewable energy sources and to interconnect networks across borders, in order to create a single EU market where electricity is cheap, clean and secure. The EU strategy and legislation on the sector<sup>73</sup> has been enriched by the recently issued Regulation on guidelines for trans-European energy infrastructure, which defines shared criteria for the identification of projects of common interest (PCIs) and proposes measures to accelerate their deployment. The Regulation sets out 12 priority corridors and areas<sup>74</sup> that include, among others, innovative concepts such as the deployment of smart grids and offshore grids in the northern seas of the EU, as well as the development of electricity storage.

146. The latest ENTSO-E 10-year Development Plan<sup>75</sup> estimates that the transmission projects of European significance for the decade up to 2020 will involve about 52,300 km of new or refurbished extra high voltage routes, of which 10,000 km will be offshore. These projects will primarily contribute to RES integration, either directly or through accommodation of inter-area flows triggered by RES, but will also support market integration and secure reliability of supply across the EU.<sup>76</sup>

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<sup>73</sup> The relevance of electricity networks has been highlighted in a number of Communications from the European Commission – Energy Strategy 2020 and Energy Roadmap 2050, to name some of the most significant – as well as in the Union's legislative framework, such as the Internal Electricity Market Directive 2009/72/EC.

<sup>74</sup> Regulation (EU) No 347/2013 sets out the following priority corridors and areas: 1) Priority Electricity Corridors (Northern Seas offshore grid; North-South electricity interconnections in Western Europe; North-South electricity interconnections in Central Eastern and South Eastern Europe; Baltic Energy Market Interconnection Plan in electricity); 2) Priority Gas Corridors (North-South gas interconnections in Western Europe; North-South gas interconnections in Central Eastern and South Eastern Europe; Southern Gas Corridor; Baltic Energy Market Interconnection Plan in gas); 3) Priority Oil Corridor (Oil supply connections in Central Eastern Europe); 4) Priority Thematic Areas (Smart grids deployment; Electricity highways; Cross-border carbon dioxide network).

<sup>75</sup> ENTSO-E, TYNDP 2012 "10-year Network Development Plan 2012", 2012

<sup>76</sup> Germany will face by far the largest investment efforts (EUR 30.1 billion) followed by the UK (EUR 19 billion), France (EUR 8.8 billion), Italy (EUR 7.1 billion) and Norway (EUR 6.5 billion).

Delays due to social acceptance and longer than expected permitting procedures will realistically affect a significant portion of these projects.

147. Electricity distribution deserves greater attention. The high potential of distribution grids in ensuring and managing the security of supply and reaching the 2020 targets is often underestimated. While currently they are in large part passively operated radial systems (simply delivering electricity to final passive users), distribution grids are smartening and evolving towards actively managed meshed networks connected to distributed generation and active consumers.

148. The European Commission estimates that total investment needs in electricity network infrastructures of European significance for the decade up to 2020 is about EUR 140 billion – circa EUR 100 billion for transmission both onshore (EUR 70 billion) and off-shore (EUR 30 billion) and EUR 40 billion for smart grids and storage. Refurbishments or new investments in other transmission networks without European significance or in distribution networks; will require at least EUR 250 billion – in total, about twice as much as the 2000-2010 period. In response to the requirements of the Internal Electricity Market Directive 2009/72/EC, smart grid investments for the decade up to 2020 will be mostly entirely focused on the deployment of smart meters across Europe. The extent of the deployment will depend on the outcomes of the benefit assessments carried out at national levels and will involve the roll-out of up to 250 million smart meters with investments up to EUR 40 billion. It is difficult to assess precisely the investment needs in energy storage in the decade up to 2020; this will likely be a result of a blend of pilot projects and R&D investments.

149. Given this background – massive investment needs in a relatively short timeframe – the Bank is prepared to provide timely and adequate financial assistance, both through traditional and innovative instruments. As the success of the EU energy strategy is for its most part dependent on the implementation of electricity grids, electricity transmission and distribution network projects will be given high priority.

### **EIB Action**

150. Over the period 2007-2012 the EIB has supported approximately EUR 19 billion of investments for the development and modernisation of the European electricity network infrastructure. This has included EUR 6.7 billion of distribution investments and EUR 12.3 billion of transmission investments, a large part of which was for cross-border interconnectors. A small but growing part of this investment was for smart grids type projects such as enhancing communication, monitoring and control capabilities of transmission systems and, in more recent years, the progressive rollout of these technologies across distribution systems.

151. In line with market trends and EU policy requirements, the EIB will prioritise its financial support to:

- transmission projects that contribute to bulk RES integration, support market integration – in particular Projects of Common Interest (PCIs) - and secure reliability of supply across the EU;
- distribution investment programmes, including roll-outs of smart meters and, more comprehensively, smart grid demonstration projects;
- electricity storage projects;
- RDI activities in the upstream manufacturing industry, where needed and commercially feasible.

## Screening and Assessment Criteria

152. Projects shall make use of best available technology and demonstrate satisfactory financial and economic returns. In particular, projects shall undergo a cost benefit analysis, which usually assesses the project's economic and social gains in terms of:

- incremental electricity demand supplied or ability to preserve the existing supplied volumes
- improvement or preservation of the security of supply
- integration of renewable energy
- reduction in network losses
- alignment of market prices in interconnected markets (for interconnector projects only).

## NATURAL GAS NETWORKS

### Background

153. Natural gas will continue to play a role in the EU's energy mix in the coming decades and will gain importance as a key transition fuel to a low-carbon economy. The EU Energy Roadmap 2050 describes gas as critical for the transformation of the energy system. Gas fired generation is a preferred option as flexible backup and balancing capacity where renewable energy supplies are variable. Moreover, substitution of coal with gas in the short to medium term could help reducing emissions with existing technologies for at least two decades. If carbon capture and storage (CCS) is available and applied at large scale, gas may also become a low-carbon technology.

154. With dependency on gas imports growing and indigenous supplies becoming scarcer, the risk of supply interruption is rising. Single-source dependency, compounded by a lack of infrastructure, prevails in parts of the EU. EU gas import dependency is expected to rise from 63% in 2010 to about 80% in 2030, despite a slow growth in demand. Although in the long run unconventional and biogas resources may contribute to reducing the EU's import dependency, in the medium term depleting indigenous conventional natural gas resources call for additional, diversified imports. Therefore securing European gas supplies is high on the EU's agenda.

155. Gas markets in EU are still fragmented and monopolistic, with various barriers to open and fair competition. In addition to the differentiation of supply routes, gas markets need more integration, more liquidity and more storage capacity, for gas to maintain its competitive advantages as a fuel - especially for electricity generation.

156. The development of new gas infrastructure facilitates a liquid and competitive internal gas market, by increasing physical market integration. The resulting flexibility of the European gas system will enable and enhance supply diversification, even with declining indigenous production, thus enhancing security of supply. As discussed above, new gas infrastructure will also play an important role in improving sustainability in Europe, therefore helping the EU meet its environmental targets. EIB acknowledges the financial needs in the sector over the next decade and considers all gas network projects in principle eligible for financing, although it regards gas transmission system projects (including LNG terminals and underground gas storages) as high priority investments.

157. According to the Commission's estimates<sup>77</sup>, the total investment needs for high pressure gas transmission pipelines (coming into and within the EU), storage, liquefied/compressed natural gas (LNG/CNG) terminals and reverse flow infrastructure amount to about EUR 70 billion for the decade up to 2020<sup>78</sup>. These figures do not account of refurbishments or new investments in transmission networks without European significance or in distribution networks. These will require additional investments that the EIB estimates in the range EUR 100-150 billion.

158. Some support to these investments will come from the Connecting Europe Facility, an instrument engineered by the Commission to support Projects of Common Interests<sup>79</sup>. Financial tools will help project promoters to access the necessary financing for their projects, also by bringing in new classes of investors and mitigating certain risks. Grants contributing to the construction costs will be applied to fill in the gaps in the commercial viability of the projects that are particularly relevant for Europe.

### EIB Action

159. Over the 2007-2012 period the EIB has provided loans for EUR 10.4 billion for the development and modernisation of the European natural gas networks, including EUR 8 billion in transmission pipelines (including LNG terminals and underground gas storages) and EUR 2.4 billion in distribution grids.

160. Investment in gas networks will be needed to diversify gas supply sources, ensure internal security of supply, increase the market liquidity and facilitate market integration, in line with the current EU policies, and consistently with the expectation on the evolution of the gas market over the next two decades. To reach those objectives, the following types of investment are priorities:

- bi-directional flow pipelines<sup>80</sup>, import and interconnection gas transmission pipelines (prioritising PCIs);
- LNG regasification plants;
- underground gas storages; and
- compressed natural gas facilities and LNG refuelling stations (mainly for ships).

161. Investment in gas distribution grids are eligible for EIB financing, especially in areas where the introduction of natural gas would displace other more costly and polluting energy sources.

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<sup>77</sup> EC, SEC(2011) 755 final "Energy infrastructure investment needs and financing requirements", 6.6. 2011

<sup>78</sup> According to a study commissioned by the Commission to Roland Berger, investment volumes for the 2010-2020 period will increase by 30% for gas, on the basis of forecasts by transmission system operators

<sup>79</sup> The recently issued Regulation on guidelines for trans-European energy infrastructure (Regulation (EU) No 347/2013) defines shared criteria for the identification of projects of common interest and sets out 12 priority corridors and areas, proposing measures to accelerate their deployment: 1) Priority Electricity Corridors (Northern Seas offshore grid; North-South electricity interconnections in Western Europe; North-South electricity interconnections in Central Eastern and South Eastern Europe; Baltic Energy Market Interconnection Plan in electricity); 2) Priority Gas Corridors (North-South gas interconnections in Western Europe; North-South gas interconnections in Central Eastern and South Eastern Europe; Southern Gas Corridor; Baltic Energy Market Interconnection Plan in gas); 3) Priority Oil Corridor (Oil supply connections in Central Eastern Europe); 4) Priority Thematic Areas (Smart grids deployment; Electricity highways; Cross-border carbon dioxide network).

<sup>80</sup> Where appropriate, as indicated in the Regulation on security of gas supply, (EC) No 994/2010.

**Screening and Assessment Criteria**

162. Projects shall make use of best available technology and demonstrate satisfactory financial and economic returns. In particular, projects shall undergo a cost benefit analysis, which usually assesses the projects economic and social gains in terms of:

- energy sales, evaluated, wherever possible, by estimating the costs of the displaced fuels and taking into account the utilisation rate of the facility and environmental externalities;
- security of supply, evaluated as the value of gas resulting from the avoided interruption;
- in the specific case of storages: seasonal storage (summer-winter swing value) and peak shaving services.







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