

DOCUMENT

Public consultation on the EIB Energy Lending Policy



European
Investment
Bank

The EU bank 

Public consultation on the EIB Energy Lending Policy

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Abbreviations and Acronyms

CEF	Connecting Europe Facility
CCGT	Combined cycle gas turbine
CCU	Carbon Capture and Utilisation
CCS	Carbon Capture and Storage
CHP	Combined Heat and Power
CSP	Concentrated Solar Power
DSO	Distribution System Operator
EC	European Commission
EDP	Energy Demonstration Projects
EED	Energy Efficiency Directive
EFSI	European Fund for Strategic Investments
EIAH	European Investment Advisory Hub
EIB (or “the Bank”)	European Investment Bank
EIP	External Investment Plan
EIF	European Investment Fund
ELC	Energy Lending Criteria
ELENA	European Local Energy Assistance
ENTSO-E	European Network of Transmission System Operators for Electricity
EPBD	Energy Performance of Buildings Directive
EPS	Emissions Performance Standard
ETS	Emissions Trading Scheme
EU	European Union
EUA	EU ETS Emission Allowance
GCF	Green Climate Fund
GHG	Greenhouse Gas
HLEG	High-Level Expert Group on Sustainable Finance
InvestEU	EU Investment Programme
IEA	International Energy Agency
IEM	Internal Energy Market
INECP	Integrated National Energy and Climate Plans
IPCC	Intergovernmental Panel on Climate Change
IPE	Investment Plan for Europe
LNG	Liquefied Natural Gas
NER 300	ETS New Entrants Reserve
NPS	New Policy Scenario
nZEB	near Zero-Energy Building
PCI	Project of Common Interest
PF4EE	Private Finance for Energy Efficiency
PMI	Projects of Mutual Interest
PPA	Power Purchase Agreement
PV	Photovoltaic
SDG	Sustainable Development Goal
SDS	Sustainable Development Scenario
SET	Strategic Energy Technologies
SFSB	Smart Finance for Smart Buildings
TEN-E	Trans-European Networks for Energy
TSO	Transmission System Operator

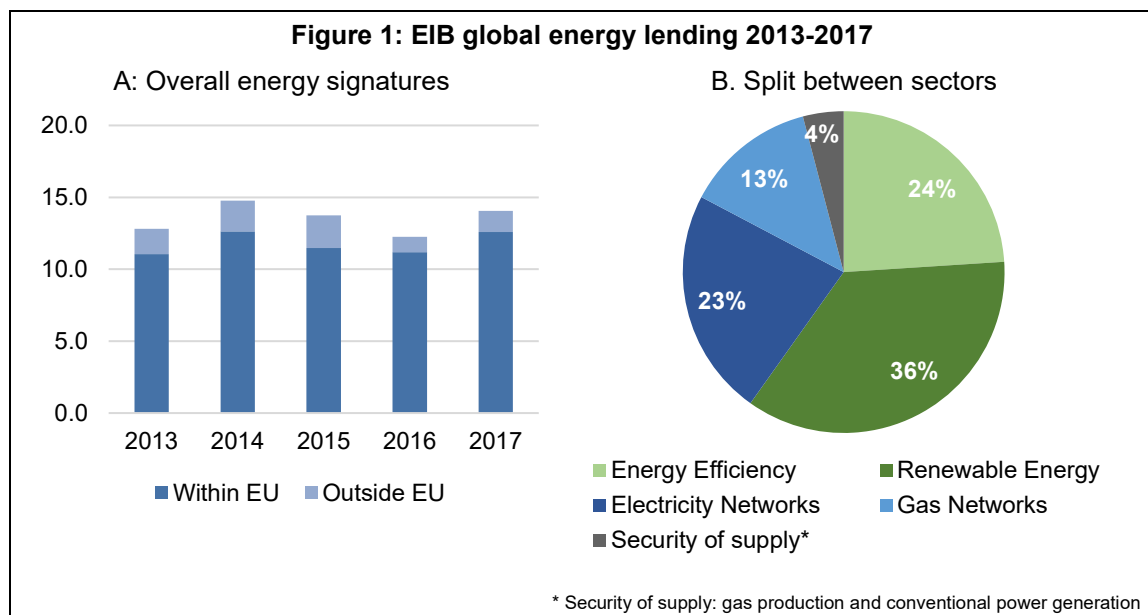
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Introduction

1. The EIB, as the European Union (EU) Bank, plays a significant role in financing energy infrastructure. The Bank's current approach towards supporting the energy sector is set out in its [Energy Lending Criteria](#) (ELC). These were adopted six years ago, in the context of Europe's 2020 targets.
2. The global energy sector is set for profound change. Europe is at the forefront of this transformation, having recently agreed the full framework to deliver ambitious climate and energy targets for 2030, updated its energy policy framework with the new Clean Energy for All Europeans package and published its 2050 long-term decarbonisation strategy. These targets are to be met against a backdrop of rapid technological change and shifts in the dynamics of global energy markets.
3. The Bank therefore intends to present a new Energy Lending Policy (ELP) to the EIB Board of Directors by mid 2019. Before drafting the new policy, the Bank would like to hear your views. This Consultation Document has been drafted to help structure this consultative process, highlighting some of the key topics that the EIB would like to invite comments upon.
4. This Consultation Document is divided into a core document and a series of annexes. The core document presents the Bank and its activities in the energy sector in recent years, describes the main features of the overall energy transformation and then turns to the potential role the Bank could play in supporting this process of change.
5. The subsequent annexes focus on more specific themes: energy efficiency, decarbonising power and heat, supporting new technologies and business models, securing energy infrastructure, and supporting energy investment outside the Union.

Energy at the core of EIB activity

6. The EIB is at the heart of the EU. Established 60 years ago under the Treaty of Rome, it is owned by the EU Member States with a mandate to invest in European innovation, cohesion and prosperity. It is the world's largest international public lending institution.
7. Supporting EU energy policy has long been at the heart of EIB lending activity. Lending to energy infrastructure has averaged EUR 13.5bn per year over the last five years, equal to around 18% of the overall volume of Bank signatures. As discussed in more detail in Annex V, around 13% of energy lending over this period has been outside the EU.
8. The 2013 Energy Lending Criteria ensured that the EIB transitioned to a very large extent to clean energy finance. Over the five-year period 2013 to 2017, lending was channelled predominantly to renewable energy (36%), energy efficiency (24%), and electricity grids (23%). All energy lending is fully in support of EU energy priorities. Box 1 sets out the key safeguards used currently by the Bank to ensure that energy projects are aligned with long-term climate targets.



9. The EIB is a significant source of finance for energy infrastructure, in particular within the EU. For instance, the Bank has been at the forefront of developing new interconnections between national energy grids, many of the so-called European Projects of Common Interest (PCIs). Over the last five years, the Bank has supported 30 such projects, lending over EUR 5bn. Secondly, the Bank has been a long-standing investor in European renewable energy projects, including in particular offshore wind, extending support before, during and after the financial crisis. Finally, the Bank has worked for over ten years with many public authorities to develop bankable energy efficiency and small-scale renewable energy programmes.
10. The EIB finances projects through numerous channels. The Bank typically lends directly to projects with relatively large capital expenditure needs. This lending can be channelled through a wide range of counterparties. For large-scale energy efficiency programmes, for instance, this might be with municipalities or regions. In the case of energy grids, this may be corporate borrowers. In the case of renewable energy, projects are often structured on a non-recourse basis, and hence the Bank lends directly to the project's special purpose vehicle. In this latter case, in addition to being able to provide debt financing, the Bank may indirectly support equity through dedicated investment funds.
11. The Bank also supports smaller projects, such as energy-efficient building rehabilitation improvements for homeowners. It does this typically by lending to intermediate financial institutions, predominantly commercial banks, which in turn lend to the individual projects. The Bank has also recently been able to provide venture debt to smaller firms to support innovation.
12. Advisory services complement the EIB's lending activity in the energy sector. Technical and financial expertise is made available to our clients to develop and implement investment projects and programmes. When complementing EIB loans, advisory services strengthen the economic and technical foundations of an investment and catalyse funding from other sources.

13. Building on a previous risk-sharing initiative with the European Commission, in 2015 the [Investment Plan for Europe](#) (IPE) established a role for the Bank within the European Fund for Strategic Investments (EFSI) to deliver EUR 315bn of additional investment over a 3-year period. This was subsequently extended in 2017 to EUR 500bn by 2020. This is combined with a [European Investment Advisory Hub \(EIAH\)](#) providing targeted support to identify, prepare and develop investment projects. The energy sector has been a core recipient of IPE support, representing 33% of signed EFSI operations of the Bank by end-2017.
14. In revising the Bank's Energy Lending Policy, it is important to learn lessons from previous exercises. The Bank is currently conducting an ex-post evaluation of the Energy Lending Criteria for the period 2013-2017. The recommendations of this report, once adopted, will be duly taken into consideration in shaping the new EIB Energy Lending Policy.

Trends in the energy transformation

15. Without further action, the rise in temperature will change the climate and have major impacts on our societies and ecosystems. The 2018 IPCC (Intergovernmental Panel on Climate Change) report concludes that limiting global warming to 1.5 degrees Celsius compared to 2 degrees could ensure a more sustainable society. Energy production and use account for two-thirds of the world's GHG emissions, meaning that the energy sector has a key role to play to reach the goals of the Paris Agreement.
16. Nevertheless, energy demand from the energy sector continues to grow globally, increasing CO₂ emissions. Fossil fuels represent 80% of energy consumption globally and fast-growing countries such as China and India are relying on fossil fuels to meet the growth in energy demand. At the same time, 600 million people in Africa still do not have access to modern energy.
17. Reaching the goals of the Paris Agreement requires the EU to eliminate nearly all greenhouse gas emissions by 2050. It follows that by the middle of the century, if not earlier, fossil fuels such as coal, crude oil and even natural gas will no longer be used to any significant extent, at least in the absence of carbon capture and storage, to generate electricity, supply heat or fuel transport. This implies a radical transformation of energy systems.
18. Energy consumers and citizens will be at the centre of the energy transformation. The significant investments required, the evolution of energy prices, the type and location of activities needed will have long-term economic and social impacts. The transition will spur innovation, create growth and jobs in new sectors. In order to be socially acceptable, these impacts will need to remain fair across regions, across society.
19. This transformation can follow different pathways, reflecting the pervasive uncertainty that surrounds the cost and performance of key technologies, social acceptability and policy choices. Government policy can define specific targets and provide the policy stability and incentive mechanisms to be used to reach those targets; but markets dynamics have an important role to determine the least-cost pathway to reach those goals.

Box 1: Is EIB energy lending in line with long-term climate targets?

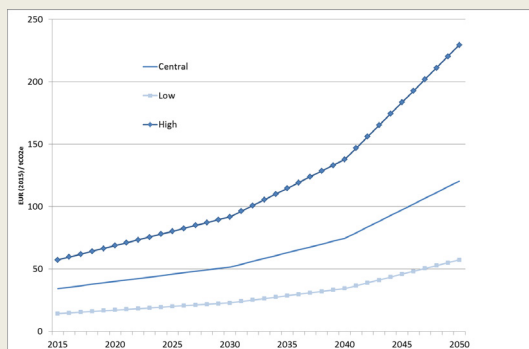
In the period 2013-2017, around 70% of EIB energy lending was in support of energy efficiency and renewable energy, including connection to power grids. This is recorded by the Bank as contributing directly to the Bank's corporate target for climate action.

The question of alignment with long-term climate targets applies to the remaining 30% of Bank lending associated with wider energy objectives: gas infrastructure, gas-fired power generation etc. This Box highlights two safeguards used by the Bank to ensure alignment with climate targets.

Firstly, all investment projects undergo an economic test that routinely accounts for the external cost of pollutants, including carbon emissions and local air pollutants. More details can be found in the Bank's Guide to [Economic Appraisal](#). A key point is that these costs are assumed to rise in real terms over time, particularly for carbon.

Secondly, in 2013, the Bank introduced a second safeguard for the power generation sector – an Emissions Performance Standard (EPS) defined in terms of GHG emissions (g CO_{2e}) per unit of power generated (kWh_e). This is designed to ensure that any power generation project helps to reduce average emissions in the sector. As with carbon pricing, this has a dynamic component, reflecting the forecast reduction in GHG emissions embedded within the EU Emissions Trading Scheme (ETS).

(a) External costs: carbon and local air pollutants

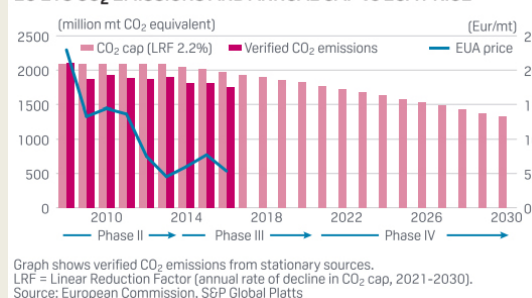


The Bank started integrating a price of carbon into its analysis in the mid-1990s. The figure above shows the latest values used by the Bank, formally adopted by the Bank as part of the 2015 Climate Action Strategy. Most recently, the report of the [High-Level Commission on Carbon Prices](#) provided recommended values consistent with the Paris Agreement, which are very close to the Bank's central to high values.

It is important to stress that the Bank also values local air pollutants. Since 2015 the Bank has adopted standard unit values for emissions of air pollutants, including particulate matter, ammonia, nitrogen oxides, sulphur dioxide, non-methane volatile organic compounds and certain heavy metals.

(b) EPS

EU ETS CO₂ EMISSIONS AND ANNUAL CAP vs EUA PRICE



Graph shows verified CO₂ emissions from stationary sources.
LRF = Linear Reduction Factor (annual rate of decline in CO₂ cap, 2021-2030).
Source: European Commission, S&P Global Platts

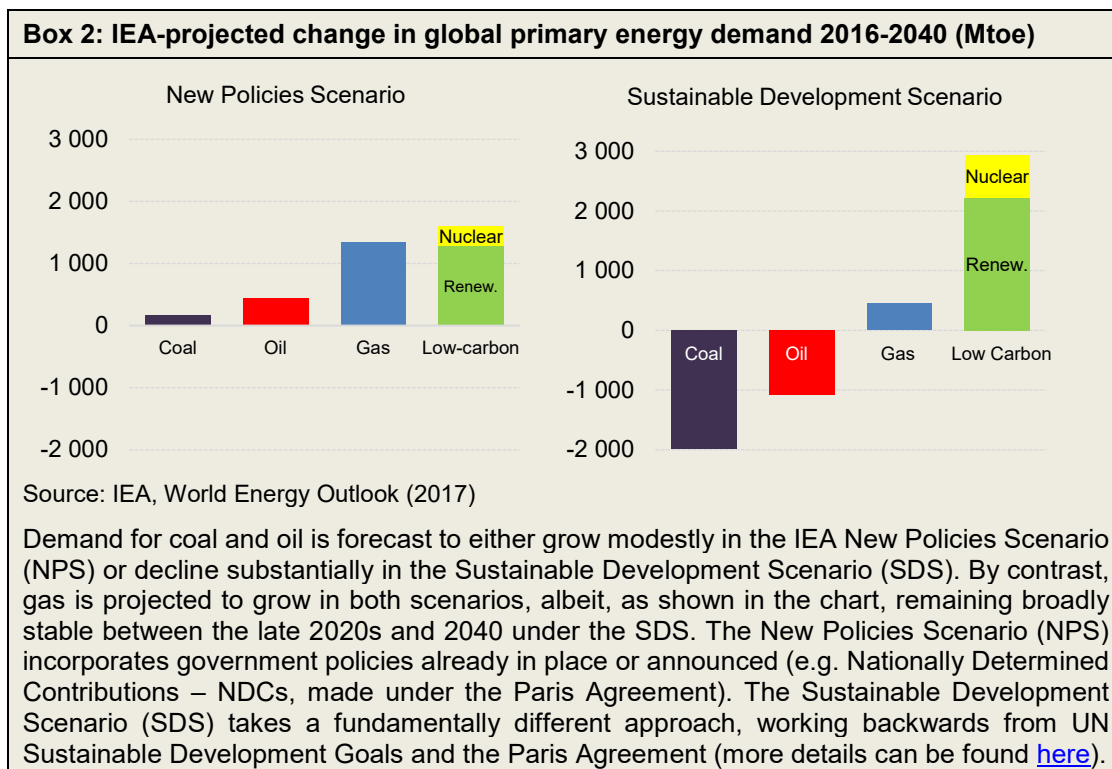
In 2013, the Bank introduced an Emissions Performance Standard at 550g CO₂/kWh_e. This threshold is calculated according to a [methodology](#) consistent with emissions reduction under the ETS Directive and demand growth under the 2050 Roadmap.

The EPS was calculated as an average for the power sector over the lifetime of the asset. As illustrated in the figure above, the ETS cap reduces over time. In recognition of this dynamic element, in 2013 the Bank limited the validity of the threshold to five years. In 2018, the Bank informed the Board that it would review the threshold in the context of its new Energy Lending Policy – i.e. with full agreement over the Clean Energy for All Europeans package and the amendment to the ETS Directive.

20. Certain key trends are likely to dominate this transformation process. Firstly, substantial investment in **energy efficiency** is required to reduce the volume of energy required to meet consumers' rising energy needs (heating, lighting, power, transport). Within the EU, a particular challenge is to improve the energy performance of the existing building stock.

21. Secondly, the market share of variable renewable sources (i.e. **solar and wind**) will increase over time. The cost of these renewables technologies has decreased dramatically. They can now be deployed competitively and will become the largest sources of power generation. Integrating variable generation has a number of profound implications on electricity systems and requires greater flexibility over the short term from either conventional sources, exports/imports through electricity interconnections or new technologies to match supply and demand (demand response, digitalisation, batteries).
22. Thirdly, and relatedly, an increasing share of the new investment in power generation will be **decentralised**, i.e. power will be injected directly into the distribution network. The traditional model of central power generation flowing through a transmission system into a (passive) distribution system is quickly breaking down. As more capacity is connected to the distribution level, the Distribution System Operators (DSOs) have to actively manage power flows, with implications on investment plans, the interface with Transmission System Operators (TSOs), network tariffs and final energy prices paid by consumers.
23. Fourthly, as with the economy at large, energy systems are increasingly **digitalised**. Digitalisation technologies (smart meters, ICT, electronics, etc.) and services contribute to cost reductions and system integration of decentralised resources, and more direct consumer participation in energy markets, notably the capacity to manage demand in response to price signals.
24. Fifthly, it is expected that the heat, industry and transport sectors will become increasingly **electrified**. Low-carbon electricity will have to play an increasingly important role in providing energy for heat (i.e. replacing natural gas and heating oil) and transport (replacing mineral oil). This will lead to increased interaction between sectors, or **sector coupling**. Electricity can also be transformed into other energy carriers, often captured under the term “power-to-x” (i.e. hydrogen, synthetic methane etc.), facilitating seasonal storage and use of existing conventional infrastructures.
25. Sixth, these trends raise new challenges for **energy security**. Renewables can reduce dependence on imported fuel but integrating high shares of wind and solar power raises energy security issues. In particular, given seasonal weather patterns across Europe, the electricity system will also need to be able to cope potentially with weeks or months of lower production from wind and solar and meeting peak demand will also remain a challenge, exacerbated by the increasing electrification of heat. This will require continued investments to ensure an adequate infrastructure. In addition, digitalisation requires a high level of reliability of energy systems but also exposes it to cyber-security risks. Modern economies rely on an uninterrupted and abundant energy and ensuring a high level of security of supply is a necessary condition for the success of the energy transformation.
26. Meeting the long-term decarbonisation targets at least cost will rely on a **portfolio of low-carbon technologies**. Most of the technological options discussed in the European Commission (EC) strategic long term vision will have an important role to play to meet the 2050 net-zero emission targets. As identified under the EU Strategic Energy Technologies Plan (SET Plan), there are potential cost reductions for a wide range of power generation technologies.

27. Europe alone can only be a part of the combined effort to transform the energy sector. In Asia, the Middle East and Africa, energy demand continues to grow rapidly, outpacing Europe. Many countries are likely to continue relying largely on fossil fuels for now, with, as shown in Box 2, gas demand continuing to increase even in decarbonisation scenarios. Meeting the objectives of the Paris Agreement will not be possible without significant efforts outside Europe and the EU intends to be exemplary in order to play a leading role in climate mitigation.



EU energy and climate policy

28. Against this background, the EU's energy policy aims to provide a stable framework to ensure that all European citizens can access secure, affordable and sustainable energy supplies. The finalisation of the Clean Energy for All Europeans package will facilitate the energy transition by setting new targets for 2030, policies and regulations to keep the EU on track with climate ambitions. The new [EC long-term strategic vision](#) for achieving a climate-neutral economy by 2050, published in November 2018, reinforces the signal that the EU is committed to deliver on its Paris Agreement commitment and willing to lead in global climate action.
29. The Clean Energy for All Europeans package (CEP) aims to improve the rules for the functioning of the internal energy market. In addition to better integrating renewables into electricity markets, in line with the 2014 Guidelines on Environment and Energy, the CEP prevents the existence of caps on electricity prices and defines criteria for the design of capacity remuneration mechanisms that have been introduced to ensure adequacy of power systems and security of supply. The CEP also promotes the development of battery storage, demand response and investment in distributed energy resources, in particular by energy communities.

30. One important goal of the package is to define market design rules that enable investments to be driven to a greater extent by market signals. This entails the development of efficient price formation in the internal energy market and the internalisation of the external cost of carbon emissions.
31. Energy and climate policies are highly interrelated. The EU has introduced the Emissions Trading Scheme (ETS), a cap-and-trade scheme to reduce GHG emissions in a cost-efficient manner. The new target – reducing overall GHG emissions by 40% by 2030 compared to a 1990 baseline – is likely to result in substantial changes in relative prices for the power and industry sectors operating within the system. The creation of the market stability reserve for Phase 4 of the ETS (2021-2030) reduces the surplus of EU allowances, and contributes to restoring moderate CO₂ prices.
32. In practice, carbon pricing and the ETS is only part of a package of policy measures designed to reduce energy consumption and guide investment decisions in low-carbon technologies. The EU has also agreed an overall 32% share of renewable energy in final energy consumption by 2030, which is likely to involve a share of renewable electricity of 50-60% or more, and larger shares of variable renewables (wind and solar) across Europe. In addition, a 32.5% energy efficiency target by 2030 is likely to require deeper structural changes to industry, SMEs and buildings.
33. These targets should be seen within the wider context of nearly 20 years of EU energy policy developing the internal energy market. Long-term European funding, including from the EIB, has helped to build a modern, interconnected [energy grid](#) across Europe that facilitates cross-border trade of electricity and the completion of the Internal Energy Market (IEM). Consistent with the objective of creating the internal market, the EU aims to rely primarily on market-based instruments and price signals to drive investments.
34. Since 2013, the EU has adopted an [Energy Union](#) strategy designed to strengthen the various dimensions of energy policy: boosting energy security, creating a fully integrated internal energy market, improving energy efficiency, decarbonising the economy and supporting research, innovation and competitiveness. In addition, the 2014 [Energy Security Strategy](#) presents measures to shore up the EU's security of energy supply.
35. The EU has set Union-wide targets while leaving flexibility to Member States to achieve them in an increasingly integrated EU market. As part of the Energy Union's governance, Member States are developing the first Integrated National Energy and Climate Plans (INECP) for the period 2021-2030 that will be monitored by the Commission. These plans will provide national roadmaps for future energy investment.
36. Energy poverty in the EU affects close to 50 million people. The Clean Energy for All Europeans package contains measures to address energy poverty through energy efficiency, safeguards against disconnection and a better definition and monitoring of the issue at Member State level.

37. A fair energy transformation is a condition for its social acceptability. The Paris Agreement makes reference to the imperatives of a just transition of the workforce. The European Commission has committed to examine how to better support the transition in coal and carbon-intensive regions. A [Platform on Coal and Carbon Intensive Regions in Transition](#) has been established. Moreover, under Article 10(d) of the amended ETS Directive, the EU has established a Modernisation Fund to “support a just transition in carbon-dependent regions in the beneficiary Member States, so as to support the redeployment, re-skilling and up-skilling of workers, education, job-seeking initiatives and start-ups, in dialogue with the social partners.

Implications for energy investment

38. The energy transformation will require sustained investment – in effect to replace the energy capital stock over a generation. For instance, based primarily on European Commission modelling, it is estimated that investment needs to rise to approximately EUR 400bn per year over the period 2021-2030, almost double the amount invested over the previous fifteen-year period. Energy efficiency investments form a substantial portion of this increase.
39. Much of the required energy capital stock is characterised by relatively high capital expenditure, low operating costs and long economic lives. In ensuring the affordability of the transformation, it is important to reduce the cost of the capital used to finance projects. This has implications in terms of public policy, but also for institutions such as the EIB that can help reduce funding costs and provide access to long-term finance.
40. The revenue streams associated with energy assets are relying increasingly on market signals, including from wholesale markets, auctions and the ETS price. Further government intervention remains possible, particularly for less mature technologies, but the expectation is that market prices will attract sufficient financing to deliver the bulk of the investments needed.
41. Given the scale of the investment challenge, there is a need to steer private capital towards sustainable investments in general. The European Commission established a [High-Level Expert Group on Sustainable Finance](#) (HLEG) which delivered a final report in January 2018. In May, the Commission adopted a package of measures implementing its [action plan on sustainable finance](#).

Implications for the EIB

42. The EIB is the lending arm of the European Union. In other words, in this context, the EIB helps deliver the investment required to support EU 2030 energy and climate policy. As such, the Bank needs to ensure that all its investments clearly support that policy in the EU. Moreover, given that the majority of the energy assets financed by the Bank will be operating for 20 years or more, the Bank also needs to look substantially beyond 2030.
43. That said, the 2013 ELC have already aligned EIB activities to clean energy investments: i.e. renewable energy, energy efficiency and energy grids. The share of EIB support to fossil-fuelled projects has declined significantly over the last decade. Greater priority is currently given to projects recognised as a PCI or which contribute to Climate Action. This consultation process will help the Bank update this policy to ensure it can best support the new goals, recognising how any new Bank Energy Lending Policy sits within a wider set of EIB strategic plans and policies (Box 3).

Box 3: Link with EIB strategic plan and other EIB policies

The Bank's Energy Lending Policy sits within a wider set of EIB strategic plans and policies. This box explains this relationship, and in doing so defines the scope of this consultation process.

On the basis of its Statute, the Bank develops a [Corporate Operational Plan \(COP\)](#), which is a rolling three-year strategy that is reviewed and updated on an annual basis. This sets orientations on signatures for public policy goals, including infrastructure, innovation and environment, as well as for higher-risk special activities. In order to facilitate decision-making, the Bank assesses the value of the projects it supports. It applies a [3 Pillar Assessment](#) within the Union and a [Results Measurement \(REM\)](#) framework outside.

All Bank lending and investment activity is subject to the Bank's risk guidelines and an independent credit-related appraisal process. The risk management principles are applicable across the EIB Group and require that risks be managed in an effective and consistent manner and in line with best banking principles and practices.

In 2015, in the context of preparing for the landmark Paris Agreement, the Bank adopted a [Climate Action Strategy](#). Under this strategy, the Bank commits a minimum of 25% of EIB lending to specific climate action projects. This includes renewable electricity generation, reducing energy demand and improving the efficiency of energy supply. In addition, the Bank will increase its lending for climate action to 35% in developing countries by 2020. More broadly, the strategy commits the Bank to reinforce the impact of its climate action finance, to build resilience to climate change and to mainstream climate action considerations across all EIB activities using specific criteria.

Energy projects may also raise important social and environmental issues. The EIB's Environmental and Social [Principles](#) and Standards set the policy context and determine compliance in the protection of the environment and human well-being. Within this context, the EIB is developing guidelines on the environmental, climate and social impacts of [hydropower development](#).

Similarly, energy projects need to meet the Bank's procurement policy as defined in the [Guide to Procurement](#). This has been particularly relevant in the energy sector outside of the EU, constraining the ability of the Bank to support renewable energy programmes which attempt to use local content requirements as a form of domestic industrial policy.

At the time of drafting, the Bank is involved in discussions with key stakeholders on its potential involvement in the next multiannual financial framework, notably within the Union through the proposed [InvestEU](#) programme or the ETS Innovation and Modernisation Fund, and outside the Union through the [External Investment Plan](#). While this consultation exercise can help to shape and improve the Bank's energy activities, the role of the Bank under these Facilities is clearly not part of this consultation exercise.

This consultation does not invite comments on these wider policy documents or processes set out above. This is not because they are not relevant to our energy financing activities – on the contrary, they significantly shape it. However, these policies concern all Bank activities, with a number of them subject to separate consultative processes.

44. One dimension of EIB support is to help reduce the cost of capital associated with the energy transformation. In this sense, EIB support to the energy sector of EUR 12-14bn per year is substantial – particularly when viewed at the level of individual sub-sectors. Nevertheless, even this sum is relatively minor compared to the overall investment needs: EIB energy lending is a few percentage points of the needs within the EU, and substantially less outside. A public bank such as the EIB should focus on support which can effectively complement private finance that is made available in the market.
45. This review aims to ensure that the Bank can deliver maximum support to reach EU long-term climate and energy targets. In that perspective, the Bank is considering aligning its activities along four main themes. The remainder of the consultation document is structured along these themes, and a particular focus on EIB activities outside the EU.

46. The themes of the consultation seek to capture key changes since the previous exercise. This consultation does not systematically address all technologies, though clearly technology-specific comments are welcome as part of this consultation exercise.
47. The adoption of INECP provides a natural framework for the Bank to discuss with Member States at a more strategic level. In the framework of its future Energy Lending Policy, the Bank intends to use the INECP processes as a means to reinforce its regular dialogue with key energy stakeholders.

The four key themes of the EIB's Energy Lending Policy are as follows:

Theme 1: Energy efficiency first

48. The Bank will continue to support the required increase in energy efficiency investments through to 2030 across all sectors including industry, SMEs and the building sector.
49. The consultation focuses on identifying how the Bank can further help unlock energy efficiency investment, with a focus on the building sector.

Theme 2: Decarbonising power and heat generation

50. The Bank will continue to support the continued growth of low-carbon technologies and in particular renewable projects while preventing the lock-in of new CO₂ emissions. Despite the cost decline for renewable technologies, the scale of the investment challenge across Europe is significant. The Bank can help deliver these objectives.
51. The consultation focuses on how the Bank can best support renewables such as new solar photovoltaic (PV) and wind projects as these technologies become increasingly competitive and are deployed using market-based instruments such as auctions or private power purchase agreements.
52. The EIB will also review its Emissions Performance Standard (EPS) as part of the new Energy Lending Policy and this consultation. This review, which was required by the EIB Board of Directors, aims at updating its lending criteria to long-term emissions targets. The Bank will also consider updated approaches towards heat decarbonisation.

Theme 3: Supporting new technologies and business models

53. The Bank will seek to finance innovative projects relying on distributed or new technologies such as some renewables, storage, electric vehicle demand response and digitalisation. These technologies are enablers of the energy transformation.
54. These new technologies are often associated with new business models and the Bank wishes to consult on the associated needs for investments and financing instruments that can increase EIB support to new entrants and new technologies.

Theme 4: Securing the infrastructure needed during the energy transformation

55. The Bank will continue to finance the infrastructure needed to ensure secure and competitive energy, in line with EU energy and climate policy and in a technology-neutral way. First, in addition to generation capacity and new technologies, electricity grid investment needs remain high to enable the energy transformation at distribution

level and in terms of interconnections. Secondly, gas networks and conventional infrastructure can also be considered when contributing to security of supply and meeting the Bank's standards.

56. The consultation aims at identifying ways to ensure that the Bank's lending can continue to maintain and reinforce reliable infrastructure, accelerate its modernisation while not being harmful to climate objectives.

Questions for consultation:

General

Q1: Do paragraphs 15-27 above provide a reasonable characterisation of the long-term energy transformation? Are there additional dimensions that the Bank should consider when reviewing its Energy Lending Policy?

Q2: As set out in Box 1, the Bank believes it has a robust framework to ensure that energy projects being financed are compatible with long-term climate targets. Do you agree? Are there areas where the Bank can improve?

Q3: Within the broad areas of renewables, energy efficiency and energy grids, are there particular areas where you feel the Bank could have higher impact?

Q4: How can EIB reinforce its impact towards ensuring affordability, addressing social and regional disparities and support a just energy transformation?

57. The annexes to this document provide a more detailed discussion of the four themes and introduce the questions for consultation. Each annex is structured in a similar manner, beginning with EU policy objectives for the sector, before examining the investment market, looking at the role of the Bank in recent years, and then potential areas where the Bank could reinforce or refine its role. For the ease of the reader, we also reproduce here the full list of questions presented below:

Theme 1: Energy Efficiency First

For details, please refer to Annex I

Q5: In the case of new buildings, do you have an opinion on the proposed approach to support only buildings that go beyond the mandatory nZEB standard after 2021? What level of ambition should the Bank focus upon, inside and outside the EU?

Q6: The Bank has developed a number of financial and technical assistance products to help promote energy efficiency in private and public buildings. Have you had any experience with these products? If so, do you have a comment or opinion as to how they can be further developed or improved?

Q7: Do you have lessons learned to share in order to improve the financing of energy efficiency in SMEs? Is technical assistance an important dimension? If so, do you have any views as to which type of technical assistance that is the most effective to provide?

Theme 2: Decarbonising power and heat

For details, please refer to Annex II

Q8: Declining costs and competitive auctions are transforming a number of renewable markets (e.g. onshore wind, utility-scale PV). How can the Bank best support these relatively mature technologies? In the context of increasing market integration, is there a need for financial instruments to help attract long-term private finance?

Q9: Does the EPS for power generation remain an appropriate safeguard? Do you agree that adjustment should be made to support flexibility and adequacy? In light of recent developments in renewables, the Paris Agreement and the Sustainable Development Goals, would an exemption to the EPS for power plants in least developed countries continue to be justified?

Theme 3: New energy technologies and business models

For details, please refer to Annex III

Q10: Are there ways in which the Bank could provide more targeted support to distributed resources (demand response, small-scale generation and storage projects)? Are new business models or technologies emerging in this context, with specific financing needs? Is the Bank's portfolio of financial products and instruments adequate to support this technological transition?

Q11: The Bank has developed a number of products – both financial and advisory - targeted to supporting innovative energy projects. Do you have a view on these instruments? Can the Bank improve or better target the financing needs of the energy demonstration sector?

Q12: Some renewable technologies or applications remain relatively expensive. Should the Bank continue to finance such projects, even in the absence of an innovative component?

Theme 4: Securing the infrastructure needed during the transformation

For details, please refer to Annex IV

Q13: In light of the long-term nature of the network development plans, which type of projects should the Bank focus upon? In addition to PCIs, should the Bank prioritise newer investment types, for instance in digital technologies?

Q14: What is your view on the investment needed in gas infrastructure to meet Europe's long-term climate and energy policy goals, while completing the internal energy market and ensuring security of supply? What approach could strike the right balance to prevent the economic risk of stranded assets?

Q15: Should the Bank refrain from supporting hydrocarbon production, in addition to exploration? If so, should gas be treated the same as oil? Within and outside the EU?

Supporting transformation outside the EU

For details, please refer to Annex V

Q16: Where can the Bank most usefully focus its support – either financial or advisory – to meet the Sustainable Development Goals outside the EU and better support the scaling up of renewables, energy efficiency and electricity grids in a developing country context?

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Annex I - Energy efficiency first

1. Putting energy efficiency first is the recognition that energy efficiency measures play a significant role in all scenarios out to 2050 in the EU and that energy efficiency needs to be considered in all investment decisions. Indeed, fully decarbonising an energy system that continues to grow would be extremely difficult. Energy efficiency cuts across sectors and can be less expensive than traditional supply-side options. It requires investment in industry, buildings (residential, retail and tertiary) and transport. Energy efficiency investment in residential buildings is a high priority.
2. This document focuses on energy efficiency in buildings, industry and SMEs. Clean and energy efficient vehicles are also an important part of the Bank's lending, but are considered separately under the Bank's transport lending policy.

Energy efficiency policy

3. In 2018, the EU reached a political agreement which includes a binding target under the Energy Efficiency Directive (EED), increasing the energy efficiency target from 20% of primary energy by 2020 to 32.5% by 2030, with a clause for an upward revision by 2023. Energy efficiency measures will undoubtedly play an important role within INECs.
4. The Energy Performance of Buildings Directive (EPBD) was also amended in 2018 requiring Member States to prepare long-term renovation strategies, including actions that can contribute to alleviating energy poverty. In the short term, all new buildings must be nearly Zero-Energy Buildings (nZEB) by 2021.

Investment barriers

5. As reviewed in several recent reports, a number of typical barriers hinder energy efficiency investment. Underinvestment may result from market failures, such as unpriced external costs, potentially exacerbated by subsidies to fossil fuels in some countries, difficulties in measuring performance (incomplete or asymmetric information). This results in a lack of awareness and understanding of the benefits of energy efficiency investments.
6. In owner-occupied buildings, these barriers may be compounded by limited access to finance and behavioural explanations such as the discounting of long payback periods. In the case of rented buildings, the benefits of investment typically accrue with the tenant rather than the owner, splitting the incentives.

Role of the EIB

7. The Bank's support to energy efficiency has increased almost fourfold since 2012. In 2017, energy efficiency lending reached almost EUR 5bn, of which around two-thirds (64%) in the building sector. However, against the backdrop of investment needs of around EUR 280bn per year in the EU, the Bank's role is primarily to complement and help facilitate other forms of financing. During this period, the Bank has also worked to mainstream energy efficiency across all operations of the Bank, including industry, hospitals and schools. Energy efficiency is now an important component of the Bank's climate action lending.

8. Building rehabilitation is the largest energy efficiency lending activity of the EIB. In 2017, it represented EUR 2.6bn (55% of total energy efficiency lending), typically consisting of smaller projects. The Bank's support to building rehabilitation is predominantly channelled through financial intermediaries (commercial banks or dedicated funds). The Bank requires the intermediary to meet EIB eligibility, monitoring and reporting requirements. The Bank also offers technical assistance to banks and final beneficiaries.
9. The Bank has worked to reinforce this support channel in various ways (box I.1). In 2009, the Bank, together with the EC, sought to unlock energy efficiency potential by providing project development assistance (European Local Energy Assistance - ELENA). In 2015, they launched a joint dedicated facility funded by EU budgetary resources – the so-called Private Finance for Energy Efficiency (PF4EE).

Box I.1: EIB energy efficiency facilities	
ELENA	The European Local Energy Assistance (ELENA) facility was established to assist regions, cities and private counterparts in designing bankable EE projects and programmes. One focus has been on developing private sector participation through energy performance contracting.
PF4EE	The Private Finance for Energy Efficiency (PF4EE) initiative supports commercial bank lending by sharing risks on the underlying portfolio of investments. In addition, the EIB under the PF4EE Instrument provides TA to banks and final clients to reduce the (perceived) risk and simplify administration. These two elements are combined with dedicated EIB long-term financing provided to the participating commercial banks.
SFSB	The Smart Finance for Smart Buildings (SFSB) initiative, together with other EU policy initiatives for smart buildings, aims to unlock a total of EUR 10bn in public and private funds by 2020. The aim is to make investment in energy efficiency projects in residential buildings more attractive to private investors.

10. The Bank has also financed new buildings with high performance standards, near Zero-Energy Buildings (nZEBs). This was designed to accelerate the uptake of nZEB construction before it becomes mandatory. Over the last three years, the Bank has approved several nZEB projects including residential, commercial and office buildings.
11. Besides buildings, the Bank continues to support energy efficiency investments in district heating, industry and SMEs. Furthermore, energy efficiency investments are eligible for EIB financing under certain conditions in energy-intensive industries such as steel, metals, cement fertilisers, pulp and paper, and glass.

Future focus of the EIB

12. The Bank will continue helping its shareholders to achieve the European targets for energy efficiency by 2030. This means continuing lending to energy efficiency projects across all sectors, including industry and SMEs as well as the building sector. The Bank already prioritises the scale-up support of energy efficiency investments, in particular for building rehabilitation and will support additional forms of financing which may include support for the development of energy efficiency rehabilitation mortgages. This needs to be further reinforced.

13. The EIB currently supports early projects associated with upcoming national nZEB requirements. After 2021, these standards will be mandatory in the EU. The Bank is therefore considering supporting only new buildings that go beyond the new mandatory standards. Furthermore, the Bank will particularly focus on projects being developed for residential purposes or as part of an urban regeneration development. The Bank is considering applying a similar logic – i.e. supporting projects which go beyond existing construction practice – to new buildings outside the EU.
14. In order to help support smaller rehabilitation projects in private and public buildings, the Bank has in recent years developed simplified criteria which facilitate the application of EIB eligibility rules by intermediaries. The Bank intends to continue simplifying technical criteria for intermediated financing.
15. The Bank is also opening this consultation to determine how to provide more targeted support to energy efficiency improvements in SMEs, developing its experience in the building sector.

Questions

Q5: In the case of new buildings, do you have an opinion on the proposed approach to support only buildings that go beyond the mandatory nZEB standard after 2021? What level of ambition should the Bank focus upon, inside and outside the EU?

Q6: The Bank has developed a number of financial and technical assistance products to help promote energy efficiency in private and public buildings. Have you had any experience with these products? If so, do you have a comment or opinion as to how they can be further developed or improved?

Q7: Do you have lessons learned to share in order to improve the financing of energy efficiency in SMEs? Is technical assistance an important dimension? If so, do you have any views as to which type of technical assistance is the most effective to provide?

Annex II - Decarbonising power and heat generation

1. Power and heat markets are rapidly evolving. The power sector alone emits 34% of energy-related CO₂ emissions in the EU, mainly attributable to coal-fired generation. However, the sector also offers opportunities to be decarbonised at reasonable cost, mainly thanks to renewables. The decarbonisation scenarios in the recent EC long-term strategic vision Communication also show a significant role for nuclear out to 2050. Similarly, heating and cooling represents 50% of total final energy consumption. This annex examines renewable power and heat generation first, before turning to the conventional market.

Renewables

2. The cost of renewables – particularly large-scale solar photovoltaic (PV) and on and offshore wind – have fallen dramatically in recent years, reflecting in large part the impact of scale, competition and increased experience throughout the global supply chain. As a result, even in the absence of a strong and stable carbon price, renewables (particularly onshore wind and solar PV) are increasingly cost-competitive with conventional plants across much of the world.
3. Whilst this reduction in cost is clearly to be strongly welcomed, there is an increasing recognition of the need to further integrate renewables into power markets while improving the flexibility of power systems. The value of investment in variable renewables tends to fall as their market share increases, at least in the absence of widespread storage. This is because of the strong correlation in the production profile of solar and wind plants, with episodes of very low and in some cases negative prices already becoming a common feature in some markets today.

EU policy

4. The EU has increased its renewable target to a 32% share in final energy consumption by 2030. This is likely to translate into a share of around 50-60% of renewables in the electricity energy mix, with around 30% of electricity likely to come from variable wind and solar power. As the market share of renewables increases, EU policy has sought to further integrate renewables into the power market, notably by strengthening balancing responsibilities, removing priority dispatch and withdrawing financial support during periods of negative prices. Market integration can provide stronger signals to develop projects that generate where and when the value of power is the highest.
5. Competitive auctions for market-based support schemes have become the new norm. This move has sparked fierce competition leading to much lower prices. As a result, the share of market revenues – rather than support scheme revenues – has grown. Some bidders have decided to take on most or even all of the market price risk (the so-called “zero-subsidy” bids). Some markets are using renewable certificate or other incentive schemes which do not provide certainty at the level of revenue support. In contrast to previous systems, project owners are increasingly being exposed to some degree of market risk.

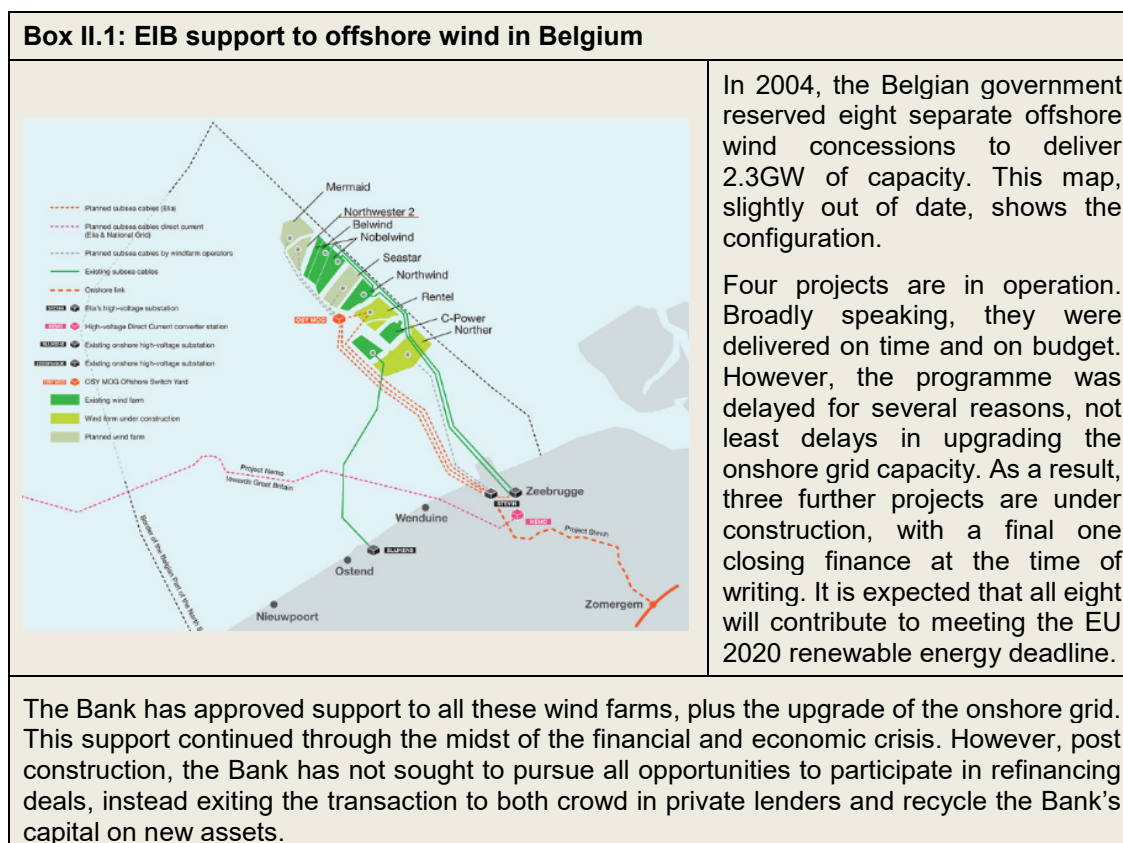
Investment barriers

6. The ambitious 2030 renewable energy targets will require sustained investment in renewable projects. The renewable finance market has grown considerably over the last decade, moving from a niche part of the banking market quickly to core energy business. Many banks are active globally or regionally, in particular offering finance on a non-recourse basis.

7. It is still relatively early to judge how the trend towards increasing market integration will impact on the financing arrangements for new projects. Future market prices remain uncertain and will be affected by the price of CO₂, fossil fuels and the evolution of renewable deployment and market design rules.
8. Corporate financing by large companies is expected to remain significant, even if European energy companies are facing a rapidly changing market environment. For smaller project developers, there is a risk that access to long-term debt becomes constrained, at least in the absence of long-term Power Purchase Agreements (PPA) or equivalent revenue hedging instruments that are emerging in some markets today. The market for long-term PPAs, either from the private sector or electricity retailers, is likely to evolve in the coming years – indeed a number of private sector responses have emerged in recent years on markets with limited public Renewable Energy Sources (RES) support.
9. The key growth in the last decade has been in wind and solar projects. However, meeting long-term targets may also require scaling up other technologies with the potential to be competitive in the medium term (e.g. tidal, biomass, wave, enhanced geothermal, etc.). Many companies developing these types of technologies have little or no track record, and raising long-term finance may prove challenging.

Role of the EIB

10. Over the period 2013-17, the Bank has been a significant source of finance for the renewables sector in Europe. Total EIB lending was approximately EUR 3-5bn per year, including corporate lending and project finance, equal to approximately 2-4% of overall investment since 2013. This aggregate result hides large differences between sub-sectors: for instance, as illustrated in the Box II.1 below, the EIB has been a cornerstone investor in the offshore wind sector, in contrast to its relatively minor role, for instance, in the rooftop solar market.



11. The Bank has continued to support projects as the trend in support schemes moved towards market-based instruments and the increased integration of renewables into electricity markets. In all cases, the Bank's participation – whether directly with debt, or indirect with equity – is required to meet its relevant risk guidelines. In addition, some of the project finance loans to renewables have benefited from a guarantee under the European Fund from Strategic Investments (EFSI), which increases the EIB's overall risk-bearing capacity.
12. On the heat side, the Bank has supported the modernisation of several district heating systems in Eastern Europe and their transition to renewable energy sources. The ELENA facility has also supported municipal authorities in developing investment programmes to decarbonise heat through either biomass or geothermal technologies.

Future focus of the Bank

13. The Bank will support Member States to deliver the 2030 renewable energy target. Within the context of the Integrated National Energy and Climate Plans (INECPs), the Bank intends to engage at a relatively early stage with Member States to identify investment gaps in the renewables sector. In particular, the Bank will seek to bring any potential financial and technical value to the auctioning process.
14. The Bank understands the policy priority to integrate renewables further into power markets. It intends to continue supporting projects through its full range of channels, albeit bound by its risk guidelines. The Bank is open to exploring whether dedicated financial instruments could be developed, particularly should there appear to be negative impacts from market integration on the availability and terms of commercial debt.
15. The Bank intends to continue supporting less mature renewable technologies. Annex III takes up this point in the context of the SET Plan e.g. wave, tidal, enhanced geothermal etc. More generally, in light of rapid market developments, the Bank will review the approach set out in the 2013 ELC towards emerging technologies.
16. Some technologies that were still relatively expensive in 2013 are now well-established and competitive in most geographies. For instance, utility-scale solar PV can no longer be considered as an emerging technology. The Bank will continue to support such projects using its standard economic assessment.
17. The Bank sees a role to continue supporting public authorities in decarbonising heat systems. District heating and the development of geothermal and biomass represent opportunities for reducing CO2 emissions.

Q8: Declining costs and competitive auctions are transforming a number of renewable markets (e.g. onshore wind, utility-scale PV). How can the Bank best support these relatively mature technologies? In the context of increasing market integration, is there a need for financial instruments to help attract long-term private finance?

Emissions Performance Standard

18. Reducing CO₂ emissions and local air pollution from the power and heat sectors calls for a dramatic reduction of fossil fuels, which currently account for approximately one-half of total net electricity generated in the EU. Nearly 70% of derived heat in the EU comes from solid fossil fuels, natural gas or oil products. The deployment of renewables will change the way those plants are operated and will reduce the load factor of conventional power plants and therefore emissions.
19. Nevertheless, natural gas plants' capacity is likely to play an important role in securing system adequacy during the transformation period. In particular, in addition to storage, demand response and grids, there might still be a need for flexible conventional plants to balance the variable production of wind and solar. As discussed in Annex IV, gas power plants could play an important role in securing system adequacy during the transformation period.

EU policy

20. The recently amended EU ETS directive is reducing the oversupply of allowances, which reinforces the carbon price. Even at a moderate price level, this may discourage new investments in the most carbon-intensive forms of power generation in Europe.
21. The new electricity regulation also establishes that "wholesale electricity prices and balancing energy prices [...] shall not be subject to a minimum or maximum limit". Market rules are aimed at delivering appropriate investment incentives to meet market needs and thus ensure security of supply.
22. In addition, the regulation recognises the existence of capacity remuneration mechanisms in some countries and has introduced an emissions performance standard for capacity participating in national Capacity Mechanisms. This measure aims mainly to avoid increasing the revenues of relatively old, polluting plants, which could extend unduly the asset life, while enabling power plants needed to ensure adequate capacity but running a few numbers of hours per year, even if they are more polluting.

Investment barriers

23. Some of the most polluting power plants in Europe are using very cheap fuel. Recent levels of carbon prices in Europe have been too low to push polluting plants out of the market and in some cases might not be sufficient to prevent the construction of new ones.
24. Several Member States are concerned with security of supply and in particular the adequacy of the power sector in their country. A variety of market design rules exist in neighbouring countries, including price caps, capacity remuneration mechanisms and strategic reserves that can lead to inefficient prices and cross-border coordination issues at EU and regional level.


Role of the EIB

25. Over the last few years, fossil-fuel power generation has represented only a relatively small fraction of EIB lending. This reflects, in part, the structural overcapacity present in segments of the EU power market. Over the period 2013-2017, EIB lending to fossil-fuel plants represented around 3% of total energy lending.

As shown in Box II.2, the Bank financed efficient Combined Cycle Gas Turbines (CCGT) and Combined Heat and Power (CHPs) in the EU, as well as conventional generation on islands and for emergency reserves. The Bank financed two CCGTs outside of the EU.

Box II.2: List of EIB loans to fossil-fuel power plants						
	EU			Outside EU		
	Operation Name	Country	Approved Loan (mEUR)	Operation Name	Country	Approved Loan (mEUR)
CCGTs and Gas CHPs	PGE Power Generation	Poland	348	El Shahab Power Plant	Egypt	205
	Konin High-Efficiency Electricity and Heat	Poland	84	Damanhour CCGT Power Plant	Egypt	538
	Lagisza Gas Fired Power Plant	Poland	189			
	Palm Energy Efficient Paper Production	UK, Fr	37			
	EL TO Zagreb	Croatia	50			
	Combined Heat and Power Kiel	Germany	105			
	Raahe CHP Plant	Finland	60			
	Kilpilähti CHP Plant	Finland	190			
	TOTAL		1063	TOTAL		743
Gas/oil Engines	Elering Emergency Reserve	Estonia	40	Maldives Sustainable Energy Development	Maldives	45
	PPC Power Projects on Greek Islands	Greece	190			
	TOTAL		230	TOTAL		45

26. In 2013, the Bank introduced an Emissions Performance Standard (EPS) – a safeguard designed to ensure that the Bank only supports plants that contribute to reducing average emission levels.
27. More generally, as highlighted in Box 1, when assessing the economic case for different power and heat generation technologies, the Bank incorporates the external costs associated with both carbon emissions and local air pollutants. Damage costs associated with small particulate matter can have a significant impact on the comparative assessment of technologies.

Box II.3: Case study: Flexible conventional plant – KIEL CHP	
	<p>German municipal utility, Stadtwerke Kiel, is developing a modern gas engine power plant to replace an existing coal-fired power plant. The EIB supported this project with a EUR 105m loan.</p>
<p>The project comprises 20 highly efficient gas engines, an electrode boiler and a heat storage unit. It is designed to maximise flexibility in power supply, reflecting the impact of higher variable renewables in Germany. It can reach full nominal power from complete standstill within five minutes, whilst using the boiler and storage to maintain heat output. More information on this project can be found here: http://www.eib.org/en/stories/innovative-power-plant</p>	

Future focus of the EIB

28. The Emissions Performance Standard (EPS) will be reviewed as required by the Board in order to update its lending criteria to long-term emissions targets and more recent data. Emissions need to progressively reduce over time which implies that the future threshold will be lower.

29. Reflecting the decisions taken regarding capacity remuneration mechanisms in the new electricity regulation, the Bank is considering adjusting the EPS for some power plants used to provide flexibility – i.e. plants which operate only for a limited number of hours but exceed the EPS level.
30. Furthermore, the Bank could retain the current exemption for isolated systems and small islands (which typically do not have access to gas and cannot rely for security reasons exclusively on variable RES) that cannot be interconnected. However, in light of developments in the renewables field and the Paris Agreement and taking into account the Sustainable Development Goals, the Bank is considering whether an exemption to the EPS for power plants in least developed countries remains justified.
31. In addition to the EPS, there is a need to address carbon emissions more broadly for heat generation. The Bank is considering whether, in the absence of carbon capture and storage, to restrict eligibility of fossil-fired heat projects only to gas.

Q9: Does the EPS for power generation remain an appropriate safeguard? Do you agree that adjustment should be made to support flexibility and adequacy? In light of recent developments in renewables, the Paris Agreement and the Sustainable Development Goals, would an exemption to the EPS for power plants in least developed countries continue to be justified?

Annex III - Supporting new energy technologies and business models

1. In the 21st century, the pace of technological change in energy has accelerated, resulting in a rapid transformation of Europe's resource mix and opening new investment opportunities across all segments of the energy system. The rapid growth of digitalisation and the deployment of storage and electric vehicles is expected to increase system flexibility, facilitate system integration of renewables and empower consumers.
2. Most of these technologies can be deployed either at utility scale or be decentralised. According to some sources, one third of new investments will be connected to the medium and low voltage networks by 2030. In some countries, the fraction of capacity that will be installed at the edge of the grid, i.e. behind the meter, is estimated to exceed 20% by 2030. Distributed resources are changing the operation and investments in energy systems.
3. These technologies will also facilitate the electrification and integration of energy consuming sectors (building, heating and cooling, transport, industry) with the power sector – also referred to as sector coupling.
4. This annex introduces briefly the potential of new energy technologies before turning to research development and innovation.

Deploying new technologies and business models

Demand response

5. Demand response is important to increase the flexibility of power systems and in particular reduce consumption during tight system conditions. While energy-intensive users have long been active participants in power markets, digital technologies and automation are increasingly allowing new customers to participate in energy markets.
6. Aggregators of demand response are developing new business models which consists in developing software and installing equipment to remotely control the load of electric appliances (heating, vehicles, batteries, etc.) installed by consumers. Customer acquisition costs are high and the revenues of demand response aggregators are usually highly sensitive to price volatility and the evolution of market design.

Decentralised energy

7. Solar PV and several new energy technologies of small size can now be deployed rapidly and at scale. In the EU, the share of new generating capacity connected to the distribution networks is growing. As discussed in Annex III, this growth will increase the operational complexity for distribution companies, and make the interface between DSOs (Distribution System Operators) and TSOs (Transmission System Operators) more dynamic.
8. New investors are able to enter this market, including non-energy companies, energy communities or customers self-generating their electricity. The financial viability of decentralised energy critically depends on the regulatory framework, in particular in terms of network and electricity tariffs and their evolution.

Battery storage

9. At the moment, the cost of battery storage remains high, but it is declining rapidly. The current capacity – 1.3GW, or 2.6GWh remains very limited, and remains small compared to pumped hydro power stations – but this is expected to rise reflecting the growth of variable renewables, new usages and further cost reductions.
10. Battery storage systems are still predominantly used for the provision of system services to TSOs. Battery storage can provide mainly short-term flexibility to the power system and can increasingly participate in the wholesale, intra-day, balancing and ancillary services markets. The business models of battery storage projects often rely on several revenue streams and they can be developed either by independent merchant companies or regulated ones.

Electric mobility

11. Electrification of light duty vehicles (passenger cars and vans) and public transport (buses) is important to reduce emissions, including CO₂ and local air pollution, and to reduce oil dependence. The electric vehicle (EV) fleet size is forecasted to reach up to 120 million globally by 2030. The investments in the associated charging infrastructure may require additional reinforcement of the distribution network. The impact of EV charging stations on the power system depends significantly on the timing of customer activities. If charging occurs at peak periods, this will exacerbate system strain. If charging occurs in periods of low demand, or high renewable generation, EV charging could help to reduce system strain.
12. In terms of business models, several new companies are developing EV charging services and networks of recharging stations, using different billing strategies. Both energy companies and EV manufacturers are currently active in this field. Investments are driven by the expected market growth and first mover strategies to secure market share.

EU policy

13. The Clean Energy for All Europeans package adopted by the EU aims at creating the conditions for the development of energy communities and new flexibility resources, in particular storage and demand response; enabling energy communities and distributed resources to participate in energy markets; and promoting electromobility.
14. The new Electricity Directive promotes market-based investments in distributed resources. New market participants are expected to develop innovative business models, relying increasingly on software, smart technologies or energy services. Compared to traditional infrastructure investments, these new activities tend to be less capital intensive.
15. Enabling the deployment of battery storage is a key priority of the EU considering the strategic importance of this technology. The clean energy package aims at creating a level playing field to ensure the efficient development of this technology, and new storage projects are expected to be mostly market-based investments, although they may also continue to be procured by system operators for specific system services.
16. In addition, this increasing diversity of new resources will contribute to the capacity adequacy of power systems, thus ensuring security of supply in cost-effective ways. As discussed in the next annexes, additional conventional generation and grid investments are no longer the only options to meet system needs. The new electricity regulation and electricity directive are creating a framework to enable demand

response and storage to participate in the market at a much larger scale than before, including where there are implemented capacity remuneration mechanisms.

Investment barriers

17. Many of the investments discussed above are relatively small-scale. As with energy efficiency, high transaction costs can deter projects. In addition, in many countries the regulatory framework has to be adapted to enable efficient investment in decentralised energy resources, to increase their participation in wholesale markets, and to modernise the structure of electricity tariffs. Despite the potential economies of scale within the larger EU market, in practice markets at distribution level, which would allow trading of electricity at local level, are still missing and remain fragmented.
18. Despite reductions in recent years, the costs of some new technologies remain high compared to conventional generation and traditional grid investments. Accelerating the deployment of these technologies can help generate positive externalities, kick-starting the roll-out of new technologies and services to capture network effects, often in a context where the market design for new services is not well established.
19. This type of investment in digitalised technologies is new to the energy sector. The aggregation of small-scale demand response, for instance, consists principally in developing software and growing a critical mass of customers. Similarly, deployment of EV charging infrastructure seeks to create a network effect to attract an increasing number of consumers in the longer run.
20. The viability of new business models relying on innovative services and technologies remains uncertain. Besides the rapid cost reduction of some technologies, the demand for these services and their revenues depend on long-run market fundamentals and market price volatility in the short run. The details of market designs differ across Member States, despite efforts by the Clean Energy for All Europeans package to increase the degree of harmonisation. Lastly, there is fierce competition between technologies and business models.

Role of the EIB

21. The Bank has financed investment in new technologies by European energy companies. For instance, the roll-out of smart meters in France, Italy, UK Spain and other countries, enabling tens of millions of consumers to better manage their electricity consumption. These clients are also investing in battery storage projects and EV charging stations.
22. To support smaller projects, the Bank typically uses intermediated loans. Between 2013 and 2017, the EIB financed around EUR 4bn in the form of framework loans in the energy sector, with a large portion directed to distributed projects. It also invested EUR 625m in funds that take small equity participations in the energy sector, mainly in renewable energy and energy efficiency.
23. To date, the Bank has largely financed battery manufacturing rather than storage projects – see Box (Northvolt). The EIB is actively financing electromobility investments across the entire value chain, from R&D of the car industry, to battery manufacturing and, as described in Box III.1, the deployment of a dense network of charging stations that will facilitate the adoption of electromobility.

Box III.1: Bank support to EV charging stations



The EIB has financed several recent projects to deploy electric vehicle charging infrastructure. It supports GreenWay Group, Slovakia's leader of charging stations and services for electric vehicles. EIB funds will enable GreenWay to expand its network of charging stations for electric vehicles on a large scale in Central and Eastern Europe. This funding was provided under the 'InnovFin – EU Finance for Innovators' Energy Demonstration Projects, with the financial backing of the European Union under Horizon 2020 Financial Instruments.

In Italy, EIB support involves the installation of approximately 14 000 charging stations and the associated connections to the distribution grid by 2022.

The charging infrastructure will consist of slow, quick, fast and ultra-fast charging stations (capacity from 3.7 kW up to 350 kW). Around 80% of the charging points will be installed in urban areas; the remaining 20% will be of the ultra-fast type and will be installed in extra-urban areas and on motorways to enable medium and long-range travel. Furthermore, the investments will contribute to developing the smart grid through the integration and aggregation of distributed storage capacity (car batteries).

The promoter is Enel X, the Enel Group business line that focuses on innovative products and digital solutions.

Future focus of Bank activity

24. The EIB recognises the policy priority to develop innovative solutions to enable a cost-effective and rapid decarbonisation of energy production and use. It will seek to continue supporting new technologies and business models, including for batteries, decentralised generation, and EV charging stations.
25. These projects will be required to meet an economic test. The Bank intends to define an appropriate approach in order to capture the different economic dimensions associated with the deployment of new technologies and business models.
26. Nevertheless, novel business models can involve a high degree of risk associated with market demand, regulation and prices. This naturally constrains the capacity of the EIB, as well as that of its intermediaries, to finance such projects in practice, particularly by means of debt financing. Guarantees such as EFSI increase the EIB's overall risk bearing capacity and the Bank will look at ways to reinforce this capacity.

Q10: Are there ways in which the Bank could provide more targeted support to distributed resources (demand response, small-scale generation and storage projects)? Are new business models or technologies emerging in this context, with specific financing needs? Is the Bank's portfolio of financial products and instruments adequate to support this technological transition?

Financing R&D and innovation

27. The EU energy sector is one of the most innovative globally. It is already a leader in many technologies and energy systems, and has the potential to be a testing ground for many more innovations. Investment is required: further research and innovation are critical to reaching long-term European climate and energy goals and maintaining Europe's competitiveness in low-carbon technologies.

EU policy

28. The EU supports research and innovation through the Horizon 2020 programme, with almost EUR 80bn of funding available over this financing period. Nearly 8% of this funding is dedicated to research, demonstration, innovation, and market uptake across different low-carbon energy sectors.
29. The Strategic Energy Technologies Plan, or SET Plan, adopted by the EU in 2008, established an energy technology plan for Europe. In 2016, an Integrated SET Plan identified ten key priorities and actions required to accelerate the deployment of low-carbon technologies in a cost-effective manner.
30. The SET Plan Community has worked on a series of implementation plans that set out more detailed proposals on research and innovation activities and funding requirements. At the time of writing, eleven such plans are available covering CSP (Concentrated Solar Power), CCS/CCU (Carbon Capture and Storage/Carbon Capture and Utilisation), PV, batteries, deep geothermal, ocean technology, bioenergy, offshore wind, energy intensive industry, system resilience and positive energy districts.
31. For the period 2021-2030, the amended ETS Directive has established an Innovation Fund (IF). 450 million allowances are to be used to support innovation in low-carbon technologies and processes in energy and also in energy-intensive industries.

Investment barriers

32. Despite the patent market, investors typically fail to appropriate fully the benefits of the investment, weakening the private sectors incentive to invest.
33. In practice, there is a particular challenge in moving from demonstration into commercialisation, the so-called 'valley of death'. At this stage, the investment decision is challenging: capital expenditure needs are often high, whilst the residual risk of technology defaulting remains relatively high, coupled often with a long lead time to market. Investment requires a much higher risk appetite than investments in mature technologies. In Europe, RDI investment rests significantly on existing industry players. However, for new innovative companies, the bridging of this valley of death is most challenging in Europe with its relatively limited availability of venture capital (vs US or China).
34. In 2017, the Commission launched a consultation process with representatives of the energy and finance sectors, followed by five expert roundtables. This led to a summary report identifying various barriers, risks and financing needs, and making specific recommendations on the structure and design of the Innovation Fund.

Role of the EIB

35. As illustrated in Box III.2, the Bank has supported both private and public investment in innovation, including R&D and deployment of innovative technologies, over many years. Support is typically provided through either public sector or corporate loans, or intermediated via banks for smaller projects. The Bank has provided finance totalling nearly EUR 3.5bn since 2008 in the areas of energy-related RDI and manufacturing, with nearly two-thirds directed to wind turbines or solar PV.

Box III.2: Bank support to energy innovation

This box provides three examples of projects benefiting from energy demonstration instruments:

Windfloat: Located 20 km off the Viana do Castelo coast in Portugal, the Windfloat project will speed up the commercial roll-out of a novel technology for floating wind farms that enables the harvesting of abundant wind resources in deep waters where mounting foundations on the sea floor is not possible. The Windfloat project comprises three 8.4 MW wind turbines on floating platforms anchored to the seabed. The EUR 60m loan is being granted by the EIB and supported by the European Commission through the Energy Demonstration Projects facility. The project also receives funding from the EU's NER 300 programme and the Portuguese Carbon Fund.

Northvolt: Located in Västerås, Sweden, the Northvolt project is a first-of-kind demo plant for the manufacturing of li-ion batteries and a research facility for battery technologies. The project is the first step towards a large-scale battery factory in Skellefteå, eventually targeting production of 32 GWh worth of battery capacity annually. The EUR 52.5m loan is being granted by the EIB and supported by the European Commission through the Energy Demonstration Projects facility.

Skeleton: Located in Estonia, Skeleton Technologies is producing ultracapacitors based on graphene-type materials. Ultracapacitors are an emerging technology used for fast energy storage. Capable of rapid charging in a matter of seconds and able to provide over 1 million charge/discharge cycles, they offer benefits in industries where reliable, instant power is a necessity. The EIB is providing EUR 15m of 'quasi-equity' financing to fund the R&D.

36. Bank support spans manufacturing capacity for innovative products or processes of SMEs and mid-caps; advanced manufacturing technologies in all sectors; and full-scale commercial production lines related to Key Enabling Technologies and those identified under the SET Plan.
37. Since the 2013 ELC, the EIB and the European Commission have established a dedicated financial instrument and advisory services (technical assistance) to help innovative firms access finance more easily – the so-called InnovFin facility.
38. Within this overall facility, a dedicated InnovFin Energy Demonstration Projects (EDP) product provides loans, loan guarantees or equity-type financing to innovative demonstration projects in the fields of energy system transformation. This includes, but is not limited to, RE technologies, smart energy systems, energy storage, carbon capture and storage or carbon capture and utilisation. The EDP envelope has been increased recently, as some of the unspent NER 300 funds have been made available to EDP to finance more projects and provide technical and financial assistance.
39. In the last eighteen months, the Bank has developed a [venture debt](#) product, aiming to fill a market gap for innovative medium-sized European companies. This product has supported over 60 companies to date.

40. The Bank also works to support particular initiatives, such as the Battery Alliance, welcoming in particular the specific focus on the whole value chain, including the sustainability dimension. The Bank is ready to support investment in this area, and has engaged in preliminary talks on a number of potential promising operations.

Future focus of the Bank

41. The Bank recognises the critical importance of investment in innovation, including R&D, within the energy sector to reach long-term climate and energy targets. The Bank will continue to seek to support the SET Implementation Plans and associated EU initiatives.
42. In particular, the Bank will seek to continue deploying the dedicated instruments at its disposal – either financial or advisory – to support innovative projects. More broadly, the Bank continues to work with the European Commission and other stakeholders to ensure the success of the ETS Innovation Fund.

Q11: The Bank has developed a number of products – both financial and advisory - targeted to supporting innovative energy projects. Do you have a view on these instruments? Can the Bank improve or better target the financing needs of the energy demonstration sector?

Q12: Some renewable technologies or applications remain relatively expensive. Should the Bank continue to finance such projects, even in the absence of an innovative component?

Annex IV - Securing the infrastructure needed during the energy transformation

1. Adequate energy infrastructure, including energy networks, fuel supply sources, power generation capacity, and flexibility resources remain essential to complete the European energy market and to reliably meet the needs of energy consumers. This infrastructure must increasingly adapt and underpin the ongoing energy transformation by integrating renewables and other new resources in an efficient and secure manner.
2. Energy networks remain the backbone of energy systems and enable the connection of new power generation capacity. This includes increasingly decentralised resources, storage, and active consumers. While their importance will decline in a progressively decarbonised economy, gas infrastructure as well as fossil fuel extraction and petroleum refining will also continue to play a role during the energy transformation.

Box IV.1: EIB provided EUR 8.1bn to electricity and gas PCI/TEN-E/PMI projects, 2013-2017



The EIB continuously provides significant support to strategic energy infrastructure for the EU. Lending to Projects of Common Interest (PCI)/TEN-E and Projects of Mutual Interest (PMI) totalled EUR 8.1bn during the period 2013-2017, with gas infrastructure receiving EUR 1.5bn and electricity EUR 6.6bn.

The projects financed by the EIB are key in the creation and strengthening of a single energy market at EU level aimed at price convergence. They are also fundamental to increasing security of supply – by increasing the resilience of the EU energy system to shocks as well as by diversifying energy supply routes.

The composition of lending to PCI/TEN-E projects reflects the urgency to remove barriers to the transformation and decarbonisation of the power sector. Over EUR 1.3bn is explicitly directed at connecting or integrating RES generation capacity in the EU power grid.

Electricity networks

3. In the EU, the transformation of energy systems involves the connection of hundreds of gigawatts of wind and solar PV capacity, which is geographically dispersed and often located far from major consumption centres. This integration requires sustained long-term investment in interconnections, transmission and distribution networks.
4. The role of transmission networks is changing. Whilst less new centralised capacity is connected and less energy is transmitted, the transmission network is increasingly used to provide flexibility and balance supply and demand across large geographic areas, depending on wind and solar generation. Congestion on the transmission network will become more frequent, within each country and at the borders, as illustrated in Western Europe already, but the construction of new lines is remaining a very long process.
5. Distribution networks are rapidly moving to the centre stage of the energy transformation. They are connecting an ever increasing amount of distributed resources and becoming a platform to ensure efficient competition. Along with new technologies (Box IV.2), distribution network reinforcement is determining the hosting capacity of solar PV, wind and other generation sources for decades to come and will participate in the efficient integration of renewables in the grid in the long term.

EU policy

6. The EU has adopted a new interconnection target of 15% by 2030 for each Member State. As this target is a percentage of the installed capacity, which is growing rapidly due to the addition of wind and solar PV, this headline target is complemented by additional criteria (such as the price difference between bidding zones and the level of renewable capacity) designed to identify the most urgent needs for investments in new cross-border capacity. The European Commission also regularly updates its list of Projects of Common Interest, which become eligible for grants under the CEF (Connecting Europe Facility).
7. Distribution companies are increasingly becoming local system operators. In the new electricity directive, the EU creates a common framework for DSOs at EU level, contributing to the creation of a Europe-wide market for the development of distributed resources.

Investment barriers

8. Investment needs in electricity networks will remain at a sustained level during the energy transformation, estimated at around EUR 60-100 bn per year in the coming decades in the EU alone according to the EC long-term scenarios. It is important to reduce the cost of capital to ensure the affordability of this investment. However, a number of potential barriers may push up the cost of capital in delivering this investment, or even deter efficient investment altogether.
9. For cross-border interconnections (including PCIs), new projects may continue to suffer from coordination failures between Member States, especially where there is an asymmetric split between costs and benefits.
10. Capacity connected to the distribution network or on customers' installations can create coordination issues at the interface with TSOs. Their participation in the larger European internal energy market still requires the development of local market standards and platforms at distribution level, which do not exist across Europe at the moment.

11. Additionally, despite being regulated entities, the rate of remuneration of the regulated asset base may be considered too low in some cases. Some distribution companies, often smaller or in cohesion regions, may suffer with structural weaknesses on their balance sheet. This can affect their ability to raise debt at attractive rates, at least until structural reforms have taken effect.

Role of the EIB

12. As shown in Box IV.1, the Bank has been a core partner in financing the European electricity grid. The current volume of EIB support – EUR 4bn per year – equates to less than 10% of future investment needs.
13. Interconnection, and Projects of Common Interest (PCIs) in particular, are a high priority for the EIB (Box IV.1), whether they are regulated or developed on a merchant basis by independent companies.
14. The EIB is also financing distribution network investments, including regular investment programmes in lines and sub-stations of DSOs and large smart meters roll-out programmes in several countries.
15. Investments in distribution grids are expected to be increasingly motivated by a growing share of distribution-connected renewables, as well as the growing participation of distributed resources in power markets.
16. The EIB's participation can help reduce regulated entities' cost of capital. EIB participation usually provides longer tenors than those available in the market, facilitating the decision to undertake investments. Depending on the national regulatory approach, the financial advantage provided by EIB loans can be passed through in the form of lower network tariffs providing a direct benefit to final consumers.

Future focus of the Bank

17. The Bank intends to continue its support towards electricity grids. It will continue to work with its clients to finance their investment needs.
18. PCIs will remain a high priority for the EIB. The EIB will continue to work in close cooperation with the European Commission and ENTSO-E to ensure a robust economic assessment of the projects it supports.
19. In addition, the Bank is considering paying particular attention to network projects which use or enable new technologies and facilitate the decarbonisation of energy production and usage.

Q13: In light of the long-term nature of the network development plans, which type of projects should the Bank focus upon? In addition to PCIs, should the Bank prioritise newer investment types, for instance in digital technologies?

Box IV.2. Cybersecurity of energy infrastructure and adaptation to climate change

An increasingly important dimension of energy security and the resilience of energy infrastructure concerns cybersecurity and adaptation to climate change and extreme weather events. The EU strategy on adaptation to climate change (adopted in 2013) includes an action on ensuring more resilient infrastructure, which is particularly relevant to the energy system. In addition, as part of the '[Clean Energy for All Europeans](#)' package, the EU recently adopted a new [Regulation on risk-preparedness in the electricity sector](#).

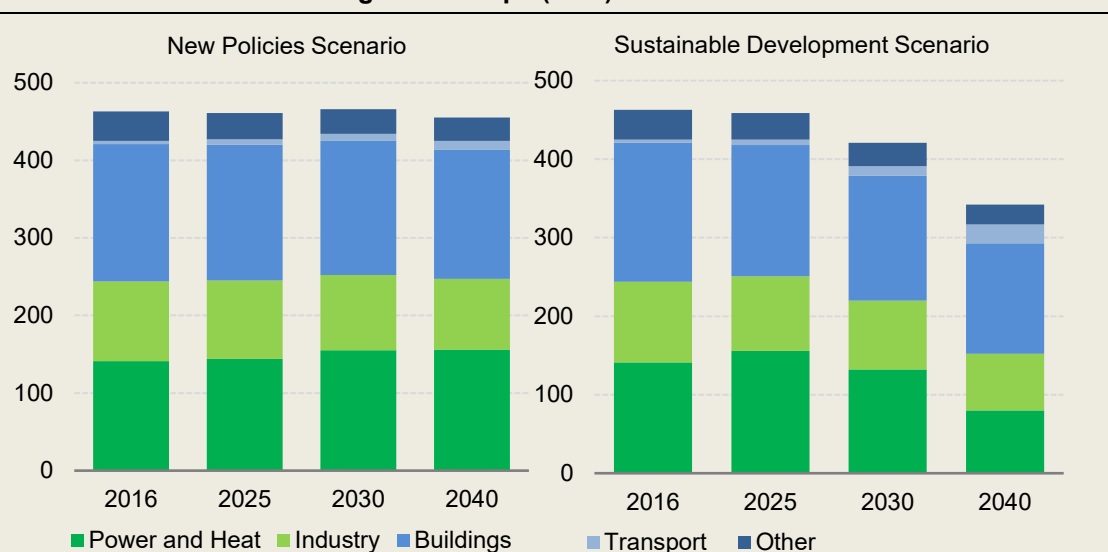
As illustrated by recent events, cyberattacks can have a huge impact on energy infrastructure. Data protection and data privacy concerns are increasingly important as the energy system becomes more decentralised and digitalised. The Bank is seeking to identify the cybersecurity components of the projects it finances with the objective to support them and to report on its activity in this field.

As part of the Bank's social and environmental standards and its [Climate Strategy](#), the Bank is also tracking the cost components of the projects that correspond to climate adaptation. Climate adaptation is part of the Bank's climate action targets. In 2017, the EIB financed EUR 19.4bn of climate action, of which EUR 0.8bn for adaptation to climate change, e.g. the undergrounding of electricity networks.

Gas infrastructure

20. European demand for natural gas is expected to decline gradually over the coming decades (Box IV.3), with all substantial usage in power generation, mobility or heating dwindling by 2050. This trend is more differentiated outside the EU, in particular where natural gas may play a significant role in substituting for coal over the medium term.

Box IV.3: The future role of gas in Europe (bcm)



Source: IEA (2018)

The chart presents results from the same modelling exercise referred to in Box 2. Under the NPS, demand for gas remains broadly constant; under the SDS it falls by around 20% between 2025 and 2040. While all sectors face a decline in gas consumption, the magnitude differs by sector:

- Buildings: gas demand drops by 20% over the period, reflecting energy savings (more efficient boilers; building envelope; switch to heat pumps);
- Power generation: gas usage increases out to 2025, reflecting fuel switching; but declines thereafter;
- Industry: demand drops by 30%. In the case of light industries, this reflects the replacement of gas by heat pumps.

21. As discussed in section II, the variability of renewable power can be complemented by increasing the flexibility of the energy system. Gas-fired power generation is important for modern power systems and for ensuring capacity adequacy. This is likely to generate peaks in gas demand in periods of low wind and sun. Equally, in domestic heating, switching from fuel oil to gas can provide significant energy savings. This requires a robust and well connected European gas transmission and distribution network.
22. The case for investment in gas infrastructure today remains highly differentiated across Europe. In some regions, for differing reasons, the current rate of usage of gas infrastructure is low, translating into a high level of system adequacy. However this is not uniformly the case, and there are a number of gas projects currently classified as EU PCIs designed to improve regional security of supply and market integration. On the other hand, there may be a risk of stranded assets in some regions where the gas infrastructure is already well developed, as a result of the EU's decarbonisation goals.
23. In addition, in the context of 2050 targets, as natural gas usage declines, gas infrastructure may continue to be used by alternative energy carriers: biogas, hydrogen or synthetic methane. The development of these technologies may enable the continued use of the existing gas infrastructure.

EU policy

24. Gas security remains an important priority for the Energy Union. Compared to 2013, gas security improved significantly in Europe due to investment in reverse flow infrastructure and LNG regasification import terminals.
25. Gas interconnections provide important benefits with respect to the completion of the Internal Energy Market (IEM), achieving the 2020 and 2030 European climate targets in some countries, as well as securing a high level of security of supply through diversification of import sources. Unlike electricity, there are no quantitative interconnection targets. The third PCI list identifies 53 gas projects.
26. In addition, the EU is currently investigating new ways to use the existing gas infrastructure, including potentially by biogas or power-to-gas solutions in order to improve the coupling of the power and gas sector. This potentially adds an 'option value' to maintaining existing gas infrastructure.

Investment barriers

27. As with the discussion on electricity networks, gas infrastructure is largely a regulated business model in which access to long-term debt is a critical factor in reducing the cost of capital.
28. Similar to electricity grids, the development of cross-border gas grids may face coordination failures. New infrastructure can continue to improve market integration and security of supply, which benefits the EU as a whole. In addition, the economic lifetime of fossil infrastructure is uncertain and this could reduce incentives to invest to maintain a high level of safety for the installations or reduce fugitive GHG emissions.
29. Today, there are no significant barriers for cross-border trades in most countries. Liquidity at EU hubs has increased, hub spreads/differentials are at minimum levels since 2005, meaning EU gas price convergence has significantly increased. The gas grid has become more resilient and nearly all Member States comply with the N-1 criterion and already have access to two sources of gas.

30. As with the discussion on power grids, some gas distribution companies, often smaller or in cohesion regions, may have difficulties in accessing long-term finance, given structural weaknesses on their balance sheet. Whilst reforms may have already been initiated, these can typically take several years to achieve full effect.

Role of the EIB

31. As shown in Box IV.1, the Bank has played a prominent role in supporting the gas PCI network. Over the five year period 2013-2017, the Bank signed loans in support of gas networks totalling EUR 8.8bn, equivalent to around 13% of overall energy lending.
32. The EC and the EIB are working closely with Member States and promoters at regional level (Baltic Energy Market Interconnection Plan – BEMIP, Central and South-Eastern European Gas Connectivity Group – CESEC, South-West Europe and the Northern Seas) to facilitate the development of key infrastructure. The priorities are now to end energy isolation and improve security of supply where these are still an issue.
33. The EIB undertakes a careful assessment of the economic case for gas infrastructure. Environmental externalities are always taken into account, both in terms of GHGs and other pollutants. The Bank periodically reviews the key element of its approach, including economic life, the assessment of renewables as alternatives to natural gas and methodologies for the valuation of benefits in terms of supply costs and security of supply.

Future focus of the Bank

34. The Bank is aware that some stakeholders question whether EIB should continue to support a 'transition' fuel such as natural gas. Nevertheless, the EIB remains committed to supporting the Energy Union in this area, and acknowledges the economic case for investment in gas infrastructure during the energy transformation.
35. At the same time, the EIB recognises the changing case for investment in gas. In the light of the EU 2030 climate and energy targets, there may be a risk that some new investments to expand gas network capacity may become stranded assets before the end of their typical economic and technical lifetime.
36. Consequently, the Bank is currently considering how to ensure that any gas infrastructure that it finances remains compatible with long-term decarbonisation targets. The new integrated national energy and climate plans will provide a useful reference framework. However, at the individual project level, the economic assessment methodology needs to be appropriate in the context of the long-term energy transformation. The Bank is currently considering whether and how it may need to adjust its present approach – see paragraph 22 above and Box 1.

Q14: What is your view on the investment needed in gas infrastructure to meet Europe's long-term climate and energy policy goals, while completing the internal energy market and ensuring security of supply? What approach could strike the right balance to prevent the economic risk of stranded assets?

Hydrocarbon production and petroleum refining

37. As already set out above, it is important to assess the need for new investment in oil and gas production in the context of long-term climate and energy targets. In the shorter term, however, the Energy Union highlights gas security, not least as domestic EU gas production is declining faster than demand and hence dependence on imported gas is increasing.
38. Regarding oil, there remains significant refining capacity within the EU, and there are no recent security of supply issues. New investments tend to focus on improving the efficiency of assets, rather than increasing capacity, or on improving the environmental performance of products, such as by reducing the sulphur content of fuel.

Investment barriers

39. In the absence of global pricing of the climate externality, there is a risk that the markets overinvest in fossil fuel activities in general compared to the level of investment needed to be on track with the objectives of the Paris Agreement. This argument diminishes the case for a public bank to further support this investment.
40. By contrast, security of supply might still require public intervention, notably to support indigenous sources and avoid import dependency.
41. In the context of refineries, the failure to internalise the external costs of local air pollutants may dilute incentives to improve the efficiency of operations and develop less polluting products. This may be corrected to some extent by product standards.

Role of the EIB

42. As has been the case for a number of years, the EIB did not finance any oil production projects during the period 2013-2017. It did support one gas production project outside the EU and one in the EU. This limited scale of activity in part reflects the financial value added that the Bank can bring to the major upstream oil and gas counterparties. Similarly, investments in refineries have become rare as far as the EIB is concerned.

Future focus of the Bank

43. Some stakeholders have requested that the Bank further exclude lending to all hydrocarbon production activities. The Bank is currently considering this, particularly in light of the level of financial value that the Bank can typically bring to major oil and gas counterparties and the absence of serious security of supply concerns.
44. That said, the EIB is also considering continuing to support projects that reduce emissions or comply with stricter environmental specifications and those improving the energy efficiency of operations. Supporting such projects could contribute to reducing overall GHG emissions. In any case, as with gas infrastructure projects, robust screening tools must be applied to these projects.

Q15: Should the Bank refrain from supporting hydrocarbon production, in addition to exploration? If so, should gas be treated the same as oil? Within and outside the EU?

Annex V - Supporting energy transformation outside the EU

1. The Bank's lending policy applies to all its operations – within and outside the EU. In this sense, everything discussed in the sections above apply to EIB operations outside the Union. However, for a number of reasons, it is equally clear that the nature of energy lending activity differs significantly outside the Union. This section focuses on these issues.
2. Outside the EU, EIB activities are making positive contributions to the UN 2030 Agenda for Sustainable Development. In the energy sector, Sustainable Development Goal (SDG) 7 requires, amongst other things, universal access to reliable and modern energy by 2030, a substantial increase in the share of renewable energy and a doubling of the global rate of energy efficiency. Africa is home to more than half of the one billion people without access to electricity. Access to reliable and affordable energy, through grid extensions or distributed off-grid solutions, is an important enabler of economic and social development.
3. SDG 13 reiterates the commitment made by developed countries within the IPCC to 'mobilize jointly USD 100bn annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions.' The Green Climate Fund (GCF) was established to support the efforts of developing countries to respond to the challenge of climate change and duly launched its first resource mobilisation initiative in 2014.

EU policy

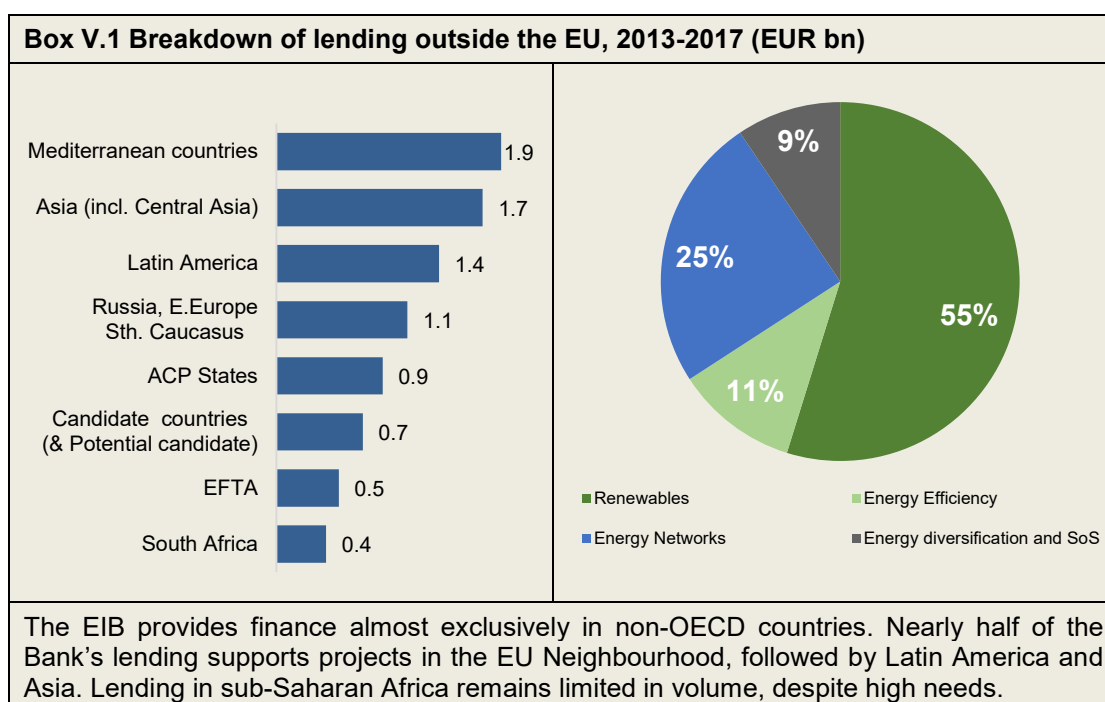
4. The EU is playing a leading role in the clean energy and low-carbon transition globally. As set out in the 2017 [New Consensus on Development](#), the EU aims to help partner countries deliver the SDGs, increase the financing of climate action and tackle the root causes of irregular migration and forced displacement. This will be delivered through the EU External Investment Plan ([EIP](#)).

Investment barriers

5. Investment in clean energy is a critical component in combating climate change and improving air quality, often against the background of the strong growth in demand for energy services. Energy efficiency of greenfield infrastructure has a strong role to play outside the EU to limit investment on the supply side. The IEA estimates that USD 2.9tn per year of investments are needed in the energy sector to meet the decarbonisation objectives by 2040, more than eight times the investment needed in Europe. China and India will each consume more energy than the EU by 2040.
6. In addition to the many potential barriers to investment in the energy sector described earlier, there are additional issues in many emerging and developing countries.
7. Some countries and corporates outside the EU lack access to long-term finance, in particular. This can be a barrier to developing capital-intensive energy projects. This is a result of many factors, including the state of development of the local financial sector, risk perceptions, as well as regulatory and political issues. Utilities often do not have a stable basis to cover costs, and thus have weak financial positions.

8. Institutions tend to be comparatively weak in poorer countries. Even where reforms are in progress, international investors may be reluctant to rely on an untested regulatory and legal framework. This often translates into a significant constraint on the ability of the public sector to develop and administer investment programmes e.g. developing a renewable energy auction. In addition, permitting processes can be complex, notably with land tenure issues, and hence fail to meet international financing standards (including those of the Bank).
9. Regional energy markets, notably for power, can suffer from coordination issues. In Africa, this has been partially addressed through several regional African Power Pool coordination entities. But new interconnection projects, for instance, take a long time to develop and continue to face many challenges.

Role of the EIB



10. The EIB can operate outside the EU in accordance with the mandates given by the EU and its shareholders. The Bank operates primarily under two mandates: the External Lending Mandate and the Cotonou Agreement. It also has access to EU regional investment facilities and is an accredited entity under the Green Climate Fund (GCF). The Bank is currently involved in discussions with key stakeholders on the terms of its involvement in the next multiannual financial framework (MFF) 2021-2027 through the External Investment Plan for its activities outside the Union.
11. As shown in Box V.1, over the period 2013-2017 the EIB lent EUR 1.75bn/year on average to energy projects, equivalent to around 13% of total energy lending. This figure corresponds only to signed loans and does not contain either grants or TA provided by the EU and managed by the EIB. As shown in Box V.2, the EIB has supported the first renewable energy projects in a number of countries.

Box V.2: EIB-pioneered renewable financing in Africa

In a continued effort to boost the development of solar power on the African continent, the EIB has recently signed several milestone loan agreements.

- In Zambia, the Bank provided a loan of up to USD 11.75m in support of the 34 MW Ngonye solar power plant developed by Enel Green Power under the Scaling Solar programme. The funding also involves senior loans of up to USD 9m from the International Financing Corporation (IFC), a member of the World Bank Group, and a concessional loan of up to USD 12m from the IFC-Canada Climate Change Program.
- In Morocco, the EIB pioneered the financing of what is now the benchmark for concentrated solar plants in Africa, the solar complex of NOOR Ouarzazate, which has a total capacity of 580 MW. The EIB, lead financier of the project, disbursed a total of EUR 250m including grants through the Neighbourhood Investment Facility (NIF). The first phase has already been producing electricity since 2016 and 2018 marked the successful completion of the most technological phase of the project with the tower and molten salt which provides storage capacity.
- In Kenya, the EIB has financed several solar, wind and geothermal projects. Notably, the Bank provided EUR 200m to support the Lake Turkana Wind Power plant. With a capacity of 300 MW, this is the single largest wind farm in sub-Saharan Africa, which is expected to generate around 20% of Kenya's power and provide low-cost wind power that will transform the supply of renewable energy in East Africa. The project benefits from additional financial support from the European Union, through the EU-Africa Infrastructure Trust Fund and a broad range of international investors.
- In South Africa, the Bank financed the first 100 MW concentrated solar plant, the KaXu CSP project which includes 2.5 hours of storage capacity. The EIB supported the project in partnership with a local domestic bank and a local development bank.
- In the off-grid solar sector, EIB has provided loans to accelerate the growth of several promoters, including a USD 25m loan to D.Light to develop the installation of solar kits – including not only panels and lamps but also low-energy equipment (radios, TVs, etc.) – in sub-Saharan Africa with the ambitious goal of reaching 10 million solar installations within five years. The installation of these systems will initially take place in Ethiopia, Kenya, Nigeria, Tanzania and Uganda. The EIB has also set up a EUR 50m debt facility to accelerate the growth of several off-grid solar promoters. The facility focuses on promoters using a pay-as-you-go scheme that improves the affordability of solar home systems for lower-income households.

These projects were all front-runner projects for their technologies in these countries, illustrating how EIB financing can accelerate the take-off of renewables in Africa and contribute to meeting the growing energy needs of the continent with competitive, low-carbon electricity.

12. The Bank has a target of 35% climate action lending for its operations in developing countries by 2020. Over the period 2013-17, renewable energy and energy efficiency represented approximately two-thirds of the Bank's energy lending outside the EU.
13. Due to the fact that the EIB cannot be the only financier of a project, the Bank operates in close coordination with the World Bank Group, as well as regional MDBs such as the ADB, AfDB, EBRD and IADB and the national promotional banks AfD, FMO and KfW. The Bank has at its disposal a wide range of funding and risk-bearing instruments, including senior debt, equity, quasi-equity, funding in local currency, access to dedicated subsidies envelopes for technical assistance and interest rate subsidies as well as EC and donor funds for blending.

14. One distinctive feature of the EIB when operating outside the EU is that it seeks to apply the same principles and quality standards as lending within the EU. In particular, lending needs to follow the Guide to Procurement and the Environmental and Social Principles and Standards that, in turn, are based on the relevant EU legislation. While EIB standards differ from other MDBs and national promotional banks, EIB involvement promoting best practices can be a powerful tool to strengthen the quality of projects.
15. Building on its extensive experience and best banking practice, EIB has structured project finance for renewables, and has used experience gained in the EU in blending public and private funding within targeted investment vehicles in the developing world. See Box V.3 below. Thanks to resources enabling more risk to be taken in exchange for superior development impact (impact financing resources), the Bank is supporting scalable funding products needed, for instance, for the off-grid solar sector which is particularly important to achieving universal access and rural electrification goals for sub-Saharan Africa.

Box V.3: Developing appropriate products

Global Energy Efficiency and Renewable Energy Fund (GEEREF)

GEEREF is a Fund which invests into dedicated renewable energy and energy efficiency funds in emerging and developing economies. To date, GEEREF has committed EUR 166m to 13 funds, which in turn have invested EUR 608m in 109 projects. This translates into approximately 2.7 GW of clean energy capacity either already operating or currently under development.

GEEREF leverages public sector funds to attract private funds to invest in projects delivering access to sustainable energy and combating climate change. The Fund is advised by European Investment Fund (EIF) staff and benefits from EIB technical support. The Fund applies rigorous quality and compliance criteria through its investee funds.

African Energy Guarantee Facility (AEGF)

Energy projects in sub-Saharan Africa often face high real or perceived public counterparty risks that deter private sector investment. Insurance offers a way to hedge against such risks, making investments more attractive. The AEGF responds to this gap. It is an innovative guarantee initiative, supporting an EU-based reinsurer, Munich Re, in the provision of political and (sub) sovereign risk insurance services for the energy sector in the region, working through local primary insurers.

The operation was initiated by the EIB and forms part of the Bank's response under the United Nations' SE4All initiative. The EIB's leading role and USD 50m investment (from the Cotonou Impact Financing Envelope) have been critical in attracting other partners and is on track to catalyse up to USD 1bn in reinsurance capacity to support the financing of green energy projects. Based on the preliminary pipeline of eligible energy projects, the facility could support the installation of 360 MW of generation capacity from renewables, enough to serve the typical consumption of some 876 000 households, or just over 4 million people.

Funding off-grid solutions

Within the context of increasing access to energy, the Bank has supported off-grid electricity solutions. For instance, under one of its mandates, the Bank has invested in the Energy Access Ventures Fund – a EUR 55m equity fund that supports off-grid energy access companies. The fund has now deployed its capital to seven investee companies in sub-Saharan Africa that provide solar home systems to remote off-grid communities, solar pumping solutions to small farmers, and rooftop PV solar installations to commercial and industrial clients.

16. The Bank also provides targeted advisory services to many of the projects outside EU in order to address certain capacity gaps, to provide additional socio-economic benefits, and to enable the projects to comply with the EIB's quality standards. Such technical assistance activities are usually financed by dedicated subsidies envelopes, EC blending facilities or donor trust funds.

Potential focus on EIB activity

17. The Bank is committed to using its energy activities outside the EU to support the EU's global strategy and remains committed to the SDGs within a multilateral framework. This has led to the adoption of a 35% target for climate action in developing countries by 2020.
18. As described in section II, the Bank is applying its Emissions Performance Standard across all operations globally and is wondering if an exemption to the EPS for power plants in least developed countries continues to be justified.
19. Under the Paris Agreement, countries are committed to present nationally determined contributions every five years. The Bank will work within this process to engage at an early stage with partner countries in identifying programmes and projects that can help deliver climate action ambitions.
20. The Bank has supported the scaling up of several innovative technologies within the EU, including on a non-recourse basis (e.g. offshore wind). It is currently considering how it can best provide advisory services to national administrations outside the EU.

Q16: Where can the Bank most usefully focus its support – either financial or advisory – to meet the Sustainable Development Goals outside the EU and better support the scaling up of renewables, energy efficiency and electricity grids in a developing country context?

DOCUMENT

Public consultation on the EIB Energy Lending Policy



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