

**DOCUMENT OF THE EUROPEAN BANK
FOR RECONSTRUCTION AND DEVELOPMENT**

DRAFT

ENERGY SECTOR STRATEGY

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ABBREVIATIONS

ADB	Asian Development Bank.
AfDB	African Development Bank.
BAT	Best available techniques.
BiH	Bosnia and Herzegovina.
CCGT	Combined Cycle Gas Turbines.
CCS	The capture (pre or post-combustion), transport and long-term geological storage of the carbon content of fossil fuels.
CHP	Combined Heat and Power.
CO ₂	Carbon dioxide.
CSO	Civil Society Organisation.
EC	European Commission.
ECSEE	The Energy Community for South East Europe.
EEPR	European Economic Programme for Recovery.
EHSS	Environmental, health and safety and social.
EITI	Extractive Industries Transparency Initiative.
EIB	European Investment Bank.
ERRA	Energy Regulators Regional Association.
ETC	Early Transition Countries (as defined by EBRD).
EU	European Union.
EU ETS	European Union Emissions Trading Scheme.
EvD	The Bank's Evaluation Department.
GDP	Gross Domestic Product.
GGFR	Global Gas Flaring Reduction Partnership.
GOGC	Georgian National Oil Company.
GHG	Greenhouse gas.
Gt	Gigatonne.
FYROM	Former Yugoslav Republic of Macedonia.
IEA	The International Energy Agency.
IED	EU Industrial Emissions Directive, (2010/75/EU).
IFC	International Finance Corporation.
IFRS	International Financial Reporting Standards.
ICER	International Confederation of Energy Regulators.
JBIC	Japan Bank for International Cooperation
JI	Joint Implementation.

kW	Kilowatt (one thousand watts).
KfW	German Development Bank.
LNG	Liquefied natural gas.
MEDREG	Mediterranean Energy Regulators.
MW	Megawatt (one million watts).
NER	New Entrant Reserve.
NOCs	National Oil Company.
OECD	Organisation for Economic Cooperation and Development.
OPIC	Overseas Private Investment Corporation.
SEC	Securities and Exchange Commission.
SEI	The Bank's Sustainable Energy Initiative Phase III.
SEFF	Sustainable Energy Financing Facility.
SEMED	Southern and eastern Mediterranean.
SRI	The Bank's Sustainable Resource Initiative (BDS13-052).
STEG	Solar Thermo-Electric Generation.
TI	Transition Impact.
TIMS	Transition Impact Monitoring System.
toe	Tonne of oil equivalent (unit of energy).
TPA	Third Party Access.
TWh	Terawatt hours.
UN	United Nations.
UNFCCC	United Nations Framework Convention on Climate Change.
WEO 2012	World Energy Outlook 2012, published by the IEA.

EXECUTIVE SUMMARY

Economies run on energy; energy fuels all commercial and public life. Whilst the energy sector is intensively regulated and in many countries the state is heavily involved private sector engagement is essential to improve efficiency, strengthen markets and meet the investment and operational challenges the sector faces. Energy producers face the challenge of managing their natural endowments responsibly and ensuring the benefits are distributed sustainably and equitably. Nearly all energy sub-sectors have large environmental and social impacts and the sector is one of the largest contributors to global greenhouse gas emissions. Combined, these characteristics place the energy sector at the heart of the Bank's mandate to foster the transition to market-oriented economies in its countries of operation, and to promote environmentally sound and sustainable development.

Bank activity over the past policy period since 2006. Since the Energy Operations Policy in 2006 was approved the Bank's annual investments in the energy sector have grown significantly – a response both to the urgency of the challenges the sector faces and the financial and economic crises which have constrained the availability of capital from other sources. The Bank invests a cumulative amount of EUR 8.3 billion in 161 direct operations in the energy sector while doubling the number of investments annually to approximately 30 and spreading its impact wider both geographically and within the sector. A particularly important trend was the growth of sustainable energy investments, especially in renewable energy and energy efficiency, with the energy sector consistently constituting over 40 percent of all financing under the Bank's flagship Sustainable Energy Initiative.

A changed environment. As the Bank now reviews its role in the energy sector, it is operating in a context that has changed dramatically. The global financial and economic crises continue to restrict the availability of capital for important infrastructure investments. The climate change agenda is now characterised by a long-term commitment to limit greenhouse gas emissions but medium-term uncertainty as to how that goal will be achieved, with carbon prices currently at low levels. Whilst the power sector has experienced dramatic growth in renewable energy generation, this growth has in turn brought its own challenges, related to the cost, market and technical implications of widespread penetration. Less heralded, smart infrastructure and decentralised energy systems are challenging the old model of a centralised electricity system where consumers have limited knowledge of, or control over, their consumption.

In the gas sector, the rapid and unanticipated revolution in the industry's ability to exploit unconventional reserves has overturned expectations for supply and demand dynamics. New gas developments, coupled with the growth in infrastructure to process, store, transport and distribute gas, have raised the possibility of better diversification of supply and the development of a global gas market. Greater gas availability may also strengthen the role of natural gas as a transition fuel to a low carbon power sector. At the same time, oil prices have risen to, and remained at, historic highs, both prompting a move to exploit more remote and challenging resources and strengthening the power and scale of national oil companies. Another key development has been the adoption of the Extractive Industries Transparency Initiative, and its incorporation into both the US and EU's regulatory framework for corporate governance.

Persistent transition gaps. Transition challenges persist in the Bank's countries of operations. Markets are still small, prices are not cost-reflective and private participation is limited. Similarly environmental costs are not reflected in prices and carbon intensity remains high.

As a consequence and as a legacy of decades of a command economy, the level of energy and other resource efficiency is low and many actors fall short of best international standards in corporate governance, transparency, technology and environment, health and safety and social practices. The scope for cross-border trade in energy is often restricted by a lack of infrastructure. While concerns about energy security are widespread, the focus is often on ensuring energy self-reliance, rather than strengthening the cross-border links that would deliver security more effectively and efficiently. Many of the Bank's countries also suffer from the damaging effects of explicit or implicit energy subsidies that distort economic behaviour, burden fiscal and public companies' balance sheets, with some countries also experiencing erratic, poor quality or unpredictable energy supply.

Security, affordability and sustainability. Against this background the energy sector is challenged to deliver energy that satisfies the three goals of security, affordability and sustainability. In this context, the Bank's role is to promote the systemic changes that shift the policies, assets, institutions, actors and regulations towards a model characterised by: competitive interactions, pricing that reflects all costs and benefits, diverse, deep and liquid markets, widespread private participation and the regulatory and physical infrastructure that facilitates these markets. Mainstreaming in this setting the Bank's key instrument, the Sustainable Energy Initiative, the Bank builds on two complementary elements: the first focuses on energy demand efficiency and seeks to the extent possible to contribute to decrease energy intensity; the second is oriented to support the cost effective development and efficiency of energy supplies.

Operational approach. The Bank's operational approach for the coming five years is shaped to tackle the remaining transition challenges. It will combine investments, policy dialogue and technical cooperation in an effort to shift the energy sector towards more market-oriented structures. It will aim to promote efficiency and enabling investments, such as networks, that open up options and allow diversification. In this context, the Bank will support the evolution of energy systems towards a model focused on empowering consumers, driving demand-side efficiency and opening up new business models for both the supply and consumption of energy. Across all countries the Bank will pursue the expansion of markets, the liberalisation of prices and more extensive private sector participation. A key theme in this effort will be the importance of clear, objective and predictable regulation as the basis for attracting new investors.

The Bank will promote the transition to a low-carbon model throughout the energy sector. A key part of this will be the efficiency agenda that is considered as part of all activities the Bank will pursue. It also includes support for cleaner production of energy through greater resource efficiency, for example by reducing gas flaring. The Bank will also continue within a defined framework to support fossil fuel generation, recognising the essential role this has in meeting energy needs, as well as the significant scope for efficiency and environmental improvements. The Bank will also pursue the promotion of renewable energy, building critical mass in established markets and supporting first movers and new technologies in newer markets. In doing so the Bank will also aim to shape frameworks for renewable energy that are market-based and characterised by long-term viability. In those countries of operation which are significant energy producers the Bank will also help diversify local economies and support the best standards in corporate and institutional governance and transparency.

The Bank's vision for the energy sector is of a partnership between industry, governments and consumers that delivers the essential energy needs of societies and economies in a manner that is sustainable, reliable and at the lowest possible cost.

1. STRUCTURE, AIM AND SCOPE

1.1 Structure

The Energy Strategy is organised in five sections. Section 1 sets out the aim and scope of the Strategy. Section 2 reviews the Bank's operations in the sector over the past seven years, since the existing Energy Operations Policy was approved. Section 3 sets the current context, identifying the key themes in the sector and the most important developments in recent years. Section 4 identifies the key transition gaps and challenges in the sector, thus defining the Bank's agenda for the Strategy period. Section 5 sets out the Bank's operational tools and approaches throughout the sector for the period 2014 to 2018 together with the Bank's strategic orientation.

1.2 Aim

Energy is a prerequisite for social and economic activity. For countries endowed with certain natural resources energy is also a major, even the dominant, source of national wealth. Energy in one form or another is an important utility and some aspects of the energy sector are natural monopolies, often in public ownership – accordingly it is necessarily regulated and a politically sensitive area. Therefore, the energy sector is also a nexus for the interaction between the private and public sectors.

The energy sector has massive and pervasive environmental and social impacts. It provides employment and economic opportunities and fuels businesses. It is a major consumer of resources, including fossil fuels, water and other materials. It is responsible for significant emissions into watercourses, landfill sites and the atmosphere. Above all the energy sector is central to both the causes of, and the responses to, climate change.

This combination of factors – economic importance, the interaction of public and private and environmental and social impact – places the energy sector at the centre of the Bank's mandate to foster the transition to market-oriented economies and its function in so doing to promote environmentally sound and sustainable development.

1.3 Scope

The Energy Sector Strategy covers all the Bank's activities in electricity generation, transmission, distribution and supply and hydrocarbon extraction, processing, transportation, distribution and supply. Hydrocarbons for this purpose include oil, gas and thermal coal.

The energy sector is however so pervasive that it affects many other areas of the Bank's operations, from the supply of energy services to residential and industrial energy use. The Energy Sector Strategy confirms the need to take a holistic approach to the energy system, and complements the Bank's Sustainable Energy Initiative (the **SEI**) which defines the Bank's approach to the wider energy system. Through the SEI, the Bank closely integrates its activities across sectors in particular in relation to energy efficiency investments. Whilst this Strategy predominantly deals with the Bank's approach to the energy sector, it has to be seen in the context of the important interactions and wider impacts under the umbrella of the SEI. The most important interfaces of this Strategy are therefore with:

- The Sustainable Energy Initiative Phase III (BDS12-020) and the recently launched Sustainable Resource Initiative (BDS13-052) (the **SRI**) which are fundamental to the

Bank's approach to both the production and use of energy. The SEI and the SRI together set out the Bank's overarching approach to promoting the sustainable and efficient use of energy, water and other resources. Within this context the energy sector is central, both in improving the sustainability of energy production and distribution and in promoting the efficient use of resources.

- The Mining Operations Policy (BDS12-219) sets out the Bank's approach to all natural resources other than hydrocarbons as well as the environmental approach to coal mining. Metallurgical coal is covered under this policy. The transport sector is one of the main consumers of energy and accordingly the draft Transport Strategy (CS/FO/13-01 (Add 1)) interfaces with the Energy Strategy in setting the agenda for higher quality fuels and the infrastructure for cleaner transport systems.
- Finally the Municipal and Environmental Infrastructure Strategy (BDS12-126) sets the framework for energy provision by municipal actors, principally district heating and cooling.

In addition, the Bank's Environmental and Social Policy (BDS08-067) guides all activities in this sector.

BUILDING ON THE 2006 ENERGY OPERATIONS POLICY

The Energy Strategy builds on the 2006 Energy Operations Policy, which has guided the Bank's operations in the sector from 2006 to 2013. It also reflects how the Bank has developed and refined its operational approach in response to developments in that period. The Bank's transition mandate remains the guiding principle for the Strategy as for the 2006 Policy. Consequently the Strategy restates the importance of markets, private participation and cost-reflective pricing in achieving the optimal outcomes for society, while identifying the Bank's role as promoting the structural shift towards a market-oriented model for the sector. Within that broader context, the Strategy develops its approach from that set out in the 2006 Policy in a number of ways.

Energy Efficiency has been a cornerstone of the 2006 Policy and remains a central element, with the Bank continuing to work, under the umbrella of the Sustainable Energy Initiative, both on supply and demand side energy efficiency throughout its operations. The Strategy expands this focus, firstly by targeting new and innovative areas such as demand side response and management and smart grid infrastructure and secondly by expanding it beyond energy efficiency to cover water and materials as part of a comprehensive resource efficiency approach.

While renewable energy was in its infancy in the Bank's region in 2006, it has since become a mainstream business globally and in several countries of operations. The Strategy restates the importance of this sector but highlights the evolving challenges that the Bank's countries are facing as a consequence of the growing scale and maturity of this sub-sector. The Strategy therefore highlights the attention the Bank will pay to supporting frameworks for renewable energy that are robust and sustainable in the face of these challenges.

Building deeper and more liquid energy markets through pursuing private participation, strengthening energy infrastructure and regulation, and supporting sound natural resource management have been important aspects in the 2006 Policy and continues to be so. In addition, this Strategy highlights the Bank's role in strengthening the whole hydrocarbon value chain and maximising the role of energy projects in building more robust economies.

In the area of cleaner energy production the Strategy codifies the Bank's methodology in evaluating the environmental implications of investment in coal-fired generation and associated mining infrastructure. This reflects the way in which the Bank's practice in this area has evolved over the preceding years.

While the EOP also recognized the importance of combining investments with targeted technical assistance and policy dialogue, this Strategy entrenches this business model by aiming to initiate overarching initiatives in a number of key areas such as transparency, gas flaring reduction, regulatory best practice, frameworks for carbon capture and storage (CCS) and demand side management.

Finally, the importance of promoting highest standards and best practice in environment, health and safety, and social aspects is reiterated in this Strategy as is the Bank's approach to nuclear safety.

2. PAST PERFORMANCE HIGHLIGHTS

Over the course of the past seven years the Bank has realized major achievements. Having set out to lend or invest a minimum of EUR 1 billion in sustainable energy projects during the period 2006 to 2010, the Bank has in 2010 alone invested over EUR 1 billion in energy efficiency and renewable energy. Overall, since 2006, the Bank has invested over EUR 5 billion in projects that help curb energy demand through demand side energy efficiency, reduce losses and improve efficiency of energy supply infrastructure or support renewable energy generation.

In the area of renewable energy, in particular, the Bank has engaged strongly with a number of its countries of operation to develop regulatory frameworks and demonstrate first renewable energy investments. In this way, the Bank financed over 57 renewable projects in the policy period, among those the first ever windfarm in Mongolia, the largest windfarm in Turkey and, in Ukraine, the Bank's first solar project.

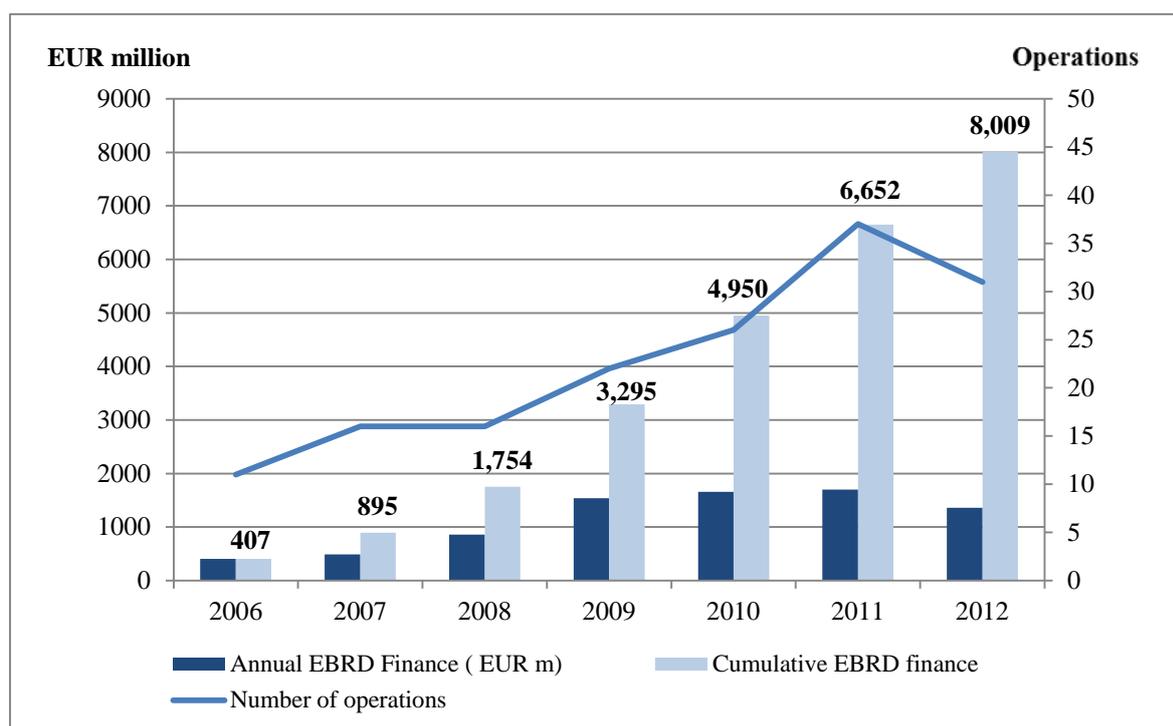
The Bank also made major contributions to help unlock the region's energy potential and improving security of supply. Alongside investing in gas and gas storage infrastructure, investments in the efficiency of the oil and gas sector have grown considerably. Hence, the Bank not only financed the first new gas power plant to be built in Russia's Far East region in the last 30 years and the first re-gasification terminal in the Bank's region, but it also engaged in the Global Gas Flaring Reducing Partnership and successfully financed two important projects aimed at reducing associated petroleum gas flaring in Russia.

Over the policy period, the Bank also successfully reached out to new investors and extended its financing to the smaller and early transition countries in the region. To achieve this, the Bank targeted resources to the early transition region, increased lending of smaller financing amounts and worked through direct lending facilities. As a result, the Bank extended its reach towards more countries and extended 27% of energy sector financing to projects in the Early Transition and Western Balkans countries.

2.1 Portfolio development¹

A continuously strong performance in the energy sector led the Bank to fund 161 operations and invest over EUR 8.3 billion since 2006. Having funded an average of 15 projects per year in the earlier years of the EOP, the sector experienced a marked increase in activity to over 30 projects per annum since 2010. This increase was not only a response to the growing demands for financing in the wake of the financial crises but was also due to a commitment by the Bank to fund smaller projects in the Western Balkans and ETC countries. Meeting its aim to leverage its investments in the energy sector, the Bank significantly boosted the financing mobilised from the private sector and other commercial and non-commercial lenders: mobilised financing in the energy sector since 2006 exceeds EUR 30 billion.

FIGURE 1: Annual and Cumulative EBRD Finance in the energy sector



As figure 1 shows, over the policy period the number of energy operations per year increased four times and the Bank's annual financing volume doubled between 2008 and 2012. This reflects both the continued transition demands in the energy sector in the Bank's countries of operation as well as the Bank's strong response to the impacts of the global financial crisis. Within this picture of a major scaling up in the Bank's energy sector activities a number of trends can be identified.

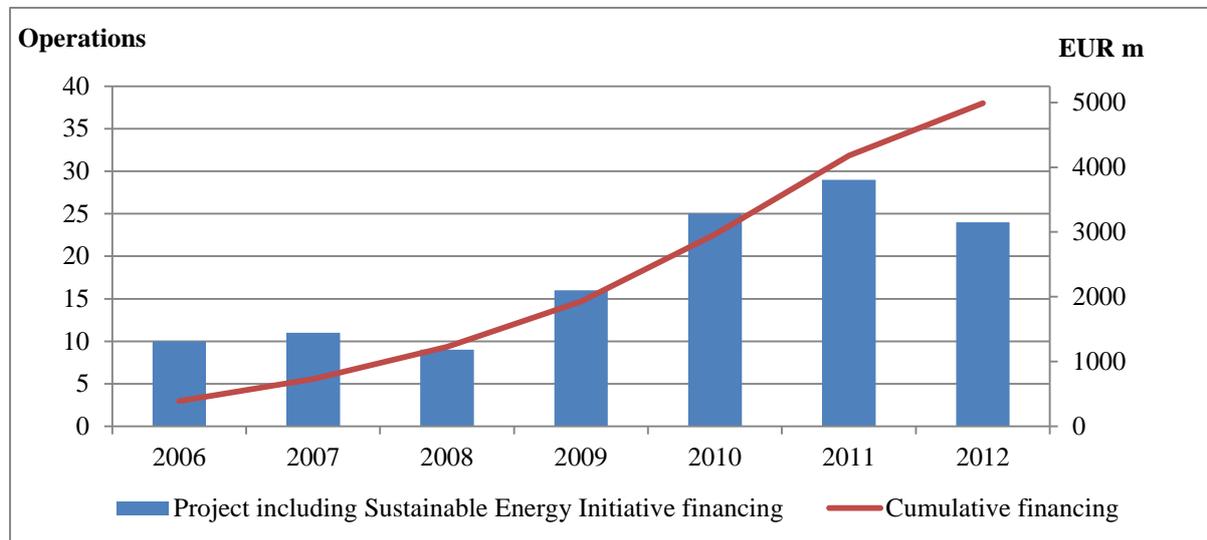
Promoting Energy Efficiency and Renewable Energy: the Sustainable Energy Initiative

Since 2006, the Bank has worked comprehensively throughout the region in addressing climate change and energy efficiency challenges through its flagship Sustainable Energy Initiative (the SEI). Whilst across the Bank cumulative SEI financing was over EUR 11 billion for over 600 projects at end 2012, the energy sector alone had contributed nearly 50% - a total of EUR 5 billion - to this achievement. By making significant investments in supply and also demand side energy efficiency and promoting renewable energy, energy sector investments have consistently been the largest single contributor to the SEI, delivering estimated emissions reductions of over 37 million tonnes of CO2 per year and energy savings of 16.5 million toe per year.

The Bank's sustainable energy investments include investments in various renewable energy technologies - hydropower, biomass, wind and solar. They also include investments in important energy efficiency upgrades and rehabilitation of power generation assets, support for loss reduction projects in transmission and distribution systems, grid enhancements to facilitate renewables, gas flaring reduction projects, coal waste recycling projects and investments in the efficiency of refinery assets. As a result of mainstreaming these type of investments into energy sector activities, sustainable energy investments have grown from 10 projects for EUR 400 million in 2006 to 24 projects for over EUR 880 million in 2012. Across the Bank's countries of operation, these investments have been regionally very

balanced, with around EUR 1 billion of financing going to four main regions: central Europe and the Baltics, Russia, eastern Europe and the Caucasus and south eastern Europe. Only central Asia has lagged slightly behind with c. EUR 350 million financed, partly attributable to slowly developing regulatory frameworks for renewables and smaller project sizes in this region.

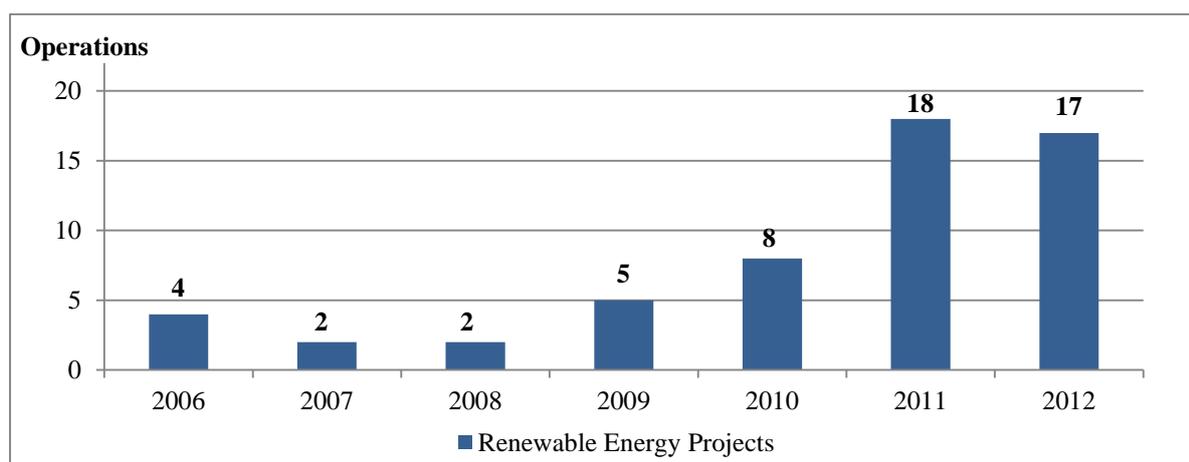
FIGURE 2 – Energy sector projects and cumulative financing under the SEI



Renewable Energy

A key area of growth and main sector of success for the Bank is its renewable energy financing. Here, the Bank's key support for investments and strong engagement to develop regulatory frameworks in the region have led to a more than quadrupling of renewables investments per annum. Between 2006 and Q1 2013, the Bank made 57 investments in this area, comprising 43 wind, solar, biomass and small hydropower projects, two contributions to renewable energy funds and 12 large hydropower rehabilitation or construction projects. Taken together the Bank invested over EUR 2 billion in projects with a total value of over EUR 5 billion, leveraging over EUR 3 billion of renewable investments from the public and private sector in its countries of operation. With over 20 investments, the wind sector has been especially strong, reflecting the maturity of this industry and the resource profile of the Bank's region. Operations under financing facilities also grew in importance, with 12 small scale biomass, hydropower and solar projects financed under Sustainable Energy Direct Financing Facilities for the West Balkans and Ukraine. Additionally, the Bank provided over EUR 800 million of financing for renewable energy projects through loans intermediated by local banks under its Sustainable Energy Financing Facility (**SEFF**) programs.

FIGURE 3: Growth in renewable energy projects (excluding intermediated facilities)



Breadth and diversity

As highlighted above, the Bank's activities shifted towards a growing number of smaller investments, with the growth in the number of projects being significantly higher than the growth in the volume of investment. This reflects sector trends towards more diversity of activities, the Bank's efforts to support projects in key target regions such as the Early Transition Countries and the West Balkans and an increased focus on sustainable energy and smaller private clients. Whilst the average energy sector investment was EUR 52 million, project sizes ranged from less than EUR 3 million (14 operations) to EUR 150 million or more (16 operations). 72 projects, over 44% of the total since 2006, financed less than EUR 25 million. The smallest direct lending operation in the period was an early stage equity investment of USD 700,000 in Mongolia's first windfarm – described below.

MONGOLIA'S FIRST WINDFARM

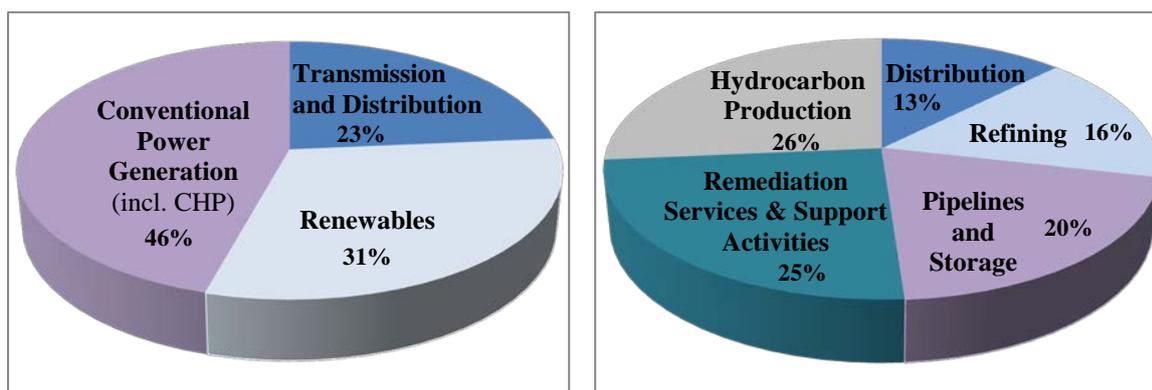
Mongolia, whose giant coal and mineral deposits have become known around the world in recent years, adopted legislation in 2007 that gives renewable energy producers preferential rights to sell their electricity output. In this context the Bank invested in what is both the first wind energy project in Mongolia and the country's first privately owned generator: the Salkhit wind farm.

In March 2012 the Bank completed a USD 42 million loan and a USD 4 million equity commitment to fund the construction of this 50 MW project, 70 km outside Ulaanbaatar, sponsored by the Mongolian Newcom Group. The investment is the culmination of five years of interlinked investment, policy dialogue and technical cooperation, which began in 2007 with donor-funded consultancy for environmental and social assessment and regulatory support, was followed by extensive policy dialogue to develop a bankable project structure and included a crucial early stage development equity investment of USD 700,000 in 2009.

Mongolian government targets now require that a quarter of electricity should come from renewable sources by 2020. As the first significant renewable energy generator in the country the Salkhit windfarm will demonstrate how the private sector can make an important contribution to this target. The project will provide about five per cent of the country's electricity needs, which are currently almost entirely met by ageing, coal-fired power plants.

Energy investments also covered a wide range of sub-sectors and activities. Figure 2 shows a breakdown of all electricity and other energy sector financing by type since 2006. In each case the breakdown shows the broad spread of the Bank's activities across all subsectors.

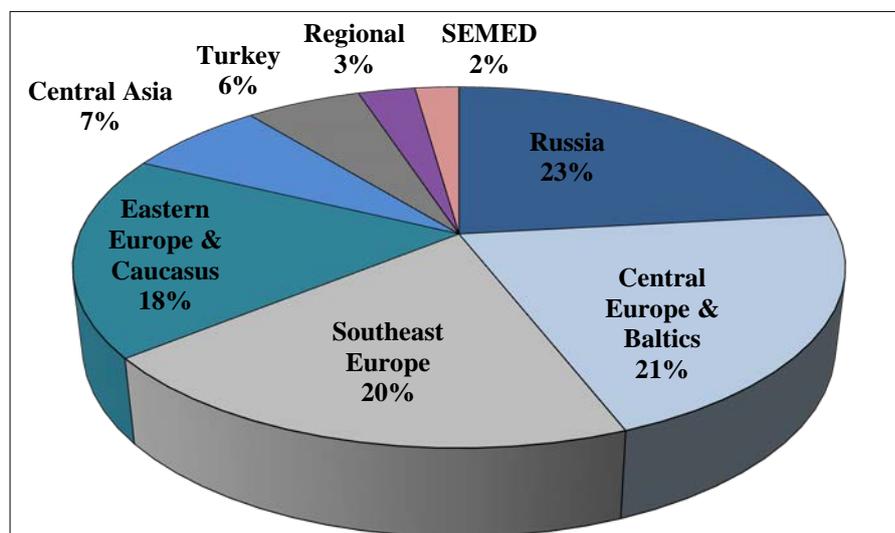
FIGURE 4: Electricity and other energy sector financing by type



This allocation of resources is not static, it is a dynamic response to the needs of the region in the transition process and varies annually. Activities the Bank invests in therefore range from small renewable generation projects in the Western Balkans, Ukraine and Mongolia, through large projects to rehabilitate thermal and hydro power plants in Russia to investments in transmission lines, gas pipelines and gas storage in south east Europe.

The energy sector is also an important contributor to transition across the Bank's region. Figure 3 summarizes the energy sector investments by region, showing the wide geographical spread.

FIGURE 5: Regional distribution of energy sector financing 2006 to 1Q 2013



Note: In 2006 to 1Q 2013 the Bank financed energy sector projects in 28 countries of operations.

Energy investments are balanced between the four large regions: Russia, eastern Europe and the Caucasus, south eastern Europe and central Europe and the Baltics. Whilst Russia had the highest share of financing since 2006, south eastern Europe has seen the highest numbers of energy sector investments, with 43 projects for over EUR 1,650 million. This included nine investments in strengthening grids, improving metering and efficiency of distribution infrastructure. It also included 19 investments in renewable energy projects. The large numbers of projects in the Western Balkans (20 projects) and Early Transition Countries (25 operations) highlight the contribution of the energy sector to the key ETC and Western

Balkans Initiatives. Two investments for EUR 185 million were made in the new SEMED region.

SUPPORTING RURAL ELECTRIFICATION AND SMART METERING IN MOROCCO

In March 2013, the Bank signed its first energy investment in Morocco, a EUR 60 million loan to the Office National de l'Electricité et de l'Eau Potable. Through this investment the Bank is supporting Morocco's goal to provide electricity access to all its citizens, bringing Morocco's rural electrification rate from 97% to 100% and improving the quality of life for rural communities. The loan also finances a pilot smart metering programme, which will be essential for the deployment of decentralised generation from renewable energy, for example through solar photovoltaic panels on roofs.

2.2 Policy dialogue, technical cooperation and donor support

The Bank's energy sector investments are closely integrated with its technical cooperation (TC) and policy dialogue activities. Donor partnerships enable these activities and help the Bank better address the challenges in the energy sector by providing targeted support to promote markets, reduce energy intensity and support low carbon solutions. The technical support given in this way to governments, regulators and private sector clients is an intrinsic part of the Bank's work and contributes substantially to the transition mandate.

The Bank typically deploys donor-funded TC in the energy sector in two main areas: project preparation and implementation, and reform and restructuring. In project preparation and implementation, TC activities support the whole investment life-cycle, including feasibility studies, design, project supervision, environmental and social impact assessments and procurement support.

The Bank has also extensively used donor-funded TC to promote the reform of the energy sector. Projects of this nature include support for the development of energy sector roadmaps and renewable energy regulation, advice on improving tariff methodologies in the electricity and gas sector and support for the commercialisation of public sector entities. For example, in Romania and Turkey the Bank has engaged in dialogue on smart metering and in the Balkan countries started a dialogue and provided assistance to improve cross border electricity trade (see Boxes below).

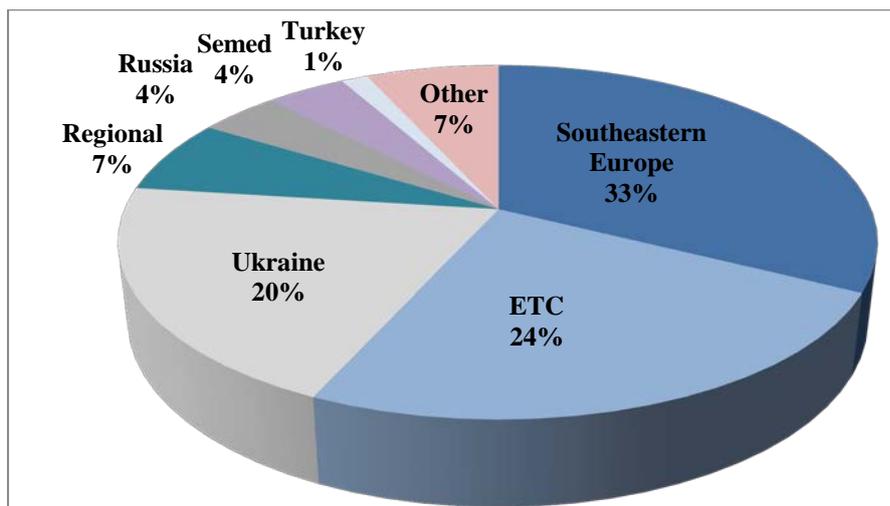
A particularly successful experience in this area has been the Bank's engagement in policy dialogue on renewable energy legislation with governments and regulators in the Balkan countries, Ukraine and Kazakhstan. Here, assistance in drafting renewable energy legislation has helped develop regulatory frameworks that have subsequently attracted investments into the sector. For example, in Ukraine the Bank financed in 2012 and 2013 its first windfarm and first solar projects in Ukraine, building on the donor-funded TC to create the support mechanism these projects rely on. Using this experience, the Bank is also implementing a strategic environmental assessment of renewable energy in Kazakhstan in close coordination with its investment projects in the transmission and thermal generation sectors. These examples are also informed by lessons the Bank has learned from previous projects about the importance of building sound regulatory foundations for initial projects and then maintaining continuity and consistency in policy dialogue and TC. To ensure commitment to the results of these activities, the Bank works closely with the beneficiaries, such as energy ministries, regulators and public energy companies, to develop the objectives and scope of each assignment.

TECHNICAL ASSISTANCE PROMOTING SMART METERING IN ROMANIA AND TURKEY

In Romania the Bank commissioned a smart metering market feasibility study, including a cost-benefit analysis, to assess the possibility of introducing smart meters in the electricity, gas and heat markets in Romania. The country is still in the early stages of smart metering implementation for electricity, with only about 15,000 consumers having access to automatic meter reading technology. In Turkey the Bank launched a similar study into the current use of smart metering in the European electricity market and its applicability in Turkey. Both studies concluded that smart metering is likely to be a profitable investment, especially in the electricity sector, with benefits for utilities from the reduction of commercial losses and meter-reading costs and benefits for consumers from an enhanced understanding of their consumption and so a better ability to manage their energy needs and bills. These studies are now being used by the energy regulators of these countries to inform the development of their regulatory frameworks.

Since 2006, the Bank initiated 73 technical cooperation projects committing over EUR 26.6 million of funds in the energy sector. Half of those projects have been completed and over half of committed funding has been disbursed. Whilst the average TC project amounts to EUR 365,000, 22 assignments cost below EUR 75,000 and the largest assignment (preparatory studies for the modernisation of Ukraine's gas transit and storage system) was EUR 2.2 million. This demonstrates the range and variety of support given. As highlighted in Figure 6, technical cooperation efforts in the energy sector particularly target south eastern Europe, ETC countries and Ukraine.

FIGURE 6: Regional split of Technical Cooperation Projects



In south eastern Europe and Ukraine the focus is largely on assisting in environmental assessments and analysis of renewable energy potential, as well as capacity building and commercialisation support for public sector companies. In ETC countries assistance is particularly required to conduct feasibility studies and support project implementation. A good example is the EU Neighbourhood Investment Facility's EUR 1 million technical assistance and EUR 4 million investment grant that complemented EUR 40 million of financing from the Bank and other IFIs for the rehabilitation of the Enguri Hydro Power Plant in Georgia in 2012. Whereas direct grant funding alongside the Bank's investments in the energy sector operations is relatively rare, this example highlights that in some countries with particularly difficult access to finance and large transition gaps this kind of support is still needed.

Annex 1 lists the donors who have contributed to these important TC efforts. The Bank gratefully acknowledges their and all other multilateral and bilateral donors' contributions and recognises that these resources are critical to the delivery of the Bank's mandate.

REGIONAL INTEGRATION AND THE DEVELOPMENT OF REGIONAL ENERGY MARKETS

The development of the Coordinated Auction Office in south eastern Europe provides a good example of the Bank's TC work in practice. At present electricity trade in south east Europe is hampered by the small size of individual national markets and the fact that each national electricity company manages their own cross-border connections with their neighbours. After years of discussion with each other and with key stakeholders such as the South Eastern Europe Energy Community Secretariat, the European Commission and the Bank, ten regional electricity transmission system operators agreed in June 2012 to establish a single agency, the Coordinated Auction Office, to manage the allocation of their cross-border capacity. EUR 660,000 TC support funded by the Bank's Shareholder Special Fund is supporting this agency's establishment, the funding of which is playing a catalytic role in mobilising co-financing and moving the project from an idea to reality. Once operational the Coordinated Auction Office will make cross-border trade in electricity simpler, cheaper and more transparent, promoting the development of a truly regional power market.

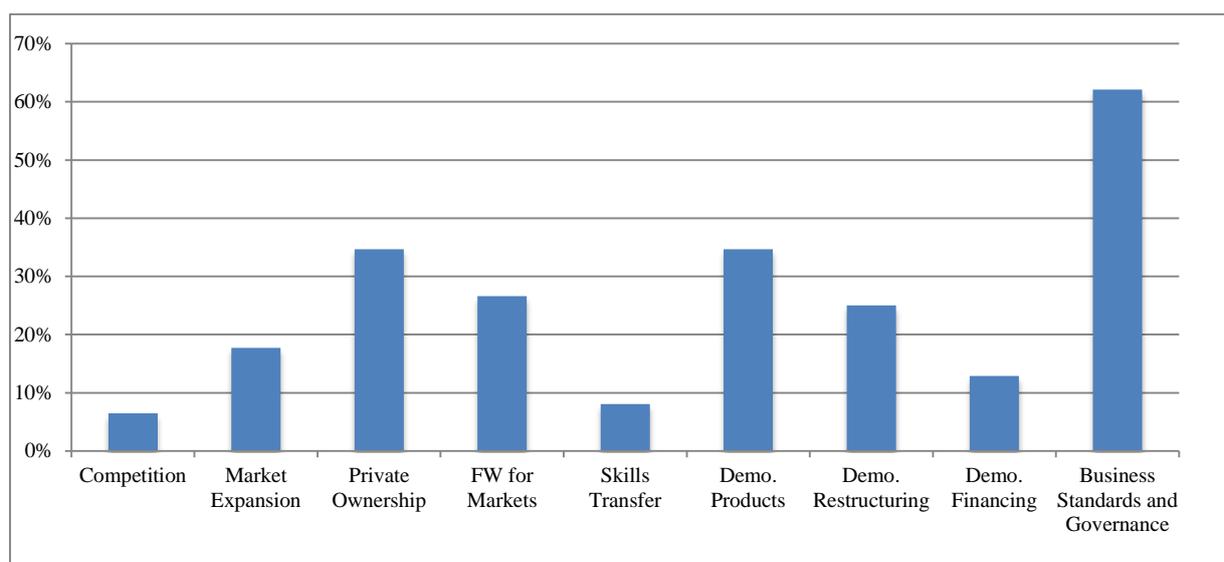
2.3 Transition impact of the Bank's portfolio

From 2006 to the end of Q1 2013, the Bank signed 128 operations in the energy sector which were individually rated for transition.² 93 per cent (or 119 projects), were ex-ante assessed as having Good or Excellent transition impact potential.³ 32 projects had Excellent transition impact potential, most of which were signed with private counterparties in countries of operations where the energy sector is still heavily dominated by the state. These projects have significant potential to provide demonstration effects of effective private sector participation throughout the region. The power sector accounted for 21 Excellent rated projects, over half of which involved support for renewable energy sources, and the remaining 11 Excellent-rated projects were in the natural resources sector.

Nine operations (or 7 per cent of the total number of signed projects) were ex-ante assessed as having Satisfactory transition impact potential. These operations, while introducing improved business standards and practices, were mostly undertaken with dominant incumbent state-owned companies in central Europe, which constrained the potential transition impact.

The key transition objectives of the projects signed in 2006-Q1 2013 reflects the Bank's response to the main challenges identified for the energy sector, including persistent state dominance and institutional inefficiencies, as well as a need for a transition to a low-carbon economy and associated business standards improvements. As a result, most projects targeted improvements in business standards (in particular environmental and social) and corporate governance practices, and over one third of all rated projects signed in the energy sector addressed increased private sector participation and demonstration of new environmentally friendly and sustainable products and processes (such as wind power).

FIGURE 7: Targeted transition objectives (share of projects) in the energy sector



Note: Numbers sum to greater than 100% because most projects have more than one area of targeted transition impact. Period: 2006 – Q1 2013.

The performance of projects under implementation (more than six months since their signing and subject to monitoring through the Transition Impact Monitoring System (TIMS) at least once) has been on track. As at end-Q1 2013, there were 109 operations in the Bank's active TIMS portfolio, all of which were assessed as on track to achieve their expected transition impact. This includes 24 operations that have already largely achieved their desired transition objectives (i.e. have retained their original transition potential rating with low or negligible risks). The Western Balkans Sustainable Energy Direct Financing Facility, sub-projects under which are not rated and monitored individually, has also been assessed as being on track in its delivery of desired transition objectives. Two projects in the active portfolio are currently characterised as failing to achieve their transition impact potential. The business development challenges of one of them, an oil exploration project in Central Europe, made achievement of expected transition targets impossible. The risks to transition impact for the second operation, a large windfarm in a Baltic country, have been rated as "Excessive" due to significant delays in implementation, in part due to a new investment strategy by the company.

An analysis of the 56 operations that were completed in this period (i.e. fully re-paid and have left the TIMS active portfolio) shows that 40 of them (72 per cent) have fully achieved the expected transition impact. 13 operations have partially achieved their transition objectives. These projects, despite realisation of some transition components, fell short in achieving certain objectives, generally the targeted level of private sector participation. Finally, three completed operations in the energy sector have failed to achieve the expected transition objectives. These operations have not been commercially successful, mostly due to a challenging external environment, which has in turn made realisation of the transition impact unfeasible.

2.4 Assessment of transition challenges 2012

The Bank annually assesses the transition gaps in its countries of operations. An overview of these gaps for each group of countries at a similar stage of transition, is set out in the following sections. Annex 2 contains a table setting out the transition gap summary country by country.

2.4.1 *Advanced countries*⁴

The EU's third package of new electricity and gas Directives, adopted in July 2009, has been the main driver of reforms in the advanced transition countries. The deadline for transposition of the third package was set as 3 March 2011 and included implementation of the rules on ownership unbundling, strengthening the independence and powers of national regulators, the creation of new cross-border bodies and measures that will promote the functioning of retail markets.

The legal and regulatory framework necessary to implement reforms and to follow EU requirements are mostly in place in all advanced countries. The regulatory agencies are competent, enjoy a high degree of financial, decision-making and managerial independence and score well in terms of accountability and transparency.

The establishment and enforcement of a cost recovery based tariff methodology which lies at the heart of good regulation has been implemented in all advanced transition countries. Although there are some residual issues, these countries have generally been successful in gradually increasing tariffs to cost reflective levels and achieving tariff rebalancing (that is adjusting relative tariffs for different users). Retail market liberalisation is still constrained by price regulation for domestic and selected industrial consumers in most countries.

Fostered by a clear and transparent regulatory framework, the process of unbundling has been mostly completed in all advanced countries. However, private sector participation remains limited due to the dominant position of state-owned companies. In particular, the power sectors in Latvia, Lithuania, Poland and Slovenia retain a significant share of state control in their generation assets. Hungary has experienced a significant decline in private investments following the introduction of an energy tax.

The distribution sector has been fully - or almost fully - privatised in Hungary and the Slovak Republic, whereas Lithuania has consolidated its distribution companies into a state-owned holding company that might hamper competition. In Latvia privatization of the state-owned holding company which engaged in power generation, transmission and distribution is not contemplated to date and its private ownership is prohibited by legislation.

In terms of the oil and gas markets, most advanced transition countries enjoy very limited resource endowment and are heavily reliant on natural gas imports from Russia to cover their energy needs. In the gas sector, transposition of the *acquis communautaire* remains incomplete. Gas markets are fully liberalised in Estonia, Lithuania, the Slovak Republic and Slovenia, but competition remains limited with the existence or predominance of a single entity in each country. In Hungary, the dominant position of one player and the recent trend of the state seeking to regain tighter control over the energy sector limit the prospects for significant progress in the near future. In Poland, one company dominates all segments of the oil and gas market. Finally, in Slovenia, which has minor oil resources, the upstream oil segment is dominated by the national oil company, whereas the retail segment is characterised by limited competition.

The countries in this group also have large investment needs to upgrade their outdated energy infrastructure to meet their commitments under EU environmental legislation such as the Industrial Emissions Directive.

2.4.2 Early and intermediate countries⁵

EU accession and the need to comply with the provisions of the Treaty Establishing the Energy Community for South East Europe (the **ECSEE**) have influenced the reform path in south eastern Europe. The ECSEE's main aim is to support its member countries in adopting the provisions of the EU energy directives, while creating a regional energy market that is increasingly integrated with the EU's internal market. Without an equivalent reform anchor, reform progress in the former CIS has been slower.

Implementation of unbundling and other basic reform steps has already commenced in most early and intermediate countries, although timely and successful completion of these reforms remains a challenge. Equally important is the implementation of regulatory reforms and the strengthening or creation of independent regulatory agencies. Surveys of regulatory quality routinely find lower levels of independence in the regulatory system than in advanced countries. Those countries that are members of the EU or the ECSEE must also make large investments to upgrade their obsolete and polluting infrastructure to meet EU standards – the Industrial Emissions Directive in the case of EU members and the Large Combustion Plants Directive in the case of ECSEE members.

Tariffs are still relatively low and in the majority of cases below sustainable cost recovery levels. Low tariffs, compounded by poor collection rates, are at the core of the poor financial and technical performance of energy utilities and the lack of new investment. In the Kyrgyz Republic, Turkmenistan and Uzbekistan, for instance, electricity consumers pay one third to one half of a cost-recovery level. Reforms need to be complemented by parallel social policy measures to mitigate potential affordability problems for low-income consumers.

Lack of competition and dominance of state-owned companies persist in most of the early and intermediate countries. In the former CIS, the private sector has a meaningful role in electricity generation in Armenia, Kazakhstan, Russia and, to a lesser extent, Georgia. Other CIS countries have little or no private sector participation in generation. However, several former CIS countries – including Armenia, Azerbaijan, Georgia, Kazakhstan, Moldova and to a lesser extent Ukraine – have transferred substantial parts of their distribution networks to private ownership or operation.

Regulatory reforms to support renewable energy have largely been implemented as a part of basic sector reforms. Although incentive schemes have been introduced, the number of renewable energy projects is growing slowly as the business environment remains uncertain and administrative obstacles persist. While Kazakhstan is working to improve its regulatory framework, Ukraine has adopted attractive feed-in tariffs, although local content requirements may slow down investment in the future. Romania has established a legal and institutional framework which had mobilised significant interest and investments in renewable energy and the country is currently reviewing its support system. Bulgaria applied retroactive legislation to the renewables sector in 2012 which has damaged investor confidence.⁶ As in the more advanced countries the biomass sector has received little structured support.

The status of reform in the oil and natural gas sectors in early and intermediate countries is varied. Although the diesel and petroleum products retail segments are largely liberalised across the region and are served by private entities, the picture is different for the upstream segment and for the natural gas sector along the entire value chain.

Most South-East European countries (BiH, Bulgaria, FYR Macedonia, Montenegro and Serbia) are heavily reliant on imports of natural gas. Unbundling, transparent and non-discriminatory third party access (TPA) to transmission/distribution networks and to gas storage facilities remain incomplete in the region. In Serbia, the vertically integrated state-owned company retains a monopoly over transport, storage, trade and distribution of natural gas. In BiH, one of the main challenges remains to create market-enabling institutions that work at the federal level, including a single independent gas market regulator. In Romania, despite privatisation and liberalisation, concentration remains high and competition limited. The legacies of long-lasting state control over oil extraction in Albania are slowly being addressed but reform is incomplete, following the failure to privatise the state owned oil company and given the limited involvement of private companies in the upstream sector. Reinforcing fiscal transparency and accountability is needed in the oil sector while the development of a well-functioning natural gas market will require amendments to the primary and secondary legislation.

Apart from resource-rich Azerbaijan, countries in eastern Europe and the Caucasus are also heavily reliant on natural gas imports from Russia. Unbundling and TPA remain a challenge, especially in Belarus, Armenia and Moldova. In Belarus, the lack of restructuring, price distortions and weak institutions worsen the picture. Finally, in Georgia, gas distribution has been privatised but privatising the national oil company and strengthening governance and transparency remain important outstanding issues.

Despite the existence of some small private independent operators upstream, the Ukrainian oil and gas sector remains vertically-integrated and entirely controlled by the state. Efficiency, transparency and accountability are low and heavily subsidised energy products make up a large part of the budget deficit, threatening macroeconomic stability and leading to inefficient energy usage. In Azerbaijan, where the sector is also dominated by the state-owned company, transition challenges include the commercialisation and restructuring of the latter, the liberalisation of the downstream segments, and the strengthening of institutions for the management of revenues from extractive industries. In Turkey, the liberalisation of the gas market, with full unbundling of the incumbent state-owned company, and the privatisation of the remaining state-owned gas distribution companies should be a priority.

Russia is characterised by not only an increasing consolidation of the industry, but also an increasing involvement of the state in oil and gas extraction, transportation and distribution. The liberalisation of the gas sector remains challenging given the monopoly in the downstream segment, depressed domestic tariffs and constrained TPA to the natural gas network. Institutions, transparency in the extractive sector and accountability remain weak.

In resource-rich central Asian countries, such as Kazakhstan, Turkmenistan and Uzbekistan, the entire hydrocarbons sector is dominated (fully controlled for the last two) by the state. Low transparency and accountability contribute to a very challenging legal environment. Some countries however have made progress such as Mongolia and the Kyrgyz Republic by fully liberalising the fuels distribution segment which is now mainly served by private companies.

2.4.3 SEMED Region⁷

The energy sector in the SEMED region faces significant challenges, similar to early transition countries in eastern Europe and central Asia. Significant involvement of the state and dominance of vertically integrated companies characterise the power sector across the region. The sector has not been fully unbundled and private sector participation is limited, with the state generally controlling the majority of generating and network assets. Electricity tariffs remain regulated and heavily subsidised. There are significant gaps at the institutional level and generally a lack of an independent regulator.

The SEMED region has significant energy efficiency challenges reinforced by a high growth of greenhouse gas (GHG) emissions, albeit from a low base. Large energy subsidies impede energy efficient behaviour throughout the region. At the same time, the lack of a legislative foundation and administrative barriers hamper investments in energy efficiency projects, although some progress has been achieved, for example in Tunisia, where the government has prioritised energy efficiency and established a national fund to support energy programmes.

The region has a significant potential for renewable energy development; however fossil fuels remain the main source of energy in all SEMED countries. Targets to increase renewable energy generation exist but clear action plans and adequate legal frameworks are still under development, as is a competitive and transparent incentive system for renewable energy that would allow the countries to meet their targets for renewable generation.

In the oil and gas sector, the significant involvement of the state, especially in the upstream segment, is a common feature in Egypt, Tunisia, Morocco and Jordan, despite the involvement of international private oil and gas companies. Similarly, in the downstream sector distribution of natural gas and petroleum products is dominated by the state in Tunisia and Jordan and to a smaller extent in Egypt. However, the Moroccan downstream sector is more advanced with private and foreign companies operating in the sector despite limited competition.

Beyond the privatisation and restructuring of state-owned companies and beyond increasing competition in downstream segments, one of the main challenges throughout the SEMED region is to tackle fuel subsidies which currently account for a large part of government spending. Reducing government's subsidies for natural gas and petroleum products should be carried out in parallel with improving the system of targeted transfers to the most disadvantaged.

2.5 Evaluation

The Bank's independent Evaluation Department (EvD) is responsible for reviewing Bank projects and policies, establishing how well they meet their objectives and the extent to which they comply with the Bank's mandate. EvD prepared a Special Power and Energy Sector Review covering the period 2003-2010, published in October 2011, and an Extractive Industries Sector strategy review covering the period 2004-2009, published in August 2011.

In these special reports, the overall performance of the Bank in the Power and Energy Sector was rated Successful, while transition impact, sustainability and effectiveness of policy implementation were rated Good to Excellent. Similarly, the overall performance of the

Bank's activities in implementing the extractive industries sector policies and operations (including mining) was rated Successful.

As table 2 indicates, from 44 projects evaluated since 2006 in the energy sector, in over 60% of cases overall performance was rated Successful or Highly Successful. Three projects, two of which signed before 2000, were rated Unsuccessful owing among others to problems in accurately assessing the management capacity and technical ability of the project sponsors and transition objectives not being fulfilled due to default or early termination of the project. It has been recognized that the Bank quickly learnt from these experiences and lessons from all projects are continuously integrated in new operations.

TABLE 1: Summary of energy sector project evaluations 2006 – 2012

Sub-sector	Highly Successful	Successful	Partly Successful	Unsuccessful	Total
Electric Power Distribution		2	2		4
Electric Power Generation		8	2	1	11
Electric Power Transmission	1	4	1		6
Gasoline Stations		4	1		5
Natural Gas Distribution		2			2
Oil and Gas Extraction		4	5	1	10
Pipeline Transportation		1	2		3
Pipeline Transportation of Natural Gas (inc storage)		1			1
Remediation Services		1		1	2
Total	1	27	13	3	44

3. SETTING THE CONTEXT – INVESTING IN AN UNCERTAIN ENVIRONMENT

This Section sets out the major themes affecting the global energy sector. In particular it highlights the key developments since 2006, when the Bank's existing Energy Operations Policy was approved, in order to identify those areas where the Bank's approach may need to evolve and adjust.

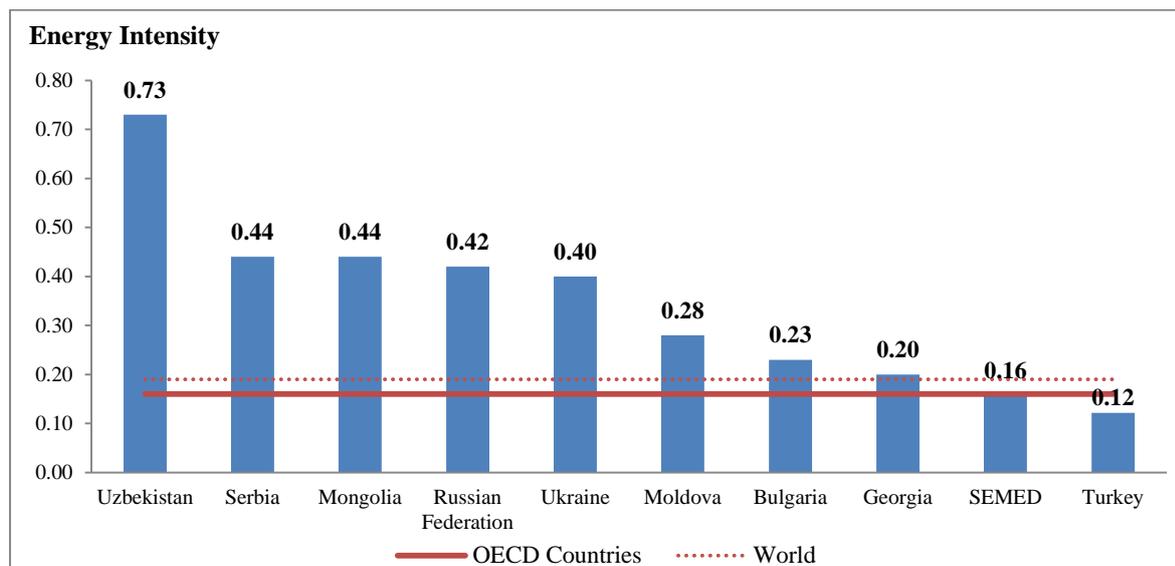
3.1 Climate Change

Climate change has become an ever more pressing concern since 2006. In December 2012 the Doha meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change (the **UNFCCC**), restated the international commitment to work urgently towards keeping global average temperature below 2 °C above pre-industrial levels".⁸

The energy sector is responsible for the largest share of all GHG emissions – approximately 26% of global emissions.⁹ It is also the sector with the greatest potential for achieving emission reductions: it is still characterised by high levels of waste and inefficiency, there is a wide range of options to generate electricity without GHG emissions and other high-emission sectors (notably transport (14% of global GHG emissions) and building lighting, heating and cooling (8% of global GHG emissions)) have the potential to switch to using low-carbon electricity.¹⁰

Accordingly the energy sector has a critical role to play in shifting the world economy to a low carbon model, consistent with the long-term global goal. Given the long life of many energy assets, the infrastructure which will deliver the emissions levels in 2050 is that which will be constructed over the Strategy period; consequently the challenge is immediate. Many of the Bank's countries of operations rank amongst the most energy-intensive countries in the world (see Figure 8) and so face particular issues. It is also a challenge for companies operating in these countries who will have to manage not only the climate risk to their operations and infrastructure, but also their exposure to changing government climate policies.

FIGURE 8: Energy intensity for selected Bank countries of operations compared to World and OECD averages (2009)



Source: International Energy Agency,

Note: Energy Intensity = Total Primary Energy Supply/GDP (tons of oil equivalent per thousand 2000 USD in Purchasing Power Parity).

Carbon markets

The current Energy Operations Policy was approved shortly after the ratification of the Kyoto Protocol setting GHG emissions targets for most industrialised countries. The Energy Operations Policy therefore anticipated that carbon markets would become an important driver of low carbon investment, under which market forces would direct funds to the most efficient and cheapest abatement opportunities. This development was expected to be central to the transformation of economies to a low carbon model.

The sector has not however developed in this way. The first Kyoto Protocol commitment period expired at the end of 2012. A second commitment period is now in force from 2013 to 2020, under which two of the Bank's countries of operations, Ukraine and Kazakhstan, have adopted binding targets for the first time. However other countries have chosen not to adopt targets in this second Kyoto period and negotiations on a new international agreement are still on-going. While the EU ETS continues to develop, in particular being extended to a larger number of emitters, prices have currently fallen to levels that are insufficient to justify significant investments in reducing emissions.¹¹ The extent of carbon pricing is however also increasing; for example in 2013 Kazakhstan started a domestic carbon emissions trading scheme, supported in part by the Bank.¹²

The environment in which the Bank will operate is characterised on the one hand by a clear long-term agenda to reduce GHG emissions through market based mechanisms and on the other hand by considerable uncertainty as to the form of those mechanisms, with the short and medium-term characterised by a growing range of national and regional trading schemes. While these schemes point towards a long-term global agreement it is unlikely that in the short term they will generate prices of a sufficient level and certainty to support low-carbon investments in their own right. Considerable uncertainty as to the future of carbon pricing and the role it will play in driving investment decisions in the energy sector will therefore characterise the Strategy period.

3.2 Energy systems

The global energy system is dominated by large centralised production and by fossil fuels. This is in particular the defining paradigm for the Bank's countries of operations. However changes in the energy sector are challenging this model and provoking the transformation of the industry's assets and operations. This transformation aims at greater efficiency and sustainability. It is driven by the independent pressures of a greater focus on competitiveness and costs, the low carbon agenda and the sustained high level of commodity prices. It is facilitated by a range of technological developments. The transformation is most pronounced in the power sector where it has the following key elements:

- On the **demand** side the conventional model is based around consumers who are typically unaware of their consumption levels in real time and who cannot adjust their demand based on prices. The growth in smart metering and smart grid technology now allows consumers to become much more aware of their demand and to participate actively in retail markets.
- On the **supply** side the conventional model conversely was built around a small number of large producers under centralised control. The growth in renewable energy generators, typically small scale, dispersed and intermittent, has changed this pattern. So too has the growth in distributed generation, especially the integration of electricity generation into industrial processes, whether through capturing by-products such as fuel gases or associated gas, or through utilising the benefits of combined heat and power generation.
- Traditionally electricity **storage** has been very limited, principally confined to the use of pump storage hydropower plants. The consequent need to balance supply and demand is a significant constraint on the ability to exploit intermittent renewable resources and generally maximise efficiency. Although not yet widespread new storage options are however increasingly under development, both through new technologies (for example heat stores in concentrated solar plants) or structural shifts (notably, the possibility for widespread deployment of electric vehicles).

At the heart of this transformation are the networks, and in particular the development of smart grids (see Box below). Closely linked with this is the need for regulation which facilitates the exploitation of these physical opportunities, for example through demand side participation in the wholesale electricity market or time of use pricing which encourages the reduction in peak demand. At the same time these developments will affect energy markets – more volatile resource and power prices will require more flexible market structures, with shorter gate closure periods and more complex hedging – while opportunities will arise for new market participants.

The central opportunity this transformation brings is increased *sustainability*, firstly through a much higher capacity to absorb intermittent renewable energy, secondly through management of peak demand and thirdly through reduction in aggregate demand as informed consumers become active participants in understanding and controlling their own energy use.

SMART METERING AND SMART GRIDS

Central to the transformation of the electricity sector is a transformation in the volume and quality of information available to participants. Historically electricity has been measured with meters that record cumulative consumption but not the time of consumption. These meters are then read manually at periodic intervals. Modern electronic meters change this picture in two key ways:

- they record the time as well as the volume of consumption, showing the profile of demand; and
- they are capable of sending and receiving information instantaneously, using mobile phone networks or the wires of the electricity network itself.

Taken together these developments dramatically expand the range of possibilities for consumers, suppliers and operators. Consumers can have detailed, real-time information about their demand, allowing them to understand their consumption patterns and potentially modify them. Operators and suppliers similarly can have an instantaneous picture of their whole network, allowing them to fine-tune planning and investment decisions, optimise power flows and accommodate greater quantities of distributed, intermittent generation. More fundamentally the provision of this vastly increased pool of information will catalyse new business models and innovative ways to provide energy services with greater efficiency.

3.3 Renewables – a technology coming of age

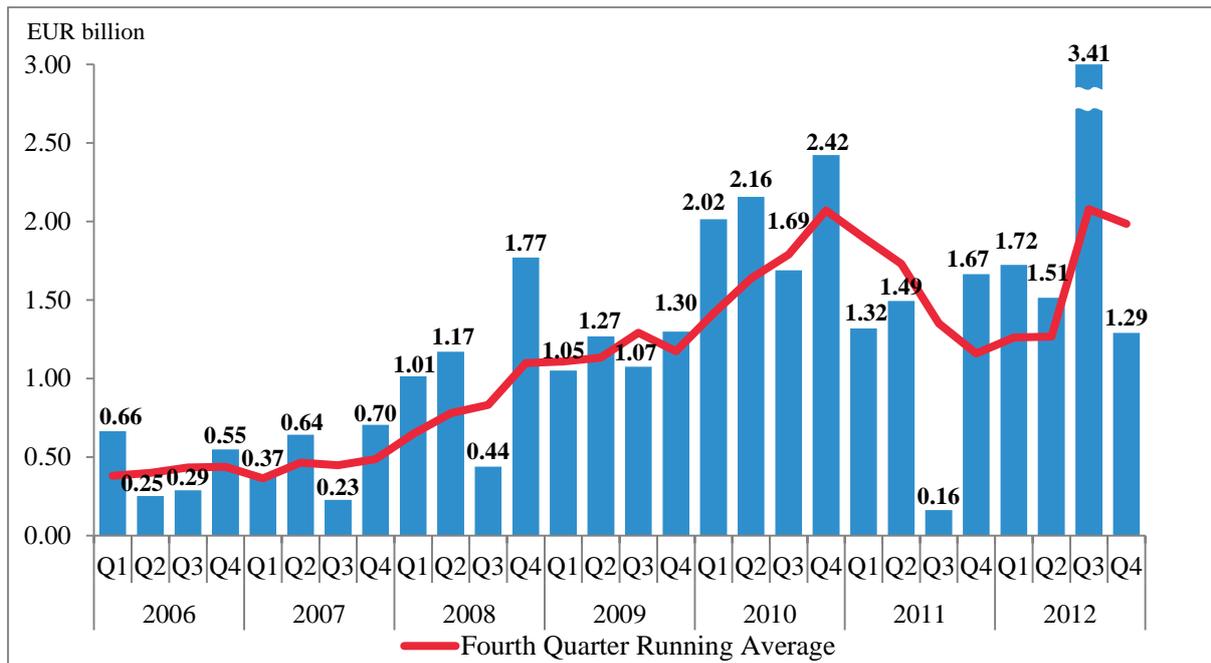
A maturing industry

In the 2006-2012 period renewable energy came of age, moving from an experimental technology deployed in a few locations to a global business, contributing significantly to power generation in a number of major economies. Most of this growth has come in the form of wind, and more recently solar: generation from renewables other than large hydropower grew by 107% between 2006 and 2011, with wind growing by 229% and solar by more than 1,000% (albeit from a very low base).

This growth has been concentrated in certain key markets. The leaders for wind generation are the United States (28% of global wind generation in 2011), China (17%), Germany (11%) and Spain (10%).¹³ The leaders in solar are even more concentrated, with just three countries accounting for 67% of world generation in 2011, namely Germany (34%), Italy (17%) and Spain (16%).¹⁴

However this picture is changing. More and more countries are adopting renewable energy strategies and support mechanisms. In EU member states this is a fundamental pillar of EU energy policy, embedded in the community-wide target to secure 20% of final energy consumption from renewable sources by 2020. In non-EU countries the same agenda has been adopted to a greater or lesser extent, to meet both concerns about GHG emissions and to promote energy diversity and security. Amongst the Bank's countries of operations almost all have adopted renewable energy targets and in many commercial-scale projects are now operational. The importance of hydropower in countries such as Russia, the Balkans and Ukraine is well established, but the Bank's countries of operations also have some of the best locations in the world for wind and solar: Egypt, Mongolia and Turkey all have exceptional wind potential while the entire SEMED region has large solar resources.

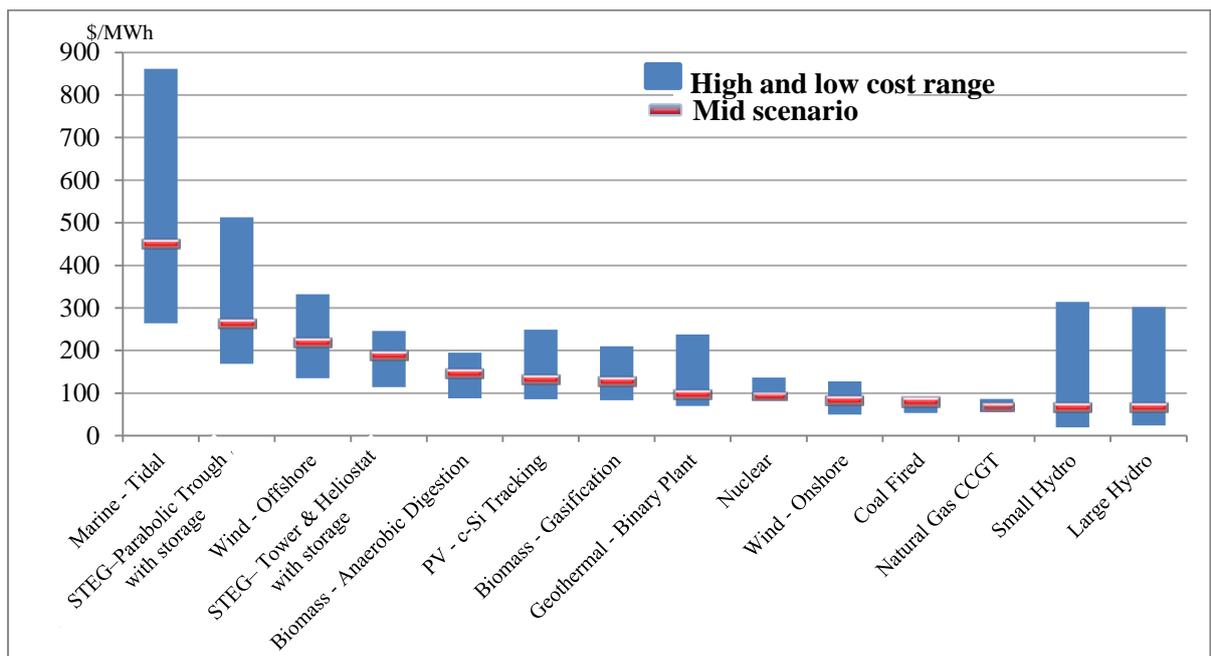
FIGURE 9: Clean Energy Investment Trends in the EBRD region (EUR bn)



Source: Bloomberg New Energy Finance May 2013. All EBRD countries of operations, including SEMED. Quarter 3 2012 includes Quarzazate I STEG Plant in Morocco and Dnieper River Small Hydro Portfolio, Ukraine.

The outcome of this rapid deployment and the associated research and development activities is a significant fall in prices for key renewable technologies, especially wind and solar photovoltaic. This fall is reflected not just in a decline in the price of components such as solar panels but more importantly in the decline in the cost of generation, as technological advances have dramatically increased the productivity and efficiency of equipment. Figure 10 sets out one estimate of the levelised cost of electricity from various sources, showing that in some locations onshore wind, for example, is competitive with natural gas CCGTs.

FIGURE 10: Levelised cost of electricity, Q4 2012



Source: Bloomberg New Energy Finance. Note: STEG: solar thermo-electric generation. STEG technologies include storage.

The challenges of maturity

The renewables sector has however faced the challenges associated with moving from a niche to the main stage since 2006. These fall into three categories:

- The **financial** challenge arises from the fact that as a still young technology the costs of renewable power remain significantly above those of conventional power, especially given that conventional power typically does not pay the full environmental costs associated with its generation and may benefit from subsidies. This additional cost has become material in those markets where penetration is large and, especially in a time of fiscal and personal austerity, prompted concerns about energy affordability. These concerns are exacerbated by a perception in some quarters that the feed-in tariff mechanisms used to support renewable energy have not delivered the most efficient prices but have instead produced windfall profits for the industry.
- The **technical** challenge arises from the intermittent and unpredictable nature of both wind and solar power. The need in any energy system to match supply and demand means that this requires significant resources, in both generating capacity and networks, to maintain stability. In addition, many renewable resources, most obviously offshore wind, are located far from demand and far from the conventional generating plant the transmission networks were designed to accommodate. As penetration becomes significant this places growing strains on the overall system and requires expensive and often controversial investments with their own environmental and social issues, for example new transmission lines through densely populated areas.
- The **market** challenge arises from the impact of large volumes of power interfering with the market because of their priority right to generate and a close to zero marginal cost of generation. Most notably in Germany the effect of this has been to significantly reduce the running hours of marginal generators, in particular the gas-fired plants that provide crucial backup power, to a point where it is no longer economical to invest in new plants or even to keep existing plants open.

In this context the framework for renewable energy has evolved considerably. In many cases these changes are positive – in particular successive reductions in the level of support are welcome demonstration of the growing competitiveness of the technologies. However, in some cases regulatory changes have been retroactive, thus increasing uncertainty in the investment climate. A theme repeated throughout the Energy Strategy, and learned in the course of the Bank's investments, is the importance of transparent, stable and predictable regulation, especially for a sector that requires long-term capital investment.

For most of the Bank's countries of operations these challenges remain remote since they are associated with widespread deployment – unsurprisingly these challenges are most acute in countries such as Germany and Spain which have led the way in renewables support. However they are a crucial background for the Energy Strategy: first because a number of the Bank's countries of operations, such as Poland, Bulgaria and Romania, are already approaching the levels of renewables penetration where these issues will arise, and second because they contribute in general to a climate of concern and uncertainty about the proper role of renewables.

Looking to the future

Despite the challenges identified above, renewable energy has a large and growing part to play in the future. That role is assured primarily by the importance of renewables in the low carbon transition. All forecasts or scenario planning that analyse the changes needed to meet the global 2 °C target show that renewable energy must become a major contributor. In addition, as costs decline and the cost of CO₂ emissions is internalised, and especially in areas with good renewable resources, renewable energy will increasingly be able to compete with conventional power and in doing so contribute to energy diversity, reduced water use and lower environmental emissions.

But the sector must adjust to its growing maturity. More sophisticated market-based support systems will be required to drive lower prices, as well as prices with greater credibility. Power markets must also better integrate renewable sources and reward flexibility in the form of backup capacity. Finally significant investments will be needed in that capacity, and even more so in grids.

3.4 Natural gas markets

Recent years have seen the development of major natural gas fields in the Bank's region, such as the Kashagan field offshore Kazakhstan and the Shah Deniz II field offshore Azerbaijan, expected to come on stream in 2013 and 2017 respectively. Combined with increased production from smaller fields, notably in northern Russia and northern Iraq, and new finds (for example in the eastern Mediterranean and offshore Mozambique and Tanzania), this is expected to increase the supply of natural gas significantly in the Bank's region. For example in central Asia increasing domestic production is expected to reduce imports by 64% by 2020 and to increase exports by 71% during the same period, as new infrastructure connects the region to the EU and China.¹⁵

A key development over the last seven years is the now well documented boom in the production of oil and gas in the United States. In summary, the industry has applied improved techniques (particularly horizontal drilling, hydraulic fracturing and multi-dimensional seismic imaging in the case of shale formations), which are commonly used in conventional oil and gas development to extract reserves of oil and gas which were previously known but regarded as inaccessible such as oil shale, tight oil (oil trapped in relatively impermeable and dense rock), shale gas, coal bed methane and tight gas. The overall effect is that the long-term decline in US oil and gas production has reversed – in 2011 the US produced more gas than ever before and 27% more than in 2005.¹⁶ Similar developments are occurring in US oil production, although at an earlier stage.

In turn this has both driven US gas prices to historic lows and raised the prospect that the US could become a net energy exporter by 2035, based on official support for more plants to export liquefied natural gas (LNG) produced in the US and approximately 20 applications for export permits under review as of May 2013.¹⁷ There is considerable uncertainty about the extent to which similar developments will occur in other countries, including in the Bank's region, because technical, regulatory or social concerns may prevent the exploitation of unconventional reserves. It is still possible however that one or more of the Bank's countries of operations will wish to exploit reserves of unconventional oil and gas on a commercial scale in the coming years.

Developing new gas infrastructure

A less heralded, but as important, development in the gas sector is the growth in LNG trade and the associated liquefaction, shipping and regasification infrastructure. Between 2006 and 2011 the volume of LNG traded globally grew by approximately 52%.¹⁸ Similar growth occurred in the number of countries exporting (from 13 to 19) and importing (from 15 to 23) LNG over the same period.¹⁹ Floating and smaller scale liquefaction and regasification facilities are also becoming increasingly common, reducing the barriers to entry to this business for both exporters and importers. The importance of LNG for the gas trade is of course that it is a far more flexible commodity than pipeline gas; once shipped it is capable of being delivered to any market with suitable regasification capacity. It thus moves gas more towards oil as a global commodity with a global, not regional, price structure.

There is also significant potential for the development or rehabilitation of international transport pipelines, storage capacity and regional interconnectors in the Bank's region. Investment needs in new gas transmission infrastructure in the EU are estimated at EUR 70 billion by 2020.²⁰ New infrastructure to process, store, transport and distribute natural gas, accompanied by the appropriate regulatory framework, may diversify supply and contribute to the formation of an open, integrated market.

These developments, taken together, have increased both the volume of global gas reserves and the diversity of sources of supply. This has in turn expanded the options for energy security as well as the volume of natural gas traded on a spot basis and not committed for years to long-term export arrangements. If this continues it opens the possibility for countries to access a wider and deeper range of natural gas supplies. For the Bank, the implications of particular note are:

- Reduced demand for natural gas in the EU and the Bank's region has resulted in a lower price environment in recent years. This may be sustained in the medium term thanks to the diversification of supply through new infrastructure and exploitation of unconventional reserves on a large scale. Increased supplies, coupled with more extensive LNG and transportation infrastructure could result in European and Asian natural gas prices decoupling from oil prices and converging towards a global, generally lower, spot price. This in turn would stimulate greater use of gas for power generation, as well as as an alternative to fuel oil for transportation.
- The expansion of natural gas supply in the Bank's region will depend on the transition towards an open market environment for natural gas. Market-oriented structures will be catalysts for the exploitation of unconventional reserves and for the private sector to invest in new infrastructure and drive innovation in the sector. This requires reliable and open regulatory frameworks implementing unregulated prices, third party access and unbundling.
- There remain many uncertainties and unpredictable consequences: for example the surge in US gas production in 2012 resulted, counter-intuitively, in greater coal consumption in the EU as coal was displaced in the US by cheap gas and forced to find other buyers. Alternatively if the global gas market remains fragmented into separate markets, most of which are dominated by long-term oil-indexed sale and purchase arrangements, economies such as the United States with access to cheaper gas may enjoy a competitive advantage in industrial production, including throughout the hydrocarbon value chain.

- Greater gas availability, and potentially lower prices, may strengthen the role of natural gas as an essential "transition fuel" to a low carbon power sector. The CO₂ emissions per MWh of gas-fired generation are one half to one third of coal-fired generation and gas-fired plants offer the same benefits as coal-fired in terms of flexibility and availability. Thus fuel-switching from coal to gas offers significant carbon savings, at least in the short to medium-term.

3.5 Changing dynamics in the hydrocarbon sector

For many observers of the oil and gas industry, the debate over "peak oil" has now been replaced by questions as to how fast oil and gas reserves can be recovered economically to match global demand for hydrocarbons.²¹ The rise in developing world consumption and the linked rise in commodity prices have transformed global energy markets. Oil prices in particular are at close to historic highs in real terms. This has prompted significant investment in the development of oil and gas fields, including those which were hitherto uneconomic. Improved exploration and production techniques have also prompted the exploitation of more and more remote or challenging reserves, such as deep water fields offshore or unconventional hydrocarbons.

These developments have been supported by a widespread application of modern technologies and processes to the industry. Although some techniques had been used since the 1960s in some oil fields, their widespread application has accelerated in recent years as the improved economics of the sector allowed for investment. Their introduction across the Bank's countries of operations has the potential to unlock further indigenous production in the region in the near future.

The private oil field services industry, which spun-off from the oil and gas majors in the 1980s and 1990s, is a key contributor to the dissemination of modern drilling and extraction technologies and practices throughout the hydrocarbon industry. This includes smaller services providers, who often benefit from local knowledge and lean operations, but are still far from the technology frontier. Whilst this increase in private sector participation is welcome, in some countries, particularly where state control is dominant, there has been a tendency to reverse the recent trend towards increased market privatisation. More recently the traditional paradigm of vertical integration of the hydrocarbon sector has been challenged.

Continued improvements of standards and transparency

As hydrocarbons are extracted from increasingly challenging environments, the Deepwater Horizon event in the Gulf of Mexico has highlighted the environmental and commercial risks of modern oil and gas production and the limited tolerance from the public for both real and perceived environmental, health and safety and social (EHSS) risks. Throughout the hydrocarbon value chain EHSS standards and practices have improved significantly. With their large scale and the potential to have severe impacts on a wide range of sustainability issues, oil and gas companies are increasingly aware of the need to meet good international practice in their operations. Over the last few recent years, major investors and banks have increasingly formalised their requirements for oil and gas companies to report regularly to show they are meeting their sustainability commitments, performance standards and action plans, including the Equator Principles.

In a related development, and in an effort to ensure that the extraction and use of natural resources also benefit broader society, a coalition of governments, companies, civil society

organisations, investors and international organisations created the Extractive Industries Transparency Initiative (EITI). Both its major aim to strengthen governance by improving transparency and accountability in the extractive sectors and its methodology of verification, publication, and reconciliation of company payments and government revenues have been widely endorsed. The wide endorsement of the principles of transparency underlying EITI helped spur broader efforts such as Dodd-Frank in the United States of America and the amendments to the EU Transparency and Accounting Directives which were approved in July 2010 and June 2013 respectively.

3.6 Economic and financial crises

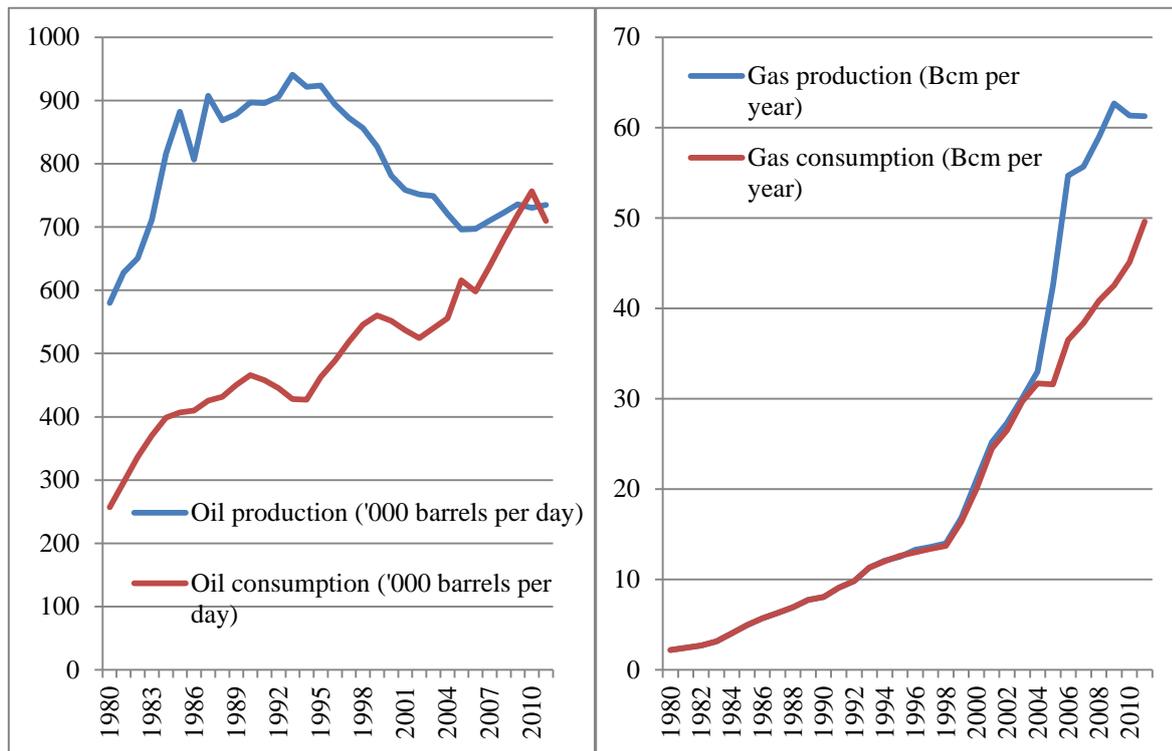
The global context for the Energy Strategy is a very different economic outlook to that of 2006. The collapse in financial markets and the subsequent economic crisis have affected all aspects of the economies of the Bank's countries of operations but in particular the energy sector, with its long timeframes and high capital needs.

On the public side a focus on austerity limits the scope for investment in new infrastructure, in particular the enabling infrastructure for other investments. It also constrains the willingness to undertake reforms where long-term gains will follow but only after an initial upfront cost. At the same time it exacerbates the fiscal impacts of subsidies. On the private side reduced demand and heightened uncertainty about future demand have limited investor appetite while the availability of capital constrains investments where there is interest. At the same time the value of efficiency investments is enhanced. For consumers personal austerity constrains their willingness to pay higher prices and this constraint may also feed through to greater political pressure on regulators.

3.7 The Bank's new region

This is the first Energy Strategy to apply to the Bank's operations in the SEMED region, where energy sector issues are particularly acute. Although closely linked to countries with vast oil and gas reserves, only Egypt out of the four SEMED countries has meaningful reserves of its own (0.3% and 1.1% respectively of the world's proved oil and gas reserves as at end 2011).²² Egyptian domestic demand means that it is now a net oil importer and is making arrangements to begin importing gas. Jordan, Tunisia and Morocco have negligible reserves and are import-dependent, in the case of Jordan importing 97% of its energy needs.

FIGURE 11: Egypt oil (left hand graph) and gas (right hand graph) production and consumption 1980-2011



Source: BP Statistical Review of World Energy 2012.

All four SEMED countries face rising demand for all forms of energy, driven by strong population and economic growth and limited incentives for energy efficiency. Compound annual growth rates in primary energy consumption between 1980 and 2009 ranged between 3.1% (Tunisia) and 5.6% (Egypt).²³ Figures for recent years are above this range. The SEMED countries accordingly face major challenges both to reduce their energy intensity and to meet this surging demand. Access to energy, in the sense of the availability of sufficient infrastructure and resources to ensure the supply of stable, reliable, high quality energy, is a major, and growing, challenge in the SEMED region.

Alongside market structure issues such as state ownership, vertical integration and lack of competition, all four SEMED countries also regulate and subsidise energy prices to a greater or lesser extent. The problem is most acute, in both absolute and relative terms, in Egypt, where the IEA estimates the average subsidisation rate in 2011 at 54%, with a value in excess of 10% of GDP.²⁴ Subsidies have multiple pernicious effects – notably removing incentives for energy efficiency and vital infrastructure – but their elimination is politically challenging, especially in the post-Arab Spring environment.

All four SEMED countries are also defined by the UN as suffering from either water scarcity (Egypt and Morocco) or absolute scarcity (Tunisia and especially Jordan). On average 19% of water withdrawal (as opposed to consumption) is attributable to industry, of which the energy sector forms an important part, for example for oil and gas extraction, refining or cooling power plants. In these countries therefore the urgency of the resource efficiency agenda is particularly acute.

THE WATER-ENERGY NEXUS.

The close links between water and energy are increasingly being recognised as the resource efficiency agenda becomes more prominent and awareness of water scarcity grows. On the one hand the energy sector is a major user of water, in both withdrawals and consumption: water is used in oil and gas extraction, mining and refining; fossil fuel, nuclear and concentrated solar thermal power plants all use significant quantities for cooling and hydropower generation inevitably has significant impacts on water systems. On the other hand, the water sector is a major user of energy: irrigation, water transportation and distribution and desalination all require significant volumes of electricity. This relationship emphasises the interrelatedness of the resource efficiency agenda. It also highlights the vulnerability of the energy sector to climate change – a warmer, more volatile weather system will result in less reliable hydropower generation; it can also affect conventional generation by reducing the availability of cooling water.

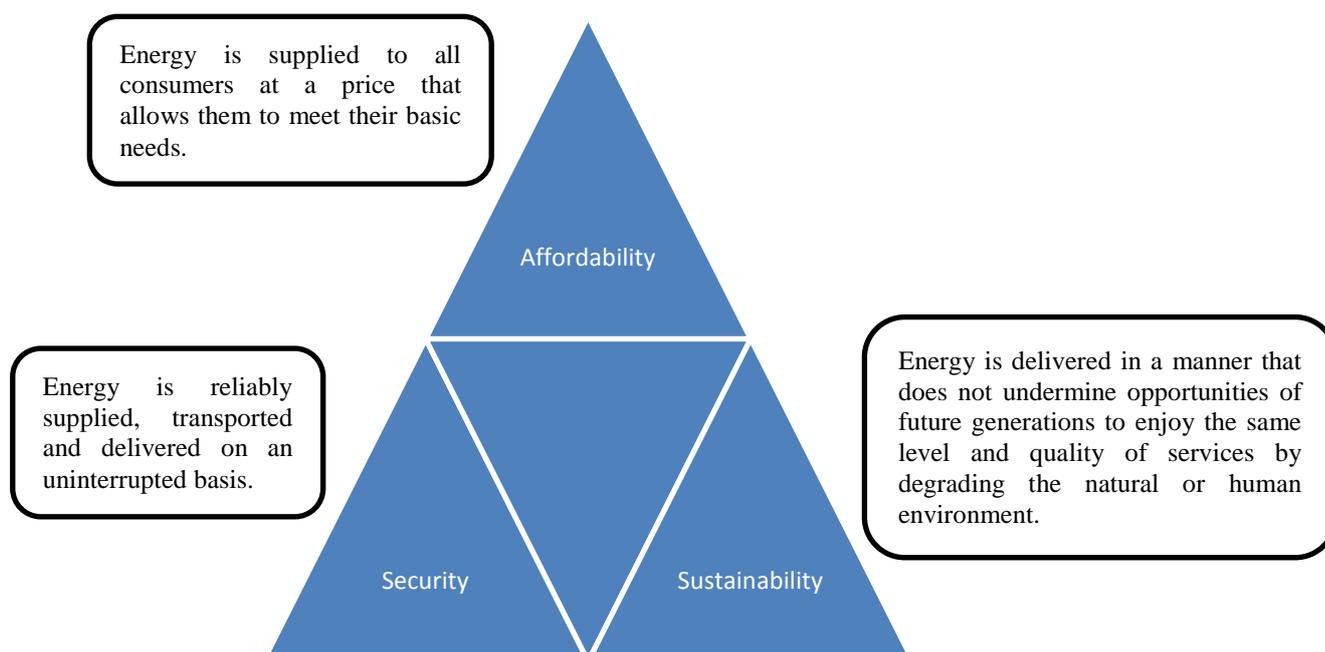
The IEA's World Energy Outlook 2012 (the **WEO 2012**) contains a detailed analysis of the implications for water use of various pathways for the evolution of the energy sector. The picture is complex: on the one hand growing deployment of renewables such as wind and solar photovoltaic (which have virtually no requirement for water) reduces water use. On the other hand greater use of nuclear power, and use of more efficient wet cooling systems in thermal generation, increase water use. Overall however a less carbon intense energy system is also significantly less water intense: global water withdrawals for energy productions grow by 4% between 2010 and 2035 in the WEO 2012's low-carbon 450 Scenario, compared with 20% growth in its baseline New Policies Scenario.²⁵

The SEMED region is therefore similar to the Bank's established countries of operation, characterised by a high level of state ownership and control over the energy sector and prices that are not cost reflective. But there are also important differences. Notably demand is rising fast and the investment challenge is less replacing an ageing but largely sufficient infrastructure and more meeting this growing demand and delivering a stable and reliable energy supply to support economic activity.

4. THE TRANSITION CHALLENGE – FUELLING A SUSTAINABLE FUTURE

4.1 Striking a balance – the Bank's role

Access to energy underlies the unprecedented growth in GDP, wealth and living standards over the past two centuries. However, the relationship between economic growth and energy use is bi-directional: provision of adequate, high-quality energy services is a necessary, although not a sufficient, condition for economic growth; economic growth increases the demand for energy services and the corresponding upstream energy conversions and resource use. Accordingly the provision of energy is a fundamental political economy challenge faced by all societies. That challenge is to ensure the delivery of energy services that are *affordable*, *secure* and *sustainable*:



Finding the right shape for this triangle is challenging – the World Energy Council describes it as a "trilemma".²⁶ Meeting these three goals is a complex optimisation problem for individuals and corporates, public and private actors, governments and regulators against a background set by a wide range of economic and social factors, national resources, environmental concerns, and individual behaviours.

There are serious consequences from a failure to find the optimum solution to this challenge. Many countries suffer from the damaging effects of explicit or implicit subsidies, distorting economic behaviour, burdening fiscal balance sheets and constraining the growth of employment and their economies. Some countries experience erratic, poor quality or unpredictable energy supply. Across the whole energy sector current structures remain on a pathway to a level of GHG emissions that is inconsistent with the global climate change agenda.

The Bank's mandate is to "*foster the transition to open market-oriented economies and to promote private and entrepreneurial activity*". This mandate is predicated on the proposition that a market-based approach is the best means of solving the coordination and resource allocation problem of balancing security, sustainability and affordability. In other words, properly defined and regulated markets will deliver the most efficient, lowest-cost outcomes.

The problem is too pervasive and too complex for any top-down, directed approach to solve – the legacy of pollution, inefficiency, waste and at times ineffective provision in the former command economies demonstrates this. Consequently the move from central planning to decentralised systems is fundamental in achieving transition. A market-oriented energy sector by contrast is both an indicator of a well-functioning market economy and a necessary condition for one.

The Energy Strategy therefore defines the Bank's role in the energy sector as promoting the transition to the policies, assets, institutions, actors and regulations that comprise a market-oriented energy sector, which will in turn deliver sustainable, secure and affordable energy services.

4.2 Defining transition in the energy sector

The Energy Strategy thus considers what transition means for the energy sector. The energy sector has several distinct characteristics which shape the balance between markets and regulation. Certain subsectors, notably the transmission and distribution of electricity and the transportation of hydrocarbons, are natural monopolies where competition is not economically efficient. Energy supply is also an important utility, meaning that vulnerable consumers must be protected and their supply assured. Natural resources are often national endowments whose exploitation requires political and public endorsement. Regulation of the sector is therefore crucial, while in some circumstances competition and liberalisation will not be the optimal solution. In these circumstances however, the transition goal is structures that best replicate what well-functioning markets achieve. In this context the key characteristics of the market-oriented energy sector that the Bank seeks to achieve are:

- **Competition** between multiple actors communicating their preferences through the **price** of their goods or services. It is axiomatic that in well-functioning markets prices capture all costs, including environmental and other externalities.
- The forum for competition is the **market**, where these actors exchange goods or services. Resource allocation is achieved through this mechanism, not central planning. Market-supporting structures are therefore key, starting with effective regulation and regulators, through liberalisation of prices and support for new market entrants to exchanges.
- Competition and effective markets necessarily require multiple market actors. This in turn requires wide and diverse involvement from **private sector** participants. Diversity increases the opportunities for innovation and thus greater efficiency as well as deepening the pool of capital available for investment.
- Particularly in the energy sector markets require **physical infrastructure** – whether this be high voltage cables, pipelines, LNG facilities and storage to facilitate energy trade or peaking power plants to support a wholesale power market. Similarly markets require **"soft" infrastructure** in the form of regulation, regulators and institutions.

Energy markets in the Bank's region tend to fall short of all or some of these characteristics, whether because of intrinsic structural issues or a legacy of non-market oriented, centrally planned structures resulting in persistent barriers to entry, ineffective regulation and mispricing. The following sub-sections discuss those areas where, within this broader context, there are particular transition challenges in the Bank's region.

4.3 Building energy markets and best practice

Traditionally, the energy sector was a centrally planned activity that operated within strictly regulated frameworks in which vertically integrated utilities handled most or all activities. Liberalisation in many countries has led to the introduction of competition through a range of structural changes such as the removal of subsidies, vertical unbundling of integrated utilities to facilitate non-discriminatory access to monopoly networks and horizontal unbundling of incumbents to create viable competitors. The process of liberalisation has significantly improved the governance of utilities, in particular through the introduction of independent regulators, opportunities for competition and innovation and the adoption of policy instruments such as emissions trading mechanisms for environmental control.

The process of liberalisation of the energy sector in most of the Bank's countries of operations is still in the relatively early stages of development. While some have unbundled and privatised parts of the sector, in many cases central planning and state ownership remain widespread, horizontal and vertical integration persists and prices are regulated. In some cases where unbundling and privatisation have occurred competition is inhibited by persistent price regulation, the dominance of incumbents or discriminatory access to network infrastructure. Such systems typically suffer from low levels of investment and private sector participation.

Over recent years state intervention and involvement in the oil and gas sector has increased in many countries, particularly by declaring as 'strategic' national resources and subjecting them to special laws and regulations. Private investors often operate at a disadvantage because of increased taxation, the risk of nationalisation of contracts or projects or state expropriation, limitations on ownership of strategic assets by foreign companies or governments' preemption rights on mineral assets or subsoil licenses. Incumbent operators have strengthened their positions to the detriment of smaller, often private operators while distortionary subsidies persist. Regional and national energy markets do not operate efficiently and trade barriers remain.

Throughout many of the Bank's countries of operations these barriers have resulted in businesses in the sector remaining relatively far from the technology frontier, using older technologies and processes in their operations and not employing best practices in addressing EHSS issues. Where standards are increasing, lack of cost reflective pricing is an obstacle to the investments needed to implement them. This gap between the EHSS and technology standards applied in many of the Bank's countries of operations and best international practice is a critical transition gap because it arises through a failure of the sector structure to price all externalities and to maximise the efficiency with which natural, economic and human capital is employed.

4.4 The role of hydrocarbon production in a market-oriented economy

A number of the Bank's countries of operations are globally significant producers of hydrocarbons. For these countries the energy sector provides an opportunity to boost employment and economic development. However they also face several key challenges in ensuring that hydrocarbon production brings about sustainable and equitable growth:

- Given the high volatility of commodity prices, the dependence of an economy on commodities can lead to macroeconomic volatility since the economy experiences booms when prices are high and busts when these prices drop. Major producers

should therefore diversify their economies, including by maximising the infrastructure and business opportunities generated by the energy sector and establishing institutions to manage this risk.

- A commodity boom can lead to the so-called 'Dutch disease', where an appreciation of the real exchange rate driven by significant commodity exports decreases the competitiveness of other sectors in an economy and leads to their contraction. This change in the structure of the economy away from other tradable sectors can lead to a concentration of economic activity in one sector. Consequently if commodity prices or production decline, the country can be left worse off than it might have been without the commodity boom revenue.
- State intervention remains significant in the hydrocarbon sector. Governments in resource-rich countries increasingly attempt to capture – mainly through additional taxes and levies – some of the additional profits being made by oil and gas companies thanks to high commodity prices. In some countries, particularly where state control is dominant, there has also been a tendency to reverse the recent trend towards increased market privatisation in the hydrocarbon sector and put certain oil and gas developments back under state control via state-owned companies. Alternative types of state intervention are also on the rise including inter alia legislation that restricts attributions of hydrocarbon licenses; the ownership of strategic assets by foreign companies; or allows governments to exercise pre-emptive rights on hydrocarbon assets or subsoil licenses.
- Appropriate institutional and regulatory frameworks are also necessary for the proper management of resources and the equitable allocation of benefits across society. Independent regulators are one of the critical bodies within this framework – their role in overseeing compliance with legislation and ensuring fair and efficient economic regulation of networks is fundamental to successful development of a market. If only a small portion of the population benefits from commodity revenues this can lead to inequalities and ultimately undermine social cohesion and economic efficiency. Because of the large size of the potential rents to be appropriated, the development of strong institutions is particularly challenging.
- More specifically the coverage and depth of EHSS legislation and practice is not fully developed to best international standards in some of the Bank's countries of operations. Issues include some of the more significant and systemic sustainability challenges faced within hydrocarbon projects. Proven technologies and practices have been developed to address these.

The transition agenda for energy producing countries thus focuses on building sustainable economies where open markets promote a diverse sector supervised by robust institutions that mitigate the risks identified above. In particular it aims at containing the impact of natural resources extraction on macroeconomic volatility, ensuring that development does not crowd out other sectors, allowing for appropriate allocation in society of the revenues from this sector (e.g. the accumulation of reserves in stabilisation funds), and maximising opportunities to develop a full range of commercial activities from natural resource production.

4.5 The low-carbon transition

The urgency of the climate change agenda is described in Section 3.1 above. This Section discusses the transition dimension, namely that climate change is essentially a market failure, described in one major report as the "*greatest market failure the world has ever seen*".²⁷ In economic terms GHG emissions represent an externality because the economic cost of emissions for the environment and ultimately society are incurred by all and not allocated to the emitters. As a consequence there are inadequate incentives to avoid emissions, which remain on a trajectory inconsistent with the global agenda to limit global mean temperature increases to 2 °C. Most proposals to address this issue therefore attempt in some form or other to address this failure by allocating a cost to GHG emissions.

These concepts were explored in detail in a Special Report on Climate Change entitled "The Low Carbon Transition", published by the Bank in cooperation with the Grantham Research Institute on Climate Change and the Environment in April 2011. This report explored the reasons for the significant fall in GHG emissions since 1990 in many of the Bank's countries of operations, the economic implications of emission reductions and the optimal policies to encourage reduction. This is in the context, noted already above, that the Bank's region includes some of the most carbon-intensive economies in the world.

The Bank's analysis emphasised the importance of market-oriented policies in encouraging GHG emissions reductions and an economy-wide carbon price as the most effective policy instrument. While identifying the costs associated with this mitigation, especially for major energy producers, it also noted the benefits associated with it, including, "*higher long-run growth from lower resource dependence, technology spillovers associated with the development of alternative energy sources, and reduced distortions from energy subsidies and inadequate regulation of energy production and distribution.*" The Bank's SEI has captured this economy-wide approach by coordinating technical cooperation, policy dialogue and investments across the full range of sectors where the Bank operates.

This latter point is of particular significance in an economic environment which has focused attention on issues of energy security, competitiveness and affordability. The low carbon transition is not a discrete objective, separate from or in competition with, other energy sector goals. The low carbon agenda, with its focus on efficiency and cost-reflective pricing also helps reduce affordability strains, promotes competitiveness and supports the development of a more diverse and productive economy.

A major transition challenge for the Bank is addressing the high carbon intensity of many of its countries of operations. In some countries and regions progress has been made towards reflecting the cost of these emissions in prices, through the introduction of carbon taxes or emission trading schemes. However these systems are still fragmented, do not cover all activities in an economy and do not apply at all in many of the Bank's countries of operations. Where they do exist they currently generate prices for carbon emissions that are low and do not reflect economic estimates of the true cost associated with climate change.

THE IEA 450 SCENARIO.

As part of its annual World Energy Outlook the IEA prepares a forecast (the **450 Scenario**) for the energy sector calibrated to ensure that atmospheric CO₂ concentrations do not exceed the level of 450 parts per million identified as being consistent with a 50% chance of meeting the global 2 °C goal. This scenario is a reference point for the Bank in identifying those areas which have a key role to play in the low carbon transition and thus in shaping its operational approach.

In these circumstances the transition challenge in the Bank's countries of operations is to secure the investments that reduce carbon intensity in themselves and have wider impacts in the sector, for example by shifting market behaviour and structures, by building critical mass in a sector or demonstrating technology or behaviour that goes beyond business as usual.

4.6 Resource efficiency

The Bank's 2006 Energy Policy noted that efficiency was its "*cornerstone*". The Energy Strategy restates that focus, but informed by the developments, both internal and external, over the intervening years. Efficiency is identified as a transition goal because competitive behaviour, driven by well-functioning markets, drives the most efficient use of resources. Nowhere is this more important than in the energy sector, one of the major consumers and suppliers of resources in an economy.

Efficiency is important for long-term sustainability but it also plays a key role in meeting the more immediate concerns of mitigating affordability issues and promoting energy security. The external environment of sustained high commodity prices and public and personal austerity makes those concerns particularly acute. The importance of the resource efficiency agenda is growing in many international forums, for example the United Nations Environmental Programme's Resource Efficiency Programme and the EU's Roadmap to a resource-efficient Europe, which sets out this vision for the European economy of 2050: "*[b]y 2050 the EU's economy has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation. Our economy is competitive, inclusive and provides a high standard of living with much lower environmental impacts*"²⁸.

THE IEA EFFICIENT WORLD SCENARIO.

The Efficient World Scenario set out in the IEA WEO 2012 explains the implications for the economy, the environment and energy markets of doing no more than exploiting energy efficiency opportunities which justify themselves in economic terms immediately. The underlying assumption is that energy efficiency investments will be made as long as they are economically viable, provided that market barriers to their realisation have been removed. Therefore the scenario assumes that all long-term economic energy efficiency potential is realised by 2035. Key energy sector policies in the Efficient World Scenario include:

- Efficiency standards on existing fossil fuel plants, reducing refurbishment and lifetime of inefficient plant.
- Efficiency standards on new fossil fuel plants.
- Support for smart grids and efficiency standards for power networks.
- All new equipment having efficiency levels matching BAT by 2015.

For the Bank the development of the Energy Strategy coincides with the launch of its Sustainable Resource Initiative (the **SRI**). The SRI is an umbrella initiative which builds on the SEI and expands the Bank's focus beyond energy to address efficiency in the use of water and other materials. For the energy sector these are key issues, both as one of the major users

of energy, water and other materials, and because of the opportunities to work through energy sector mechanisms to promote more resource efficient behaviour generally. This latter aspect will be a growing focus for the Strategy period, leveraging reforms in the energy sector to promote efficiency not just in the supply but also in the demand for energy.

As the SRI and the SEI highlight, the Bank's countries of operations are in many cases characterised by high levels of resource inefficiency²⁹ with large transition gaps therefore centred around a lack of cost-reflective pricing and persistent barriers to the adoption of best practice even where pricing is adequate. The transition goal is therefore to promote the standards, regulation and structures that harness market forces and private sector engagement to drive higher resource efficiency. These changes will support the Bank's countries of operations in their transition away from the wasteful legacy of central planning.

4.7 Energy security

All economies rely on a continuous and reliable supply of high quality energy while reliability of energy demand and routes to markets on objective and equal terms are no less important for energy producers. In this context countries have increasingly focused on energy security, driven by a sustained rise in many commodity prices, an awareness of growing competition for resources and specific events or circumstances which have disrupted energy supplies unpredictably, such as the 2009 Ukrainian gas crisis and the Libyan revolution. Even where energy supplies remain abundant, inefficiencies and bottlenecks mean that many countries lack access to supplies or, more commonly, adequate infrastructure. Without stable, high quality and reliable supplies of energy economic and employment opportunities are compromised and quality of life is diminished.

Often energy security is defined as *energy self-reliance*. The path to energy security is seen as requiring extensive state intervention to ensure that a country has access on its own territory to all the energy supplies it needs. The Energy Strategy takes a broader view of energy security, recognising that diversification of sources, in particular through better integration into regional markets can deliver it more effectively and efficiently.

The Energy Strategy acknowledges the role of markets, institutions and infrastructure in contributing to energy security. This means putting in place market and regulatory structures that recognise the value of capacity and resilience. It also means emphasising that broad and liquid markets will typically generate a diverse range of supply or export options. Export and import infrastructure, such as pipelines, LNG facilities and high voltage interconnections are therefore crucial, as are third party access regimes and regional initiatives and platforms that facilitate energy trading, such as the Coordinated Auction Office for energy trading in south eastern Europe (see box in Section 2.2). At a national level energy security is advanced by open markets that encourage new entrants offering different sources of supply and new opportunities for exports, coupled with energy efficiency and demand-side management to minimise peak demands on the sector.

The principal transition gaps in this area for the Bank's countries of operations are failure to promote diversity through open markets, the absence of sufficient physical and regulatory infrastructure to allow for effective cross-border trading and the failure to price the value of security and diversity.

4.8 Affordable energy

Energy's basic utility nature means that it must remain affordable to avoid inequality, to preserve competitiveness and to ensure public support for the sector's structure. In the Bank's countries of operations, affordability is often assured through energy subsidies. On the other hand a market-oriented economy requires cost-reflective prices, which in most cases means higher prices. Higher prices are never welcome and typically mobilise strong opposition. The Energy Strategy thus faces the challenge of reconciling the importance for market-oriented economies of cost reflective pricing, and hence typically higher prices, with this reality of social and political opposition. The response is twofold:

- The key contribution that a market-oriented economy makes to affordability is **efficiency** – it ensures that energy is delivered at the lowest possible cost and that energy efficiency measures are properly rewarded. Indeed typically the most effective way to alleviate affordability concerns is efficiency measures so that customers are supported in reducing the volume of their consumption, as the cost per unit of that consumption rises.
- Affordability concerns are best addressed through **social policy** where the state uses direct intervention to protect the most vulnerable consumers in society, including by helping them to reduce their consumption. Energy markets should not be used as a vehicle to deliver social policy, which should instead be addressed through the welfare system. In this way goals are not confused and resources are not appropriated for unintended purposes.

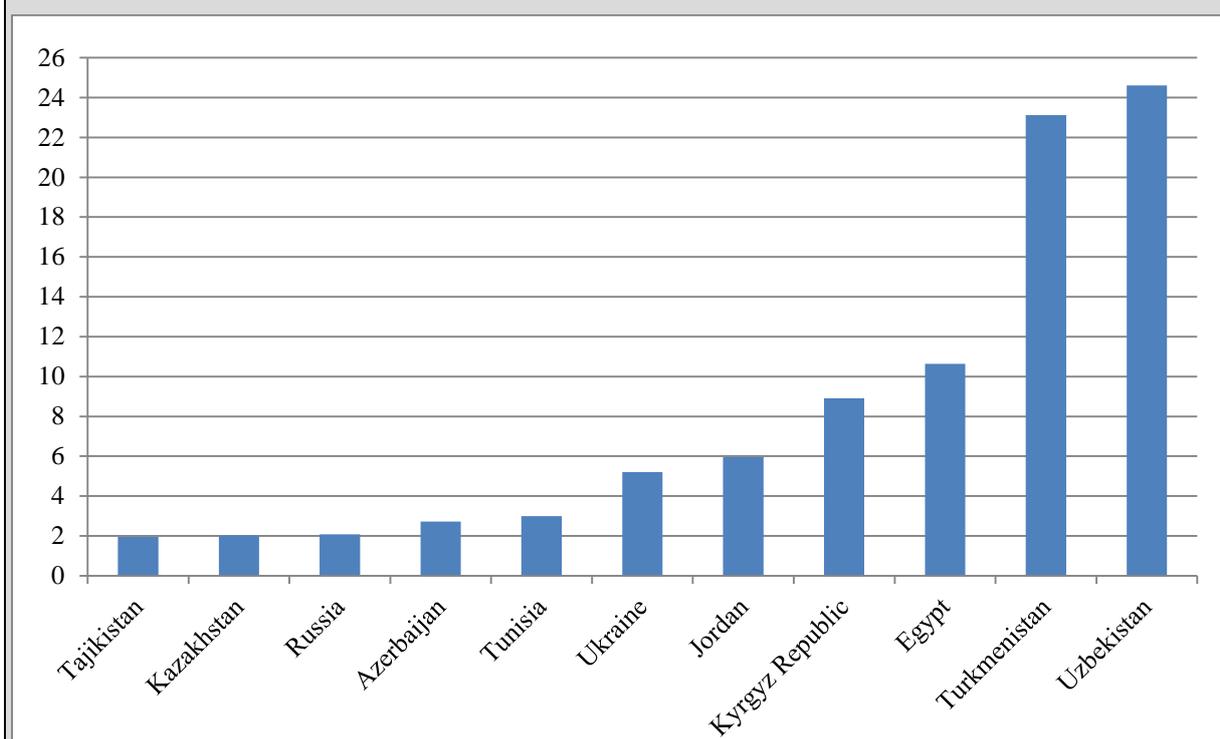
In the Bank's region the transition agenda intersects with affordability concerns when these inhibit a move to cost-reflective pricing. The transition to cost-reflective pricing must therefore combine efforts to mitigate the impact of price rises through energy efficiency policies, transparent, competitive price discovery and measures to protect vulnerable consumers.

ENERGY SUBSIDIES.

Estimating the exact quantum of energy subsidies is challenging because of the wide range of different methodologies that may be applied and because many subsidies are implicit rather than explicit. A January 2013 study by the International Monetary Fund³⁰ estimated global pre-tax subsidies for petroleum products, natural gas, coal and electricity as USD 480 billion in 2011, equivalent to 0.7% of global GDP and 2% of total government revenues. These subsidies burden state budgets and distort investment and consumption decisions. They reduce incentives to efficiency, in turn reducing export revenues for energy exporters and increasing environmental impacts. In addition subsidies inhibit job creation by diverting investment towards capital-intensive rather than labour-intensive opportunities.³¹

Within these figures the Bank's region includes some of the largest pre-tax subsidisers. As shown in this chart, eleven of the Bank countries of operations spend 2% or more of their GDP subsidising energy:

Pre-tax energy subsidies as a percentage of GDP for selected countries – 2011



Source: *Energy Subsidy Reform: Lessons and Implications*, International Monetary Fund, January 2013. For detailed methodology underlying these figures please see Appendix 1 of this report.

The IMF report also reviewed 22 case studies of attempted subsidy reform and identified six key ingredients for success: (i) a comprehensive reform plan, (ii) effective communication of the plan supported by price transparency, (iii) phased price increases, (iv) improved efficiency in state-owned energy companies, (v) targeted measures to protect the poor and (vi) institutional reforms to depoliticise energy pricing.

The Bank's transition mandate aims to eliminate subsidies and mispricing throughout economies. Its operational approach and specific experience gives it a particular role to play in certain of the IMF's key ingredients, notably supporting efficiency improvements in state-owned energy companies and institutional reforms to both depoliticise and progressively increase prices.

5. OPERATIONAL APPROACH

5.1 Organising theme

Section 4 identified the role for the Bank in the energy sector and its goal of a market-oriented energy sector. This final section sets out how in practice the Bank will pursue that agenda. It does so within the context of the Bank's project-based and country-specific approach, that identifies and responds to specific opportunities. The organising theme is *transition*: supporting systemic transformation through discrete but coordinated activities that in different ways move economies towards a market-oriented energy sector. That transformation in turn generates an energy sector better equipped to deliver the goal of sustainable, affordable and secure energy that supports the growth and development of economies.

Reflecting a holistic view of the sector the Energy Strategy sets out an operational approach organised by theme rather than by sub-sector. Two fundamental considerations cut across all of the themes discussed below:

- **Efficiency** – the Bank uses two complementary approaches to this critical area. The first approach focuses on energy demand efficiency and seeks to the extent possible to contribute to decrease energy intensity. Experience shows that the cost of saving one unit of energy is in most cases significantly below the cost of producing an additional unit of energy so the Bank's energy strategy seeks to curb demand growth through energy efficiency. The second approach is oriented to support the cost effective development of supply both by enhancing the efficiency of production, transmission, transportation and distribution and through the development of a diversified supply structure. Reducing supply-side and demand-side consumption helps achieve the three main policy goals for the energy sector and is fundamental to the market-oriented transition agenda. All the Bank's activities in the energy sector will in one way or another focus on the efficient utilisation of energy, water materials and human capital. The Sustainable Energy Initiative is the main instrument of the Bank to promote efficiency on both the demand and supply side.
- **Uncertainty** – the survey in Section 3 highlighted that the energy sector is volatile and unpredictable. While energy investments are long-term and capital intensive the sector is also vulnerable to single events that can rapidly and unexpectedly change circumstances – for example the Deepwater Horizon and Fukushima Daiichi events. This uncertainty inhibits investment and reform, entrenching wasteful patterns of behaviour and inefficient infrastructure. For decision makers this environment also means that it will not always be clear what the best policy choice is; hard choices must be made in circumstances where none of the available options is optimal. The Bank has a key role to play in supporting those choices and sharing the lessons it has learned from its experience of the transition process.

The following sections discuss the range of operational approaches the Bank may adopt in different contexts and sub-sectors. The final section 5.11 describes how the Bank will prioritise and focus those approaches, by setting out its strategic orientation and a number of key indicators that it will track to measure progress towards its transition goals.

5.2 Energy Efficiency and Demand Side Measures

Energy efficiency is critically important not only in the energy sector but across the whole economy. Energy efficiency reduces production costs, enhances competitiveness, supports energy security and lowers CO₂ emissions per unit of production. Energy efficiency is an energy resource.

In the WEO 2012 the 450 Scenario identifies that energy-related emissions must peak before 2020 at 32.4 Gt CO₂e and thereafter fall rapidly to 31.2 Gt CO₂e in 2035. Efficiency, in the form of reduced electricity consumption, increased end-use efficiency and increased power plant efficiency, accounts for 71% of the reduction compared to the business as usual case in 2020 and 42% in 2035.³² This demonstrates both the importance of efficiency in meeting climate change goals and its immediate priority while other longer-term solutions are developed.

To unlock the significant energy efficiency potential in its countries of operation, the Bank promotes the widest possible range of demand-side as well as supply-side efficiency investments. It works not only in the energy sector but across all energy related activities and along the entire energy value chain in an economy. For example, the Bank not only finances efficiency measures in power generation or gas flaring reduction, but also energy efficiency in industrial processes, energy savings in residential and public buildings and investments in public transport energy efficiency. To encompass these various activities the Bank uses a holistic approach, principally set through the Sustainable Energy Initiative. The SEI brings together a range of operational tools that aim to consistently promote energy efficiency across the Bank's operations.³³ It also ensures integrated assessments of complementary demand and supply side opportunities.

Demand and supply side energy efficiency. The principal tools and approaches that guide the Bank's demand and supply side energy efficiency activities under the umbrella of the SEI are summarized below.³⁴

- **Manufacturing, Services and Agribusiness.** The Bank promotes a wide range of industrial and commercial energy efficiency measures and works primarily through energy audits to provide business owners with information on profitable energy efficiency opportunities in industrial plant and equipment. Energy audits play an essential role in translating energy efficiency gains into specific investment opportunities. The Bank also funds a variety of energy efficiency measures through tools such as the Agribusiness Sustainable Investment Facility (ASIF). Where appropriate the Bank identifies key areas for clean-energy technology adoption, efficiency improvement of production processes and works with companies towards implementation of a comprehensive approach to energy efficiency. Here, emphasis is placed on measures and actions which promote a systemic reduction in energy intensity, such as the introduction of company energy efficiency standards or energy monitoring.³⁵
- **SMEs and Buildings Energy Efficiency.** To reach out to small and medium sized businesses and individual end consumers, the Bank extends credit lines to local financial institutions that develop energy efficiency financing as a permanent field of business. These sustainable energy finance facilities (SEFFs) fund smaller energy efficiency measures directly at the end consumer. Accordingly, the Bank promotes investments in profitable buildings energy efficiency measures in the residential, commercial and public buildings sector. The Bank also directly invests in buildings energy efficiency for

example where its projects finance construction of commercial and residential property or larger structures such as railway stations. These investments are especially important to curb energy demand, reduce energy costs and demonstrate new technologies.

- **Municipal Sector.** The Bank supports energy efficiency measures in municipal services – investing in projects such as efficiency upgrades of district heating networks and more efficient waste and wastewater treatment systems. It also promotes low carbon transport alternatives in urban public transport infrastructure and actively supports the establishment of private sector Energy Service Companies to finance and operate energy efficiency investments under Energy Performance Contracts.³⁶
- **Transport Sector.** The Bank extends its financing to promote energy efficiency in the transport sector, including for energy efficiency investments in the rail networks, in road freight services or logistics chains.³⁷
- **Energy production, generation and delivery.** Energy efficiency measures aim to reduce losses that occur every day in the production and delivery of power, heat and hydrocarbons. The Bank will therefore consistently promote energy efficiency measures, the upgrade of inefficient equipment and investment into best available technologies (BAT) throughout its activities in electricity generation, transmission, and distribution as well as in hydrocarbon extraction, processing, transportation, distribution and supply. Energy audits will help identify these opportunities. The Bank will also assess opportunities to combine supply side measures where appropriate with adequate demand side efficiency opportunities. Further details of the Bank's operational approach to exploiting energy efficiency opportunities across its energy operations are set out in section 5.4 on rethinking energy systems and section 5.6 on cleaner energy production.

Alongside direct investments, the Bank will work through technical assistance and policy dialogue to enable energy efficient behaviour, supports the introduction/upgrading of energy efficiency standards and establishment of appropriate energy efficiency policy frameworks. Evidently, the most effective driver of energy efficiency is the promotion of cost-reflective pricing of energy supplies. Where structural barriers to cost-reflective pricing cannot be addressed in the short term, the Bank will promote a gradual move towards cost-reflective pricing and combine this with efforts to mitigate the impact of price rises through energy efficiency policies, transparent, competitive price discovery and measures to protect vulnerable consumers. Strong support and commitment by donors is an important determinant of the SEI performance in this area.

Demand response and distributed generation. Energy distribution and supply companies are well placed for promoting demand side efficiency at the end consumer level: they have the customer relationship and the best knowledge of their customers' demand patterns as well as billing arrangements in place. Accordingly there is considerable potential to work with these companies to promote efficiency in their customers.

The Bank will therefore support new models for meeting energy demand in distributed forms. This may be through small installations to meet own demand in industrial facilities, especially where this maximises efficiency through the utilisation of waste products or the combined generation of heat and power. This may also be through demand response projects, where consumers, either individually or through an aggregator, commit to reduce demand in response to power spikes. These models are not just interesting technical possibilities, they have the potential to become major business areas, generating jobs and economic

opportunities in their own right. Recognising the early stage of development, the Bank's initial operations in this area will likely begin on a small scale.

Existing regulatory frameworks do not easily accommodate these models – for example there is typically no provision made for the selling of "negative generation", in other words reduced demand, as opposed to actual generation. Similarly distribution tariff methodologies are seldom structured so as to incentivise companies to sell less of their product. Further, these developments often challenge incumbents and established ways of working. They therefore need a strong and often innovative regulatory framework. Accordingly the Bank will coordinate its investments with policy dialogue aimed at restructuring the market framework.

5.3 Building deep and liquid energy markets

Section 4 set out the primacy of markets, market-supporting structures and cost-reflective pricing in the Bank's agenda. The Bank will pursue these aims through a number of routes:

Improving market signals. The Bank will support projects which contribute to reducing subsidies and promote the sale of energy and energy services at cost-reflective prices.

Wider private participation. The Bank will promote reduction in state ownership, new entrants bringing know-how, capital and improved corporate governance, wider private ownership, including through independent power projects, and other developments which deepen and diversify energy markets. In particular in the oil and gas sector the Bank will support private participation and competition in the sector in the face of rising state intervention. This will be combined with policy dialogue to improve licensing regimes and reduce restrictions on foreign ownership.

Modernization of the public sector. Where private participation is still some way off the Bank will support unbundling, commercialisation and outsourcing as well as optimal tariff methodologies. This may include Bank financing for joint ventures between state-owned and private operators, where it is able to act as an honest broker and strengthen the transparency and effectiveness of these arrangements.

Support to smaller companies. In an industry dominated by very large companies, smaller companies can play an important role in building more diverse and competitive markets. For example junior oil and gas companies may extend the reach of hydrocarbon markets by developing marginal and complex oil and gas deposits or introducing new technologies. The Bank will also look to invest in small operators, including by selectively financing exploration projects in the hydrocarbon sector, early stage development of sustainable energy projects and new business models such as demand response. It will use the Local Enterprise Facility, SEFFs and similar frameworks and facilities to promote small scale and local projects.

Strengthening the hydrocarbon value chain. Recognising the key role of the energy sector in producer countries the Bank will work to strengthen the whole hydrocarbon value chain and maximise the role of energy projects in building more robust economies. The Bank's involvement can be an important opportunity to promote backward and forward linkages, for example through support for service providers to an oil and gas project, construction of refining or petrochemical plants, downstream processing and marketing activities or economic use of by-products of hydrocarbon activities such as coal waste. Although oil and

gas upstream and downstream sectors are often considered as a well-funded business dominated by large international companies, transition is, however, contingent on whether natural resources and the associated revenues are developed and managed responsibly over time.

Market-enabling infrastructure. The Bank will promote the development of the physical assets that underpin the development of energy markets as well as greater energy security, namely the infrastructure used for the transport/transmission, distribution and storage of energy. This will include the following elements:

- The Bank will support cross-border energy transportation and transmission projects, to break down barriers to regional and international trade and increase opportunities for both producers and consumers. The Bank's role in these projects will be particularly important because of the need to mobilise capital from many sources and to coordinate several different countries.
- The Bank will similarly encourage the development of LNG supply infrastructure and address shortfalls in gas storage capacity, both of which play an important role in the diversification of energy sources and in the creation of a single market for natural gas.
- The Bank will contribute to reducing transport bottlenecks affecting the hydrocarbon industry by supporting the upgrade of railway and road infrastructure, acquisition of rolling stock and the development of marine fleets servicing offshore developments, particularly for those landlocked countries which face significant barriers in getting goods to market.
- Adequate distribution capacity, storage and metering equipment is essential for wholesale and retail markets. Better efficiency in the infrastructure also brings environmental and social benefits. The Bank will therefore support the expansion and strengthening of gas and electricity distribution networks, as well as the introduction of sophisticated metering technology to increase the information and control opportunities for both consumers and suppliers.

Market-enabling regulation. The physical infrastructure referred to above is a necessary but not sufficient condition for well-functioning energy markets. The right regulatory framework and strong institutions, both regulators and market bodies, are also necessary. The Bank will accordingly emphasise the strengthening of independent regulation, the implementation of market-supporting regulatory frameworks and the entrenching of market-based behaviour. It will in particular expand its cooperation with national and international organisations such as the ECSEE and associations of electricity and gas regulators including the International Confederation of Energy Regulators (ICER) and its member organisations, ERRA, MEDREG and CEER. The Bank will also support the introduction of transparent, fair and stable legislative and regulatory frameworks for the attribution and monitoring of subsoil licenses.

SUPPORTING UNBUNDLING IN THE GAS TRANSMISSION SECTOR IN BOSNIA AND HERZEGOVINA.

In 2010, the Bank provided a EUR 17 million sovereign loan to Bosnia and Herzegovina (BiH) to build a 40-kilometer gas transport pipeline to expand the availability of natural gas to population and businesses in the centre of the country. The investment was combined with a project to improve the regulation of the natural gas market in the Federation of BiH. Through a Regulation Action Plan, the Bank agreed with BH-Gas, the public

gas operator in the Federation, and the government of the Federation to create an independent regulator for the gas distribution market at the level of the entity, mirroring the structure in place in Republika Srpska. Further, the parties agreed on an organized process spread over several years to unbundle the trading and transportation activities in the Federation, which were hitherto combined within BH-Gas. The Regulation Action Plan was intended to bring BiH in to conformity with the EU directives regulating the natural gas markets and help the country meet its commitments as a member of the ECSEE. This effort was implemented in the context of one of the first Integrated Approaches developed by the Bank.

5.4 Rethinking energy systems

Section 3 describes the impacts of new technologies on both the power and hydrocarbons sectors while Section 4 identified the importance of expanding market opportunities and allowing new business models to thrive. The Bank will support these developments in the following areas:

5.4.1 Smart grids

Smart networks and smart meters will be the backbone of the future power sector; critical to the transition to a more sustainable, efficient model. The Bank will therefore focus on investments in smart networks, including smart metering, to support the sector transformation. These investments will drive increased efficiency and quality of supply as well as facilitating a range of different solutions to energy needs for the benefit of both suppliers and consumers.

BANK EXPERIENCE IN SMART METERING PROJECTS.

The Bank has long supported investments in transmission and distribution and over the 2006-2012 period it increasingly developed this focus into efforts to promote the introduction of smart grids and smart metering. Notable examples include two loans signed in 2010 in the Balkans, one with the Serbian utility EPS and the other with the Montenegrin utility EPCG. Both involved the wholesale replacement in key areas of the networks of all old, electromechanical meters with smart meters and the associated communications, meter management and customer relationship infrastructure. In each case the utility aimed to use the renovation of its physical assets to stimulate an internal cultural transformation towards a service approach, focused on understanding and meeting consumers' needs.

In implementing these and similar projects the Bank learnt a number of lessons. First, that physically installing smart meters is relatively simple; the challenging but crucial dimension of these projects is ensuring first that the meters form part of a fully integrated system from the individual customer through the substation right to the customer relationship and billing software. Second, that the physical changes must be complemented by organisational and regulatory changes that enable the exploitation of the many benefits of these smart systems. Third, that when installed in a comprehensive way, and when complemented by the right organisational and regulatory changes, the results can be dramatic. Commercial losses, which can account for 10% or more of electricity supply, have been all but eliminated in certain areas, demonstrating how rapidly and effectively efficiency gains can be achieved.

5.4.2 Best practices in the hydrocarbon sector

In the hydrocarbon sector, the Bank will support the introduction of efficiency- and productivity-enhancing technologies. This includes areas such as enhanced oil recovery, simulation, oil spill response, occupational health and safety, energy efficiency, waste management, emissions control and environmental management systems. The adoption of new technologies, extraction methodologies and systems, and improved knowledge and skills of both labour and management, can significantly enhance performance in all of these areas. In particular the Bank will support oil field services companies, which are catalysts in introducing new technologies and processes to the Bank's countries of operations because of their versatility and market reach. Similar opportunities exist in the midstream and

downstream sectors, for example through the introduction of client relationship management systems or automated vehicle recognition technology.

5.4.3 Investing in advanced technologies and business models.

The adoption of innovative business models and advanced technologies is essential to deliver the resource efficiency and low-carbon goals promoted throughout this Strategy. Consequently, the Bank will seek to invest in projects that extend the application of innovative technologies and techniques, for example demand-side response, advanced smart-grid infrastructure, new renewable technologies, high efficiency conventional generation and advanced techniques in the oil and gas sector

5.5 Low carbon transition

5.5.1 Renewable energy

Renewable energy can contribute to energy security and diversity; however the objective of limiting GHG emissions is the principal driver for its promotion. Long-term forecasts for a low-carbon energy sector all show a significant increase in renewable energy production, in particular for electricity. In the WEO 2012 the 450 Scenario shows electricity generation from sources of renewable energy other than hydropower increasing from 776 TWh out of a global total of 21,408 TWh (3.6%) in 2010 to 9,031 TWh out of a global total of 31,748 TWh (28.4%) in 2035.³⁸ The 450 Scenario also anticipates that renewable energy will be responsible for 15% of the required reduction in energy-related CO₂ emissions in 2020 and 23% in 2035.

Recognising this key role in the low carbon transition the Bank will continue its strong support for the deployment of renewable energy throughout its countries of operation, financing investments in new capacity as well as combining those investments with policy dialogue and technical cooperation to initiate and strengthen regulatory frameworks. This support will take different forms, depending on the degree of maturity and renewable energy potential in the relevant country:

- For those countries of operation where renewable energy is not widely deployed the Bank will focus on supporting the key initial projects which confirm the sector's viability and establish it as part of the broader energy sector. This will include funding early stage projects across different technologies, supporting new private operators in state-dominated environments, scaling up pilot operations to commercial scale and helping to build a critical mass of investments that establish renewable energy as a mature, mainstream industry in the country.

In this early stage of development the Bank will also support countries in establishing regulatory frameworks that encourage investment in renewable energy on transparent and open terms. Typically, and especially in countries with limited liberalisation and perceived high risks for investors, these will be mechanisms that prioritise clarity and a relatively low risk profile for investors, such as feed-in tariffs or auctions.

- In other countries of operations, such as Poland, Bulgaria and Romania, some renewable technologies, notably wind, are more mature and there is widespread penetration. In countries that are in this situation the Bank will focus on ensuring the *sustainability* of the sector in the face of the financial, technical, environmental and market challenges

described in Section 3.3. This will include investments and policy dialogue that make the renewables sector more diverse, through the introduction of new participants and new funding models, as well as the development of more sophisticated and market-oriented support mechanisms that integrate renewable generators in wholesale markets and communicate price signals more accurately. It will also highlight the benefits of strengthening regional markets and trading to deal with the intermittent nature of renewables.

Support mechanisms may include green certificates, auctions or feed-in tariff premiums for example. The overall goal will be the integration of renewable energy with conventional energy so that each energy source participates in the energy market on as similar terms as possible. Where the development of renewable energy is stalled by regulatory uncertainty the Bank will play a role in bolstering confidence in the long-term centrality of the industry, ensuring that it achieves critical mass.

In addition, as this capacity becomes more widespread, and places greater demands on a country's energy system, the Bank will support the essential enabling infrastructure that allows increasing penetration of renewables. This will include investments in transmission lines to connect remote locations with good renewable resources, smart grids that increase the absorption capacity of networks for intermittent power and flexible backup capacity.

In terms of technology the Bank's approach will continue to be pragmatic, guided by the natural endowments of its countries of operation and the maturity of each technology. The Bank's efforts to date have therefore mainly been focused on *wind* and *hydropower*. This has reflected both the natural endowment of the Bank's countries of operations and the maturity of these technologies, which has meant that they are typically the most economic sources of renewable energy. The Bank expects to continue to fund these resources but also to see a growing diversification in its portfolio. Where new or more novel technologies will be considered, the Bank will particular use lessons learned from earlier projects and apply careful planning and monitoring to manage any additional risks.

The Bank will continue to support large and small *hydropower*. This is the oldest, and often cheapest, form of renewable energy, where many of the Bank's countries of operations have excellent resources. It is currently the single largest source of renewable generation and its use in electricity generation is forecast to grow by 80% between 2010 and 2035 in the WEO 2012's 450 Scenario.³⁹ In large hydropower the Bank will focus on rehabilitation to improve the efficiency and capacity of existing plants as well as their resilience to climate change impacts. The Bank will also support greenfield developments where these meet the most stringent demands of international best practice in the environmental and social areas, including evaluation of the full carbon implications of construction and operation.

The Bank expects to see major growth in the role of *solar* power over the Strategy period. This principally reflects the dramatic decline in recent years in solar photovoltaic costs. It also reflects the start of operations in the SEMED countries, where solar resources are exceptional. Amongst the solar technologies *solar photovoltaic* is the most widely adopted technology and the area the Bank expects to be most active – in some locations such plants are already close to grid parity and likely to become closer still during the Strategy period.

Concentrated solar thermal electricity generation (STEG) remains significantly more expensive and the Bank will accordingly be more cautious. However STEG may also anticipate significant cost declines, especially in regions such as SEMED which have

particularly clear and strong direct sunlight. In addition STEG offers the key benefit of being able to store power for several hours, allowing the plants to continue generating during evening peak demand. The Bank may therefore support the introduction of this new technology where it is affordable, including by catalysing resources from the Clean Technology Fund and similar funds.

Amongst other renewable resources the Bank will support the growing use of *biomass*, which does not suffer from the intermittency problems of wind or solar and where many of the Bank's countries of operations, with their large forestry or agribusiness sectors, have strong resources. Support for biomass will however be subject to stringent environmental and social guidelines to ensure the sustainability of feedstock supplies and accurate carbon accounting for the entire value chain.

Where good resource is identified the Bank will actively support *geothermal* power, given its ability to provide despatchable baseload capacity.

Since renewable energy projects are often smaller and more numerous than conventional projects the Bank will use more flexible and intermediated structures such as the West Balkans Sustainable Energy Direct Financing Facility and sustainable energy credit lines in this area.

5.5.2 Carbon Markets; Adaptation and Resilience

As described in Section 3.1 carbon markets currently offer limited incentives to stimulate significant investment. The Bank's approach to this area is informed by the view that pricing carbon is the appropriate mechanism to address the climate change agenda, but constrained in practice by the reality of currently low carbon prices. In this context the Bank's approach to this sector will be, as set out in the SEI3, essentially twofold:

- Continuing to build the institutional capacity and regulatory frameworks for carbon markets, for example through the development of monitoring, reporting and verification mechanisms. The Bank is already closely engaged in supporting the development of emissions trading schemes in Turkey, Kazakhstan and Ukraine and will look to expand this work to other countries.
- Supporting its clients to monetise carbon credit revenues as and when opportunities become available.

Climate change is expected to entail both global warming and greater climate volatility, with both droughts and floods becoming more common. Recognising that some of these impacts are now inevitable the Bank will look to support adaptation and incorporate resilience into its work throughout the energy sector. In the Bank's countries of operations, the principal impacts of climate change on the energy sector are likely to be water-related. The Bank will therefore support investments to increase the resilience of hydropower systems to both higher and lower water flows, as well as improving the water efficiency of oil and gas extraction and generation, while at the same time maintaining compliance with the Bank's environmental and social requirements. It will also include in its project evaluation assessments of the vulnerability of projects to long-term climate shifts as well as help its clients understand these issues and learn from international best practice in integrating climate resilience into energy investment decisions. For example, the Bank is developing practical guidance on climate change and hydropower, which will be used to inform the development of investments in this

area. In accordance with the broader agenda set out in the SRI the Bank will also work to promote systems that properly monitor and price water consumption. The Bank is taking steps to.

INTERNATIONAL BEST PRACTICE FOR CLIMATE RESILIENT ENERGY INFRASTRUCTURE.

Energy utilities around the world are increasingly aware of the sensitivity of energy generation and transmission infrastructure to climatic variability and longer-term climate change. Hydropower generation is directly affected by climatic conditions through its influence on hydrology. Major hydropower operators such as Hydro Quebec in Canada and Hydro Tasmania in Australia have therefore conducted extensive climate and hydrological modelling work to help them understand the implications of climate change for their operations and how to optimise hydropower generation in the face of anticipated increasing climatic variability through both physical upgrades and modifications to management regimes. Thermal power generation is also sensitive to climatic conditions through the availability of cooling water. For example in France EDF suffered losses of \$300 million during the 2003 extreme summer heatwave – an event expected to become more common as a consequence of climate change – when cooling water temperature restrictions forced it to shut down 17 nuclear reactors.

The implications of shifting seasonal temperatures, including peak temperatures, are also being given careful consideration by electricity distributors. For example, analysis commissioned by the California Energy Commission identified significant risks to transmission line and substation capacity during hot spells and peak electrical demand.

5.5.3 Carbon capture and storage

The long-run goal for the power sector is near complete decarbonisation by 2050 if the global climate change agenda is to be achieved. Most scenarios for this recognise that for reasons of affordability, availability, flexibility and energy security, as well as the existing legacy of infrastructure, fossil fuels such as coal and gas will continue to provide a significant portion of power generation. Decarbonisation in these scenarios relies extensively on the capture (pre or post-combustion), transport and long-term storage of the carbon embedded in these fuels (CCS).

CCS is proven as a technology only in small scale industrial applications and efforts to scale it up and implement it on a large scale have not yet been successful – the largest operational plant with CCS implemented is only 30 MW. A number of OECD economies are devoting considerable resources to supporting CCS, notably in the EU through the NER 300 programme.⁴⁰ CCS development however confronts a range of problems: the lack of a stable and significantly high carbon price, in most countries an unclear regulatory framework (in particular in relation to liability regimes for long-term storage), the technical challenge of scaling up the complex technology and integrating it with generation and boiler technology and public concern about the risks associated with long-term storage. In addition any CCS implementation will have significant negative effects on the efficiency, availability, flexibility and operation costs of generation plants.

As a consequence CCS remains some way from becoming a mainstream technology and there is no clear timetable for this, nor a clear sense of the costs involved. The IEA Technology Roadmap for Coal-Fired Generation does not envisage deployment of CCS beginning before 2020 and anticipates that this is likely to happen first in the US, EU, Korea or China.

Given the importance of CCS in the low carbon transition the Bank will strongly support any commercial projects adopting this technology. However in the context described above the Bank expects few if any such projects during the Strategy period. The Bank's focus will

accordingly be to support countries in developing the regulatory framework and technical knowledge required to facilitate CCS. This approach is part of the Bank's general theme, in an environment of uncertainty, of supporting enabling frameworks, taking steps now that facilitate a long-term agenda.

5.6 Cleaner energy production and supply

5.6.1 Resource efficiency across the sector

The preceding sections identified ways in which the Bank will work to achieve market-based structural reforms which will deliver efficiency across the sector. This section identifies the areas where the Bank will work directly to enhance resource efficiency. These investments will in turn also support the low carbon transition agenda described above, alleviate affordability pressures and strengthen competitiveness.

In this area the Bank will draw heavily on the resources and methodologies set out in the SRI, in particular on resource audits for its clients. These tools will be used to take a holistic approach to the energy sector's industrial processes, identifying opportunities throughout the whole process to maximise efficiency and achieve significant aggregate improvements through many small interventions.

In this context the Bank's Environmental and Social Policy plays a crucial role in testing the Bank's projects against best international practice and in particular the EU Industrial Emissions Directive (the **IED**).⁴¹ In addition to specific restrictions on certain emissions the IED imposes a general requirement to follow "best available techniques". This broad concept captures not just the plant involved in an investment but also the way in which it is operated. This standard is then expanded on in a series of detailed reference documents for each industrial sector, prepared under the supervision of the European Commission. Taken together these form a set of detailed guidelines which identify the best available levels of efficiency in construction and operation, which the Bank tests its projects against.

Resource efficiency across the energy value chain. Consistent with the SRI, the Bank will support significant improvements in energy, water and materials efficiency through rehabilitation or new build capacity in the generation of electricity and the refining sector. It will also support investments in gas and electricity transmission and distribution networks which reduce commercial or technical losses. Where the energy sector produces usable by-products, for example clinker from ash, the Bank will promote reuse rather than disposal. The Bank will also support increased efficiency and decreased carbon intensity along the coal value chain, including through improved coal handling, drying and washing facilities at coal mines.

INTRODUCING COAL WASTE RECYCLING TECHNOLOGY IN UKRAINE.

In December 2012, the Bank agreed to provide financing to a Ukrainian coal group to finance the development of their coal recycling businesses to produce energy coal from waste dumps and tailing ponds in eastern Ukraine. The company was already active in this segment, although using less advanced technology and achieving lower rates of recovery. The Bank's financings will support a significant expansion of the coal recycling industry in Ukraine. Coal recycling generates an energy source from discarded waste material and also has a positive impact in terms of environmental remediation as areas previously occupied by waste material can be put to different economic use once recycling operations are concluded. Coal waste recycling also generates CO₂ emissions reductions (by avoiding spontaneous combustion resulting in uncontrolled emissions and by avoiding methane releases from coal that is consequently not required to be mined) that can be monetised

through carbon credit transactions. Given the abundance of waste coal material in eastern Ukraine, the demonstration effect in the country and potential for replication of this project is high.

5.6.2 The hydrocarbon sector

Gas flaring reduction. A specific and particularly serious instance of resource inefficiency in some of the Bank's countries of operation is gas flaring – the venting or uncontrolled combustion of associated gas produced in the course of oil production. The Bank recognises that its countries of operations are among the world's largest contributors to flaring-related GHG emissions. In 2011, 140 billion cubic meters of natural gas was flared worldwide, 85 per cent of which originated from 20 countries, including four of the Bank's countries of operations. This is the equivalent of 30 per cent of the EU's gas consumption and represents 1.2% of global emissions of carbon dioxide per annum. As well as being both a local pollutant and a major contributor to GHG emissions⁴², this practice also harms competitiveness and reduces energy security by wasting a valuable resource. The Bank will therefore support associated petroleum gas utilisation and flaring reduction projects throughout its engagement in the upstream oil sector. The Bank will also engage in policy dialogue to promote regulatory frameworks that both restrict flaring and facilitate utilisation of associated gas through market-oriented structures such as open third party access regimes and cost reflective pricing. In this context the Bank is an active participant in the Global Gas Flaring Reduction Partnership.

SUPPORTING THE GLOBAL GAS FLARING REDUCTION PARTNERSHIP (GGFRP).

The World Bank led GGFRP supports the efforts of oil producing countries and companies to increase the use of associated natural gas and thus reduce flaring and venting. Jointly with the GGFRP, the Bank co-managed a EUR 1 million study entitled "Associated Petroleum Gas Flaring Study for Russia, Kazakhstan, Turkmenistan and Azerbaijan" that reviews and analyses the flaring situation in these countries, and assesses venting and flaring in about 100 oil sites.

Furthermore, the Bank supports on-going GGFRP efforts and a number of projects, some of which have already been completed and others are well under development. For example, in 2010 the Bank provided a EUR 41 million loan to a subsidiary of Monolit, an independent privately-owned oil and gas company in Russia that employs new technologies to provide economically viable solutions for using associated gas.

Part of this funding has been used to finance the construction of a gas processing plant on the Zapadnoe-Salymkoe oil and gas field. Whilst the Salym field delivers associated gas, Monolit supplies in exchange, dry stripped gas for an existing gas turbine power plant. The loan also funded another 44 MW gas power plant built at the Nizhne-Shapinskoe field that uses the dry stripped gas produced after being pumped through a pipeline connecting the two fields. The facilities are already fully operational.

Overall this investment will have a significant impact on eliminating gas flaring at this particular oil field saving an estimated 650,000 tonnes of CO₂. The wider demonstration effect of the project is also crucial, as Russia remains the largest contributor to global gas flaring, estimated by a World Bank report at 50 billion cubic meters.

In another project, the Bank invested over EUR 144 million alongside a Russian oil and gas company in a gas cycling and reinjection facility to allow the separation of associated petroleum gas into heavy fractions that can be on-sold as fuels, and the re-injection of dry gas back into the gas reservoir, thus avoiding it being flared. Over EUR 100 million of the investments were solely related to gas flaring reductions, expected to lead to CO₂ emission reductions of approximately 900,000 tonnes per year for 2012-2017. These emission reductions were successfully registered under the Joint Implementation (JI) carbon credits mechanism in 2012.

Clean and efficient refining. In the midstream sector the Bank will support projects to improve efficiency and product quality, allowing the use of cleaner vehicles and ensuring

competitiveness. The Bank's countries of operations have significant refining capacity, which require important upgrade investments to meet the growing demand for cleaner, low sulphur fuel oil which conforms to higher specifications, such as those outlined in the EU's BAT reference document on refining or the global sulphur emission cap mandated by the International Maritime Organisation in the fuel bunker market. The Bank will support new refining capacity which will replace inefficient plants and so reduce emissions of CO₂ and nitrogen oxides and improve the competitiveness of the sector. The Bank will also support the more efficient utilization of resources within industrial complexes, including by promoting on-site power generation and full water recycling.

Supporting a cleaner transport sector. The Bank's Transport Strategy identifies the importance for the transport sector of shifting to higher quality fuels. This includes both higher fuel standards and over time moving away from petroleum products, taking advantage of the cleaner qualities of compressed natural gas and liquefied petroleum gas to fuel cars, buses and commercial vehicles. The Bank will therefore, in the energy sector, support this agenda through investments in infrastructure and, as described above, petroleum refining and distribution capacity to increase the availability of high quality fuels.

SUPPORTING IMPORTANT ENERGY EFFICIENCY UPGRADES IN REFINERIES.

In 2010 the Bank lent EUR 150 million to a medium-sized European company with a leading role in the oil business in Croatia and a significant role in the region in the areas of oil and gas exploration and production, oil processing, and oil and oil products distribution. The Bank financing contributed to the modernisation of the company's two refineries in Croatia, both of which were old and technically sub-scale, and did not meet the minimum EU environmental standards and energy efficiency requirements.

Of the Bank's total loan, EUR 68 million was specifically dedicated to energy efficiency improvements such as the rehabilitation of steam condensate system, waste heat recovery, fuel switching and an environmental management system. Following the investments energy efficiency at both refineries increased and fuel losses and own consumption reduced significantly. The project achieved an estimated 1,064,000 tons of CO₂ per annum reduction in carbon emission and led to savings of over 600,000 tons of oil equivalent.

5.6.3 Conventional generation

Throughout the world and the Bank's countries of operation fossil fuels are responsible for the bulk of energy supply for electricity and heat. This dependence is reflected in a stock of infrastructure, constructed over decades, for the conversion, transmission/transportation and supply of fossil fuel based energy. In the specific case of coal some of the Bank's countries of operations have no other indigenous fuel and no economically viable access to alternative fuels, including gas.

While much attention is rightly focused on the CO₂ emissions of fossil fuels their combustion, particularly in the case of coal, emits local pollutants, primarily sulphur dioxide, nitrogen oxides and dust. Similarly coal mining in the Bank's countries of operations is often a dangerous and polluting activity with significant shortfalls from best international practices in the areas of mine safety, remediation and wastewater treatment for examples. These factors have serious local health and environmental impacts which can be reduced through efficiency improvements and other investments.

Currently, the global efficiency of global coal-fired plants ranges from 20% to 45%, with an average of 33%.⁴³ Most plants in the Bank's countries of operations are in the lower end of the range, the outcome of a non-market oriented economy without adequate price signals to reflect the costs of this approach. As a result, there is significant potential to reduce emissions

beyond business as usual by replacing and upgrading existing plants with plants that may be 50% more efficient and hence emit 50% less CO₂.

One key contribution to achieving the worldwide required CO₂ emissions reductions is increasing the efficiency of the current fossil-fuelled generation fleet and switching from coal to gas for electricity generation. This is especially relevant in the timeframe of this Strategy as well as for the Bank's countries of operation which have an existing legacy of inefficient infrastructure assets. In the case of coal this is also particularly important; both to reduce emissions and to facilitate the introduction of CCS, since more efficient plant generates less CO₂ to be captured.⁴⁴ A key transition challenge for the Bank's countries of operations is therefore to improve the efficiency and reduce the carbon intensity of their generation infrastructure.

COMBINED HEAT AND POWER.

In many of the Bank's countries of operations, such as Russia, Ukraine, Kazakhstan or Mongolia, heat in the form of steam or hot water for residential use forms a key part of the energy sector. Centralised provision of heat from industrial boilers feeding a network of pipes and heat exchangers offers the opportunity to maximise the efficiency of heat provision through economies of scale. It also allows for the generation of electricity using heat from the same combustion process. Combined heat and power (CHP) technologies can achieve overall efficiency levels far above those that can be achieved through separate generation. However heat, unlike electricity, cannot be transmitted efficiently over long distances and accordingly CHP plants are typically located close to, or in, urban centres and are relatively small scale.

In the Bank's countries of operations the CHP sector is generally characterised by ageing infrastructure that has not received investment for several decades. The plants themselves are inefficient and emit high levels of local pollutants such as dust, an issue which is particularly serious given their proximity to residential areas. The heat distribution networks are likewise dilapidated, leaking and generally lack proper metering equipment to record and control consumption. This is wasteful in itself but also prompts consumers to switch to alternative, autonomous methods of heat generation, such as using electricity for space heating, which are even less efficient.

There is therefore significant scope for the Bank to improve energy and water efficiency and reduce local pollution, through rehabilitation and replacement projects in this sector. In doing so it will adopt a holistic approach, looking at the entire network from generation, through distribution to metering and supply, aiming to catalyse a transformed understanding of heat as a commodity that must be properly priced and carefully conserved.

The Bank will therefore support the introduction of the best available techniques to the fossil fuel sector, where this goes beyond the business as usual case and helps to shift the emission pathway of the relevant country. The Bank will also support fuel-switching from coal to gas where this is realistic. Through a combination of targeted investments of this nature and policy dialogue to promote pricing that reflects resource and environmental costs the Bank will work towards the systemic transformation of the energy sector. The Bank anticipates that it will provide its financial support for greenfield coal power generation only on limited occasions.

While efficiency increases are fundamental to the low-carbon transition much of the infrastructure that is constructed now will still be in operation in 2050. In the particular case of coal, the Bank will assess whether any investments in coal-fired generation and associated infrastructure risk locking-in unsustainably carbon intensive infrastructure. It will do so by applying a tripartite test:

- The infrastructure being considered must be the *least carbon-intensive* of the realistically available options. For the country where the project is located the Bank will assess the

full range of options to meet that country's energy needs. This range will include energy efficiency, possibilities for energy imports, renewable energy generation and other fossil-fuelled options. The Bank will only support a coal project if it is the least carbon intensive of the range of options that can realistically meet the energy needs.

- The infrastructure must be implemented in accordance with the highest standards. In the case of new build plants this means compliance with the IED, which, as described in Section 5.5.1, imposes both limits on emissions of local pollutants and the application of best available techniques. An important component of the reference documents which define BAT is an efficiency guideline which in turn ensures the lowest practically available carbon intensity. Similarly rehabilitation projects must achieve significant efficiency gains, again measured by reference to the best available techniques standard.
- The plant must also comply with the IED requirements in relation to carbon capture and storage readiness. Accordingly for all large new plants the sponsor must assess the availability of storage sites and the technical and economic feasibility of retrofitting carbon capture equipment and transporting the captured CO₂. If this assessment is positive then sufficient space provision must be made on the site to allow CCS equipment to be retrofitted.

In addition the Bank will incorporate into its analysis an assessment of the impact of a shadow price of carbon on the sustainability of the investment. Taken together this approach is intended to ensure that the important benefits of improving efficiency and environmental performance in the short and medium-term are realised while also mitigating long-term carbon intensity.

5.7 Setting standards and best practice

5.7.1 Closing the gap

Section 4.3 identified the command economies' legacy of waste of environmental, economic and human capital and the transition challenge of achieving best international practice. In some cases this will mean supporting the introduction of more rigorous regulatory requirements and supporting their entrenchment as the new market standard. In other cases this will mean developing mechanisms that reward best practice, in particular through pricing that reflects the social and environmental costs of energy sector activities. Specific opportunities the Bank will pursue are set out below.

Responsible exploration and production. The Bank will support exploration and production of oil and gas by applying the best international EHSS standards while unlocking the potential for economic growth and development of the value chain. The Bank will focus on supporting companies in identifying, avoiding and mitigating environmental and social impacts of their activities. In doing so it will both improve the specific behaviour in that context and demonstrate to the market the economic viability and rewards of adopting these standards.

One new area for the Bank in this context is the possibility of supporting production of unconventional oil and gas, an industry described in more detail in Section 3.4. Outside of the United States this is still an industry in the earliest stages of development and so the Bank expects very limited engagement in this sector in its countries of operations in the Strategy period. The Bank will consider an approach in this area that achieves transition impact,

subject to compliance with domestic legislation and the highest international standards as well as the Bank's Environmental and Social Policy and its related Performance Requirements.

Entrenching best practice. The implementation of best EHSS practices is particularly important in the energy sector because of the scale of potential environmental and social impacts. For small and medium sized companies one challenge is that they will generally not have the skills or the financial resources of larger companies, the lack of which may impair EHSS performance. Similar issues also arise in thermal coal mining and the Bank's approach to this area is set out in detail in the Mining Operations Policy. In its approach, the Bank will aim to strengthen companies' corporate structures to help them allocate capital and meet the best EHSS standards. The Bank will further support the application of these standards, and their establishment as market norms, throughout the energy sector, including electricity generation, refining, and energy transportation, distribution and supply. In EU member states and parties to the ECSEE this will include supporting companies in meeting the challenge of large investments in the power sector required to comply with the environmental standards set out in the IED and the EU Large Combustion Plants Directive.

PETROM ENVIRONMENTAL LOAN.

In 2009, the Bank arranged a syndicated loan of EUR 231 million (USD 300 million) to the largest Romanian oil and gas group to implement a company-wide environmental improvement programme designed to remedy past liabilities and enhance the environmental performance of its facilities in Romania. Similar projects had already been undertaken in Russia and had been evaluated successful, providing important guidance and lessons to this operation.

The Project was designed to finance a series of environmental individual sub-projects. The Project is already well advanced and the various sub-projects currently being financed have significant environmental and social benefits, including remediation of legacy wastes, upgrades of a waste water treatment plant to expedite compliance with EU discharge limits, rationalisation of field production facilities thereby returning land back to original use and lowering the number of in field flow lines and associated leaks. This project helped the group to close or otherwise abandon over 10,000 wells with potentially more than 10,000 ha of land taken out of operation activities and returned to original use. This is a substantial reclamation effort for any international oil company.

This project still provides a very visible demonstration effect to persuade other central and eastern European resource companies to openly acknowledge environmental weaknesses and undertake comprehensive and long term remediation programmes.

5.7.2 Nuclear safety

The role of nuclear power both in the energy mix and in meeting rising electricity demand is discussed differently in all countries of operations. While the use of nuclear energy has been reconsidered in some countries following the Fukushima Daiichi event in March 2011, others remain committed to it as a low-carbon source of baseload power.

Across the Bank' region, nuclear power remains an important component in the energy mix, including in Armenia, Bulgaria, Hungary, Russia, the Slovak Republic, Slovenia and Ukraine. Most of these countries operate nuclear power plants of Soviet design, which have been in operation since the seventies and eighties, and are planning to extend the operation of existing reactors. Some countries are also pursuing plans for new units or reactors.

In the nuclear sector, it is an important principle that nuclear safety standards are constantly reviewed in light of new technical experience and in line with international best practice.

Safety is of paramount importance in all aspects of the use of nuclear energy. The Bank hence promotes adherence to accepted international safety standards as defined by the IAEA and identifies continuing transition potential in demonstrating best practice in nuclear safety, decommissioning and radioactive waste and spent fuel disposal and in promoting sound and independent nuclear regulation. This is based on the scale and importance of the nuclear sector in certain of its countries of operations, the Bank's established presence in the sector and the patent importance of supporting a transition towards best practice in both the management and regulation of nuclear risks.

The Bank therefore remains committed to its approach to the nuclear sector outlined in the 2006 Energy Operations Policy. While the Bank will not provide funding for the construction of new nuclear power plants it will continue to consider funding for safety improvements of operating plants as well as for radioactive waste management and decommissioning of nuclear facilities. It will continue to use its projects to promote efficient nuclear regulatory frameworks, including independent, competent and well-resourced nuclear regulatory authorities. It will also continue to administrate donor funds which are aimed at improving nuclear safety and at safely mitigating the legacy of past nuclear operations in its countries of operations.

5.7.3 Transparency and good governance in the hydrocarbon sector

There are important benefits which may flow where governments follow an internationally recognised transparency standard that demonstrates commitment to reform and anti-corruption, including improvements to the tax collection process and enhanced trust and stability in the mining sector. Companies also benefit from a level playing field in which all companies are required to disclose the same information. A further benefit is an improved and more stable investment climate in which companies can better engage with citizens and CSOs. Citizens and civil society benefit from receiving reliable information about the sector and a multi-stakeholder platform where they can better hold the government and companies to account.

The Bank will accordingly support the implementation of transparency and good governance across the energy sector. This will cover both the public and private sectors, ranging from transparency over hydrocarbon revenues, through implementation of IFRS and associated auditing procedures in socially owned enterprises to encouraging best corporate governance in major energy companies. The guiding principle is that well-functioning markets depend on the transparent and rapid communication of accurate information as well as established principles of corporate governance.

EITI. The EITI principles and criteria have remained the reference for the disclosure of payments in the extractive industries, as the rules for the application of EITI have evolved, most notably in 2013. A smaller set of clearer requirements were developed, while a stronger focus on national ownership of reform efforts, and the participation of civil society organisations and companies through the establishments of national multi stakeholders groups which decide how their EITI process should work. The Bank is committed to adhere to best governance, transparency and revenue management standards by requiring its clients to implement the principles and criteria of the EITI. The Bank will continue to adapt its approach as improvements are made to the EITI principles and criteria and to engage actively with the EITI Secretariat to contribute to improving the EITI principles and criteria from the inside.

Disclosure. Under Section 1504 of the Dodd-Frank Act the final rule issued by the Securities and Exchange Commission (SEC) in August 2012 made reference to the EITI and its reporting requirements, with some differences in the reporting requirements. Under the SEC rule, certain oil, gas, and mining companies are required to disclose certain payments to governments once a year, including details of all payments that equal or exceed USD 100,000 individually or in aggregate, broken down by country and by project. The new disclosure requirements announced by the European Commission in April 2013 will impose similar obligations on EU companies, with a disclosure threshold of EUR 100,000, and a required break down by governments, by country and by project. There are some small differences between the three disclosure standards (EITI, US and EU), including the list of the types of payments which must be disclosed. The Bank will require the most stringent level of disclosure that is outlined in the EITI principles, the SEC rule and the EU directives from its clients in the upstream oil and gas sector as a minimum revenue transparency obligation. This goes beyond what the Bank required in the existing EOP. In particular, the Bank will require such disclosure from clients operating both in countries that have adopted EITI and have not adopted the EITI principles and criteria.

Implementation. The Bank is committed to go beyond the application of the EITI principles and criteria by encouraging endorsement of EITI where governments have yet to do so and support the implementation of EITI in countries which have adopted the principles. Overall improving transparency in the extractive industries depends on the internal expertise acquired by governments for effective policy formulation and governance at various stages of the decision chain, including the collection and disbursement of data. It is widely recognised that these deficits may be overcome by a combination of capacity building and acquired expertise from a trusted source or institution – see for example, the Natural Resource Charter. The Bank has had a successful experience in such capacity building by enabling Mongolia to effectively implement and sustain the global standards of the EITI. The Bank provided training and capacity building to the Mongolian institutions responsible for implementation, and drafting of an EITI law. The Bank will seek to replicate this successful programme in other countries of operations and will also support wider capacity building on good governance and transparency. Such implementation efforts will contribute to a further institutionalisation of the good governance, transparency and the EITI and move to the next level of implementation.

Stakeholder engagement. One key component of transparency in the extractive industries is stakeholder engagement. The EITI plays an important role by allowing the public to access information on extractive projects. However although publicly available this information is often difficult to access and understand by project-affected people. The Bank has an opportunity to play an important role in disseminating information on its projects to local communities and stakeholders. The Bank will support outreach and training events for EITI to allow for the access of information to CSOs and local communities and to act as an honest broker in the dialogue between governments, companies and CSOs as to the implementation of EITI and wider good governance and transparency principles in relevant countries of operations.

5.8 The wider role of the energy sector

The scale and pervasiveness of the energy sector also means that it has significant influence on wider social and economic activity, whether this be through its environmental and social impacts, pricing influence or as a large employer. Energy companies are typically amongst the largest and most high profile companies in any country. Many energy activities,

especially hydrocarbon extraction, that take place in remote, underdeveloped locations, generate significant employment and create demand for a range of service businesses. Accordingly supporting these companies and influencing their behaviour has the potential for significant transition impacts both by virtue of their scale and through demonstration effects. By financing large energy projects the Bank may also support local businesses and promote inclusiveness in local communities.

The Bank will seek to promote local entrepreneurship, set commercial or environmental standards and link local businesses with partners and financial institutions. In particular the Bank will leverage the significant role of the energy sector in any economy to promote the goals of the Strategic Gender initiative, by both better understanding any gender differentiated priorities for, and use of, energy and promoting equal opportunities in the work place.

Access to energy is, in several of the Bank's countries of operations, imperfect: while electrification rates are high in almost all countries, in many cases, particularly in the SEMED countries, energy supply is unreliable, unpredictable and of poor quality. This diminishes quality of life and reduces economic opportunity. For example energy subsidy regimes typically benefit middle class consumers who have medium levels of energy consumption, thus consuming fiscal resources that could be deployed to help the poor, who often have negligible levels of consumption. Further, poor quality energy, or constraints on new supply, increase costs to businesses, discourages new entrants and generally dampens the growth of economies and employment. For example the Business Environment and Enterprise Performance Survey commissioned by the Bank and the World Bank shows that in countries which experience significant electricity disruptions 20-34% of businesses identify this as a major obstacle.⁴⁵ The Bank will therefore support projects that ensure a sustained, reliable and high quality supply of energy.

The Bank recognises that different sections of the community use energy differently and that therefore the impacts, both positive and negative, of sector reforms and the Bank's projects are unlikely to be uniform but to be differentiated by reference to characteristics such as gender, age, wealth and whether urban or rural. The Bank will take account of this differentiation in its project assessment and, where appropriate, will include in its activities, awareness raising components to ensure that all sections of the community are properly informed and empowered in relation to their energy use.

5.9 Leveraging investments, policy dialogue and technical assistance

Over the years technical cooperation and policy dialogue have been recognised as fundamental to the Bank's business model and a vehicle to ensure its additionality. Previous experience shows that addressing transition gaps with targeted assistance and policy dialogue is critical to achieve transformational change in the region. This has also been recognized in the Bank's energy sector evaluation that not only highlighted that the development of regulatory frameworks, tariff reform and privatisation is essential to the success of investments but also that on-going policy dialogue and continued attention to sector reform is needed, particularly in early transition countries.

The sections above describe many of the areas where the Bank may use technical assistance and policy dialogue to achieve its transition goals. In most cases projects in these areas will be developed in response to discrete opportunities or project-related challenges. The Bank looks to leverage the credibility, relationships and knowledge it gains from its project work to

promote identified reforms through long-term policy dialogue. It also deploys technical assistance to help inform policy makers, turn policy decisions into actual implementation and build capacity amongst its public and private sector partners.

In some cases, the Bank will also establish an *integrated approach* drawing together additional resources, technical assistance and policy dialogue coordinated with a series of targeted investments to address specific transition gaps. The Bank will use this operational tool selectively where it identifies clear transition goals at the sector or country level, an indicative pipeline of projects, which can be shown to have a certain coherence, opportunities for related policy dialogue and technical assistance and a receptive environment.

Critically, the Bank will build on its successful experience and lessons learnt from supporting renewable energy legislation and regional trading (see for example Boxes in Chapter 2) applying this in other countries where appropriate. The Bank also expects to use policy dialogue as one tool to prepare new ground and enable future areas of investment such as for example in the area of demand side management. To support projects and strengthen impacts, the Bank will also continue to leverage financing from Climate Investment Funds, the EU Neighbourhood facilities and other sources, building on past experiences and using lessons from the currently on-going evaluations of projects and financing.

An important contributor to this work is the Bank's Legal Transition Team, which has dedicated resources for the areas of infrastructure and energy efficiency as well as working closely on the EITI agenda described above. The expertise and long-term engagement of this team is important in building the transparent and stable regulatory environment that the sector requires.

Achieving these expected results will depend crucially on strong partnerships with external stakeholders (see the following section). The Bank will therefore strengthen existing and develop new partnerships and also use the breadth of existing experience for example gained through the SEI or the Legal Transition Programme to deliver these initiatives.

The Bank will also entrench this business model by initiating and pursuing overarching initiatives, which will likely be structured as integrated approaches. As outlined above, the Bank will choose the initiatives to pursue on the basis of opportunities that arise over time but some areas it expects to focus on are:

- *Supporting the EITI.* Building on existing projects in Mongolia and Kyrgyzstan, the Bank will improve the practical implementation on the ground of the EITI in other countries of operations, focussing not just on the adoption on paper of this standard but also building the institutional capacity to implement it.
- *Laying the foundations for CCS.* As described in Section 5.5.3 a long-term perspective on the low-carbon transition reinforces the importance of laying the foundations in the coming years of enabling frameworks for CCS. The Bank will both identify physical opportunities for transport and storage of CO₂ and promote the necessary regulatory framework to allow for this.
- *Regulatory best practice.* This initiative will promote best practice in different aspects of energy markets regulation based around the principles of transparency, independence, objectivity and predictability. It may include exchanges between regulators within the Bank's region as well as peer-to-peer policy dialogue between regulators from countries

and non-countries of operation to exchange knowledge, build capacity and ultimately strengthen regulatory frameworks.

- *Gas Flaring.* The Bank is already an active participant in the Global Gas Flaring Reduction Partnership and has supported some important projects that specifically aim at gas flaring reduction. Gas flaring is a particularly serious instance of resource inefficiency and the Bank's countries of operations are among the world's largest contributors to flaring-related GHG emissions. The Bank will therefore engage in a coordinated policy dialogue initiative in relevant countries of operations to promote regulatory frameworks that both restrict flaring and facilitate utilisation of associated gas.
- *Demand Side Management.* Section 5.1 outlined how distribution and supply companies are now in the frontline of the drive for greater energy efficiency. There is considerable potential to work through these companies to promote efficiency in their customers. Existing regulatory frameworks do not easily accommodate new demand side models. There is therefore a particular need for working with regulators, governments and investors in a number of countries of operation to promote regulatory frameworks that accommodate the changing nature of managing demand.

5.10 Key partners

Strong partnerships and cooperation are vital to achieve the Bank's mandate given the scale of the challenge. Therefore, the Bank will continue its close cooperation with multilateral partner institutions such as the EIB, WB/IFC, AfDB, ADB and IDB, both in co-financing investments but also in coordinating policy dialogue and assistance activities in countries of operations.

Similarly the Bank will work closely with bilateral institutions and export credit agencies (including KfW, AfD, JBIC and OPIC). There are economies of scope in combining the complementary strengths of the different institutions in policy dialogue, technical expertise and financial capacity. This is especially relevant for the joint implementation and leveraging of Climate Investment Funds and the work through the EIB/EBRD joint Multilateral Carbon Credit Fund. Another intrinsic part of such cooperation is the exchange of information about challenges faced and lessons learnt in particular countries and circumstances.

IFI coordination and cooperation is particularly important for the SEMED countries where the Deauville Partnership is a key forum for coordination with other bilateral and multilateral actors. Alongside this engagement, the Bank expects to expand and build new partnerships in the SEMED region, including with regional cooperation funds and regional bilateral institutions.

The Bank will also continue close dialogue and cooperation with the EU and its institutions, including the leveraging of funds and blending facilities in its investments available through the EU Neighbourhood Facility, Western Balkans Investment Facility and Investment Facility for Central Asia. In the Western Balkans, Moldova and Ukraine, the ECSEE will continue to be a key partner in building stronger energy markets and achieving the implementing of more demanding environmental standards.

Given its focus on achieving results through the private sector and through improving market frameworks, the Bank has naturally established good partnerships with private stakeholders, regulatory bodies, governments and donors. The Bank expects to strengthen those

partnerships which are important to maintain the continuous dialogue needed for achieving results and also for delivering the forthcoming key initiatives.

Another important partnership is the on-going dialogue between the Bank and civil society organisations which helps the bank both receive relevant input on its investments and strategies and ensures its awareness of the full range of concerns and opportunities. The Bank is committed to seeking CSO input and utilising CSO expertise in responding to the complex challenges ahead.

5.11 Strategic Orientation

5.11.1 The Bank's working approach

Section 4 of this Strategy defined the Bank's role in the energy sector, while the preceding paragraphs set out the range of tools and operational approaches the Bank may employ in carrying out that role. This Section 5.11 sets out the strategic framework which will guide the application of that "toolkit" to the Bank's role and goals.

The Bank's working approach is based on a dynamic response to market demand as circumstances create scope to achieve transition impact. The energy sector has certain characteristics which require an approach that looks beyond an individual project to take into account the development of the entire system: assets are capital intensive and long-lived and the sector is a network of interrelated assets whose operations are closely linked.

The Bank periodically prepares for each country of operations a country strategy which sets strategic orientations for the Bank in the energy sector in that country. The Bank defines these targets by reference to the transition gaps identified for that country, taking into account its natural endowment, degree of interconnection and the existing structure of its energy sector. The Bank also identifies transition goals on a regional level, which is particularly relevant for the energy sector given the importance of cross-border trade.

Although the detailed strategic priorities for each country of operation are therefore defined in the relevant country strategies this Strategy identifies certain broader priorities that will shape their preparation and guide the direction and focus of the Bank's operations in the energy sector. Given the breadth of the energy sector and the very different characteristics of more than 30 countries of operations the Bank does not set the same priorities for all countries of operation, other than an overarching focus on energy efficiency, but does identify certain priorities for categories of countries that share certain common characteristics. The prioritisation is not absolute or exclusive; the Bank may pursue projects that are not identified here as priorities in response to changing circumstances or unexpected opportunities.

5.11.2 Strategic priorities

The Bank will prioritise **energy efficiency** across all its countries of operations. The basis for this prioritisation is the importance of energy efficiency in reducing carbon intensity, improving competitiveness and mitigating affordability pressures. In addition this prioritisation responds to one of the defining characteristics of the Bank's countries of operations, namely their legacy of assets and market structures which have systematically underpriced energy and which remain very inefficient. More focused priority areas for specific categories of countries are as follows:

- **Energy producers:** For those countries of operations with significant energy resources the Bank's priority is ensuring the responsible development of those resources, and in particular ensuring that their extraction is managed in a way which strengthens the value chain and uses best environmental, social and operational standards.
- **EU Member States and candidate countries:** The EU energy sector legislation sets the Bank's agenda for those countries which are EU Member States or candidate countries for EU membership. This prioritises a low carbon transition, unbundling, market coupling and promoting security of supply.
- **Small, isolated markets:** Some of the Bank's countries of operations have small, isolated energy systems where liberalisation and competition is harder to implement. In these countries the Bank prioritises the effectiveness of regulation and tariff mechanisms, recognising that cost-reflective pricing may have to be achieved through transparent tariff mechanisms rather than market pressures.
- **State-dominated sectors:** As the Bank's assessment of transition gaps indicates the energy sector in a number of its countries of operations remains largely or completely dominated by the state sector. In these countries the Bank attaches the highest priority to enabling and supporting private participation, followed by the commercialisation of state-owned enterprises.
- **Regional Markets:** For those countries of operations which are important transit countries or which have unutilised scope for the import or export of energy, the Bank prioritises the development of interconnections, recognising the importance of cross-border energy trade in promoting markets and liberalisation.

5.11.3 Operational performance indicators

The Bank has identified five key indicators which it will track in order to measure the progress of its countries of operations towards the transition end goal of a market-oriented energy sector. The Bank has selected these indicators on the basis that they are measurable, comparable over time, reflect key transition goals for the energy sector and are outcomes rather than inputs. Given the Bank's working approach it does not expect necessarily to be able to show clear causal links between its activities and these indicators. In addition the nature of the energy sector is such that systemic changes take time to manifest themselves in outcomes. However improvement or otherwise in these indicators will allow the Bank's stakeholders to evaluate whether and where the Bank's activities are correlated with transition progress. The five indicators selected are intended to capture the full spectrum of the Bank's transition goals:

- **Private participation:** the percentage of a country's energy sector assets owned by parties other than the government or government owned entities.
- **Cost reflective pricing:** the proportion of domestic energy prices, weighted by domestic consumption, that is either liberalised or if regulated at levels that do not imply any pre-tax subsidies.
- **Energy efficiency:** the energy intensity of the country, measured as total primary energy consumption per unit of GDP, adjusted for purchasing power parity.

- ***Carbon intensity***: measured as CO2 emissions per unit of GDP, adjusted for purchasing power parity.
- ***Interconnections/energy trade***: measured as the proportion of energy exports over total energy production, proportion of energy imports over total energy consumption and aggregate interconnection capacity.

The Bank will measure and report these key metrics for each country of operation by the end of 2013. They will be measured again following the conclusion of the Strategy period during the process of preparation of the next Energy Strategy. The Bank will also issue a brief commentary on these metrics, identifying non-quantitative areas of improvement or otherwise in the same areas.

ANNEX 1 –ACTIVE DONORS AND MULTI-DONOR FUNDS

European Union
Australia
Austria
Belarus
Belgium
Canada
Czech Republic
Denmark
Estonia
EU
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Kazakhstan
Korea
Latvia
Lithuania
Luxembourg
Netherlands
Norway
Poland
Portugal
Russian Federation
Slovak Republic
Slovenia
Spain

Sweden
Switzerland
TaiwanICDF
Ukraine
United Kingdom
USA

Central Asia Risk Sharing Investment Special Fund
Clean Technology Fund
Climate Investment Fund
Eastern Europe Energy Efficiency and Environment Partnership
EBRD Early Transition Countries Fund
EBRD Shareholder Special Fund
EBRD Water Fund
ETC Local Currency Risk-Sharing Special Fund
European Commission Neighbourhood Investment Facility
European Western Balkans Joint Fund
Financial Intermediary Investment Special Fund
Global Environment Facility
Green Carbon Fund
MENA Transition Fund
Multilateral Carbon Credit Fund
Northern Dimension Environmental Partnership Support Fund
Southern and Eastern Mediterranean Multi-Donor Account
The Russia Small Business Fund

ANNEX 2 – ASSESSMENT OF TRANSITION CHALLENGES

The below section shows the table sector transition indicators for the energy sector, as well as the Assessment of Transition Challenges (ATC) for both the power and energy utilities sector and the oil and gas sector, on a country by country level

TABLE 2: Transition indicators in the energy sector

	Power and energy utilities sector		Oil and Gas sector		Sustainable Energy	
	Market Structure	Market Institutions	Market Structure	Market Institutions	Market Structure	Market Institutions
Central Europe and Baltics						
Croatia	Large	Medium	Small	Small	Medium	Medium
Estonia	Small	Negligible	Small	Negligible	Medium	Medium
Hungary	Medium	Small	Small	Small	Medium	Small
Latvia	Medium	Negligible	Medium	Negligible	Medium	Small
Lithuania	Medium	Small	Medium	Negligible	Medium	Small
Poland	Medium	Negligible	Medium	Medium	Medium	Small
Slovak Republic	Small	Small	Small	Small	Medium	Small
Slovenia	Medium	Small	Small	Small	Small	Small
South Eastern Europe						
Albania	Medium	Medium	Medium	Medium	Small	Medium
Bosnia and Herzegovina	Large	Large	Large	Large	Large	Large
Bulgaria	Medium	Medium	Small	Medium	Large	Small
FYR Macedonia	Medium	Medium	Medium	Medium	Large	Medium
Montenegro	Large	Medium	Small	Medium	Large	Medium
Romania	Medium	Medium	Small	Small	Medium	Small
Serbia	Large	Large	Medium	Large	Large	Medium
Turkey	Medium	Medium	Medium	Small	Medium	Medium
Eastern Europe and Caucasus						
Armenia	Medium	Medium	Medium	Medium	Medium	Medium
Azerbaijan	Large	Large	Large	Medium	Large	Large
Belarus	Large	Large	Large	Large	Large	Medium
Georgia	Small	Medium	Large	Large	Medium	Large
Moldova	Medium	Large	Medium	Medium	Large	Small
Ukraine	Large	Large	Large	Large	Large	Small
Russia	Medium	Medium	Large	Large	Large	Medium

Central Asia						
Kazakhstan	Large	Medium	Medium	Large	Large	Large
Kyrgyz Republic	Medium	Large	Large	Medium	Large	Large
Mongolia	Large	Large	Medium	Large	Large	Medium
Tajikistan	Large	Large	Large	Large	Large	Large
Turkmenistan	Large	Large	Large	Large	Large	Large
Uzbekistan	Large	Large	Large	Large	Large	Large
Southern and Eastern Mediterranean Region						
Egypt	Large	Large	Large	Large	Large	Medium
Jordan	Medium	Medium	Large	Medium	Large	Medium
Morocco	Large	Large	Large	Large	Medium	Medium
Tunisia	Large	Large	Large	Large	Large	Medium

Note: Kosovo became a country of operation on 17 December 2012. An assessment of transition challenges will be available in autumn 2013.

ENDNOTES

- ¹ Data refers to the period from the first quarter 2006 to the first quarter of 2013 (if not otherwise specified).
- ² An additional 35 operations were signed in the equivalent period by the Bank but were not individually transition-rated. These fall under the frameworks that are only monitored on a facility level (in particular, Western Balkans Sustainable Energy Direct Financing Facility (WeBSEDF)) or represent extensions to existing projects that do not bear incremental transition impact. The total number of 128 rated operations also includes 4 projects that were signed but later cancelled; as these projects may still have achieved some transition impact despite their cancellation, they are included in the transition analysis. Finally, there were two extensions of financing under existing projects originally signed before 2006; these are not rated and counted as new from the transition perspective.
- ³ See <http://www.ebrd.com/pages/research/economics/transition.shtml> for transition impact assessment and monitoring methodology.
- ⁴ Advanced countries: Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia.
- ⁵ Early and intermediate countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, FYR Macedonia, Mongolia, Montenegro, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Romania, Serbia, Montenegro, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Turkey and Russia.
- ⁶ Retroactive changes in this context mean changes to the support regime, which would apply to investments, that had already been made by the date the regulation came into force.
- ⁷ SEMED Region: Egypt, Jordan, Morocco and Tunisia.
- ⁸ Decision of the Conference of the Parties to the United Nations Framework Convention on Climate Change 1/CP.18, paragraph I(1).
- ⁹ IPCC (2007). *Climate Change 2007: Mitigation of Climate Change. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- ¹⁰ Ibid.
- ¹¹ EU ETS prices averaged 7.37 EUR/TCO₂e in 2012. Source: Simple average of EUA Daily Phase 3 Futures Contract settlement price as traded on ICE Futures Europe, as reported by Bloomberg.
- ¹² More information on the EBRD PETER (Preparedness for Emissions Trading in the EBRD Region) project in Ukraine and Kazakhstan is available at <http://www.ebrdpeter.info/index.html>.
- ¹³ BP Statistical Review of World Energy 2012.
- ¹⁴ Ibid.
- ¹⁵ Oxford Institute for Energy Studies, Simon Pirani (2012), *Central Asia and Caspian Gas Production and the Constraints on Export*, p.109.
- ¹⁶ US EIA Natural Gas Annual released 2013.
- ¹⁷ Bloomberg Finance LP (2013), *Cajun roulette: US LNG exports in a global context*.
- ¹⁸ International Gas Union, World LNG Report, 2011.
- ¹⁹ Ibid.
- ²⁰ European Commission (2012), *Connecting Europe. The energy infrastructure for tomorrow*. p.3.
- ²¹ From 1980 to 2011 the world produced more oil (795 billion barrels) than total estimated reserves in 1980 (683 billion barrels), while 1,774 billion barrels were added to total reserves. (Source: John Mitchell, *What Next for the Oil and Gas Industry?* (2012), Royal Institute of International Affairs, p.30).
- ²² Ibid

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- 23 United Nations Development Programme (2012). Energy and Arab Economic Development. Bassam Fattouh and Laura El-Katiri. Arab Human Development Report Research Paper.
- 24 IEA Fossil Fuel Subsidies Database 2011.
- 25 International Energy Agency (2012). World Energy Outlook 2012. Pp 514-516.
- 26 World Energy Trilemma. Time to get real – the case for sustainable energy policy. The World Energy Council, 2012.
- 27 The Stern Review: the Economics of Climate Change, 2006.
- 28 EU COM (2011) 571.
- 29 See for example Figure 5 in the SRI.
- 30 Energy Subsidy Reform: Lessons and Implications. International Monetary Fund, January 2013.
- 31 Jobs for Shared Prosperity, Time for Action in the Middle East and North Africa. World Bank, 2013.
- 32 International Energy Agency (2012). World Energy Outlook 2012. Pp. 252-253 and Figure 8.7. The reduced role in subsequent years reflects the expectation that in the later period renewable energy and carbon capture and storage will play an increasing role.
- 33 Financing Sustainable Energy: EBRD Action and results, available at: <http://www.ebrd.com/downloads/research/brochures/sei.pdf>
- 34 Although there often does not exist a clear dividing line between supply and demand side energy efficiency opportunities, the Bank's approaches are for presentational purposes separated into demand and supply side focussed activities.
- 35 Please refer to the Agribusiness Sector Strategy, <http://www.ebrd.com/downloads/policies/sector/agri.pdf>, the Agribusiness Sustainable Finance Facility (ASFF), <http://www.ebrd.com/downloads/research/factsheets/agriSIF.pdf>, and the Bank's Manufacturing and Services Sector website <http://www.ebrd.com/pages/sector/manufacturing.shtml>.
- 36 Please refer to the Bank's Municipal and Environmental Infrastructure Sector Strategy <http://www.ebrd.com/downloads/sector/mei/mei.pdf>, (BDS12-126).
- 37 Please refer to the Bank's forthcoming Transport Strategy (to be finalised in autumn 2013) and (CS/FO/13-01 (Add 1)).
- 38 International Energy Agency (2012). World Energy Outlook 2012. Annex A, pp.554-555.
- 39 International Energy Agency (2012). World Energy Outlook 2012. P 216.
- 40 More details of the NER300 programme are available at http://ec.europa.eu/clima/policies/lowcarbon/ner300/index_en.htm.
- 41 Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control).
- 42 Methane has a global warming potential 21 times greater than CO₂ over a 100 year time horizon. See: http://unfccc.int/ghg_data/items/3825.php.
- 43 IEA, Technology Roadmap, High-Efficiency, Low-Emissions Coal-Fired Power Generation.
- 44 IEA, Technology Roadmap, High-Efficiency, Low-Emissions Coal-Fired Power Generation.
- 45 EBRD/World Bank. Business Environment and Enterprise Performance Survey, 2009. Available at: <http://www.ebrd.com/pages/research/economics/data/beeps/beeps09.shtml>.