

Level 2: The Bank's contribution to the energy sector

This chapter sets out the Bank's contribution to Africa's energy needs, looking at policies, strategies and investments to increase access to affordable and reliable energy. We show how our programmes have developed over recent years, with a shift towards clean and renewable energy and a focus on increasing energy efficiency. We also describe how we have fostered regional cooperation and strengthened governance and energy sector reforms. Finally, we explain our efforts to help African countries attract increased finance into the sector, particularly from private sector investors.

To assess the Bank's contribution to Africa's energy sector, we will build up our results from the project level. In Level 2 of our Results Measurement Framework for energy operations, we have 15 indicators that aggregate outputs from Bank projects that closed between 2009 and 2013 and for which we have Project Completion Reports. We also look at the results expected in 2014–18 from ongoing projects, giving us a 10-year period of analysis. To help explain these results, we provide examples of our energy projects at work. Lastly, we review some of the lessons learnt from implementing energy projects.

The evolution of our energy policy

The Bank's Energy Sector Policy (1994) set the framework for our support to Africa's energy sector over the last 20 years. Our overriding aim was to strengthen the capacity of African countries to meet the energy needs of businesses, public services and households. In addition, in the policy the Bank committed to develop energy infrastructure in a sustainable manner, with close attention to the efficient management of resources, protection of the environment, and cooperation at the regional and international levels.

In the first phase of implementing this policy, the Bank concentrated on energy sector reforms and capacity development, with the aim of attracting the private investment needed to develop the physical infrastructure. We recognised that inefficient pricing policies, poor management and lack of maintenance had led to major inefficiencies and had limited the development of new generation and distribution capacity in the public sector. Further, a lack of regional planning and cooperation had prevented the rational expansion of energy supplies across the continent. We therefore focused our efforts on supporting this ambitious reform agenda.

After a few years, however, it became clear that private sector investment in the energy sector was not forthcoming. In fact, most African economies were becoming increasingly dependent on importing petroleum products for energy as a substitute for electricity – a stopgap measure that is both expensive and environmentally unsustainable. We therefore decided to support

our regional member countries by scaling up our activities in the energy sector and investing our resources in major infrastructure development across the continent.

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In recent years, as we learned more about the causes and impacts of climate change, we established the Financing Energy Services for Small-Scale Users scheme to help build a pipeline of investment projects in renewable energy and energy efficiency. In line with our Clean Energy Investment Framework for Africa 2008, we increased our focus on renewable energy generation, security and greater efficiency. In 2009, the Bank established a Climate Change Risk Management and Adaptation Strategy, which set out how we could help African countries build their resilience in the face of more frequent climate changes.

A new Energy Policy launched in 2012 pulled together the various strands of our updated approach to supporting Africa's energy sector, based on recent experience and learning. The new policy sets out how we will assist African countries to provide their populations and productive sectors with access to modern, affordable and reliable energy services, and to develop their energy sectors in ways that are increasingly sustainable – socially, economically and environmentally.

Table 2: How the Bank contributes to energy sector development in Africa (Level 2)

This table presents the contribution the Bank is making to development through its energy operations, showing expected and actual achievements for all operations that have been completed.

- Bank operations achieved 95% or more of what was expected at the beginning;
- Bank operations achieved 60%–94% of what was expected at the beginning;
- Bank operations achieved less than 60% of what was expected at the beginning;
- Data are not available to measure performance.

INDICATOR	2009–2013			2014–2018
	Expected	Delivered	Percentage delivered	Expected
INCREASING ACCESS TO MODERN ENERGY				
● Transmission and distribution lines rehabilitated or installed (km)	15 300	15 900	104%	40 500
● Distribution substations and transformers constructed or rehabilitated (number)	1200	1900	158%	11 800
● Power capacity installed (MW)	2100	1900	91%	4300
● People with a new electricity connection (people)	222 000	567 000	255%	1 100 000
● People benefiting from improved electricity connections (people)	13 000 000	14 300 000	111%	33 700 000
PROMOTING CLEAN ENERGY				
● CO ₂ emission reduction (tCO ₂ -equiv/yr.)	523 000	523 000	100%	12 200 000
● Renewable energy capacity installed (MW)	325	324	100%	1562
FOSTERING REGIONAL ENERGY COOPERATION				
● Cross border transmission lines constructed or rehabilitated (km)	470	465	99%	734
● Amount of energy traded in multinational projects (MW)	78	78	100%	..
STRENGTHENING GOVERNANCE IN THE ENERGY SECTOR				
● Staff trained in / recruited for the maintenance of energy facilities (people)	1700	1700	100%	2400
● Doing Business-Getting Electricity (days)	53 ^A	45 ^A	115%	..
● Total jobs created for investee projects and sub-projects (number)	6300	6300	100%	22 000
● Total jobs created for women (number)	1000	1000	100%	1100
● Population reached (people)	1500	1500	100%	20 000 000
ENERGY POVERTY				
● Social facilities constructed or rehabilitated (number)	140	140	100%	480

^A In countries the Bank engages in; km = kilometers; MW = megawatts; .. = Data not available.

Source: African Development Bank

In the four decades preceding 2008, the Bank invested over \$13 billion (12% of its investments) in Africa's energy sector

Increasing access to modern energy

In the four decades preceding 2008, the Bank invested over \$13 billion (12% of its investments) in Africa's energy sector, to increase access to electricity for people and businesses. Of these resources, 90% went towards increasing the generation and distribution of energy, with an emphasis on rural electrification. We also focused on interconnecting regional grids, developing

renewable energy sources and promoting national energy sector reforms. We have been working at both national and international levels, alongside governments and other donor partners.

Most of our projects include investments designed to increase access to electricity and promote affordable and reliable supplies. Some have focused primarily on distribution networks, helping to expand the grid to provide access across a wider geographical area. Overall, since 2009, our projects have rehabilitated or installed 15 900 km of ● **transmission and distribution lines**¹ and constructed or rehabilitated 1900 ● **distribution substations and transformers**.

¹ A green bullet indicates good progress has been made and we are on track to meet our target.

One of the Bank's flagship projects was Tunisia Electricity Project VII, which helped to expand the capacity of the power distribution system to meet increased demand. A steady increase in Tunisia's living standards through the early 2000s had generated an annual 12% increase in the demand for electricity, saturating parts of the distribution network and reducing the quality of the service. In line with Tunisia's 10th Five Year Socioeconomic Development Plan 2002–2006, we supported the installation and rehabilitation of more than 4800 km of transmission and distribution lines and nearly 1700 substations and transformers with 202 MW of capacity. As a result, over half a million people received new connections, and more than 5 million people benefited from improved service standards.

Another major investment in transmission and distribution networks will deliver electricity connections to 140 000 households in Burkina Faso at completion in 2015. Our Electricity Infrastructure Strengthening and Rural Electrification Project supports the government's plan to achieve countrywide coverage through a unified national grid linked by trans-border lines to the power systems of neighbouring countries, so that cheaper power can be imported. The project rehabilitates and extends nearly 1800 km of high voltage lines and accelerates rural and urban connections. It also installs pre-paid meters, strengthens institutional capacity and train operators, all of which will help reduce technical and commercial losses and lower the costs of power for consumers.

Besides providing benefits to households, the Burkina Faso project promotes public service delivery and business development. It will provide reliable power supplies for 272 schools and will also provide electricity to five cotton-producing areas, allowing the development of ginning and other processing plants.

Another key objective in our investments is boosting electric generation capacity. Since 2009, our projects have financed over 1900 MW of new **power capacity**, and we have plans to deliver more than double this amount in 2014–18. In Egypt, we funded the El Kureimat Combined Cycle Power Plant, which provides 780 MW of additional capacity, increasing national generation capacity by 3.2%. Besides providing new connections for 170 000 people, this strategic investment met the expanding electricity needs of key productive sectors—agriculture, industry, tourism and transport—that underpin Egypt's rapid economic growth. Furthermore, efficient exploitation of natural gas reserves, with light oil to be used in case of emergencies, will have a positive impact on the environment by reducing carbon emissions by well over half a million tonnes annually.

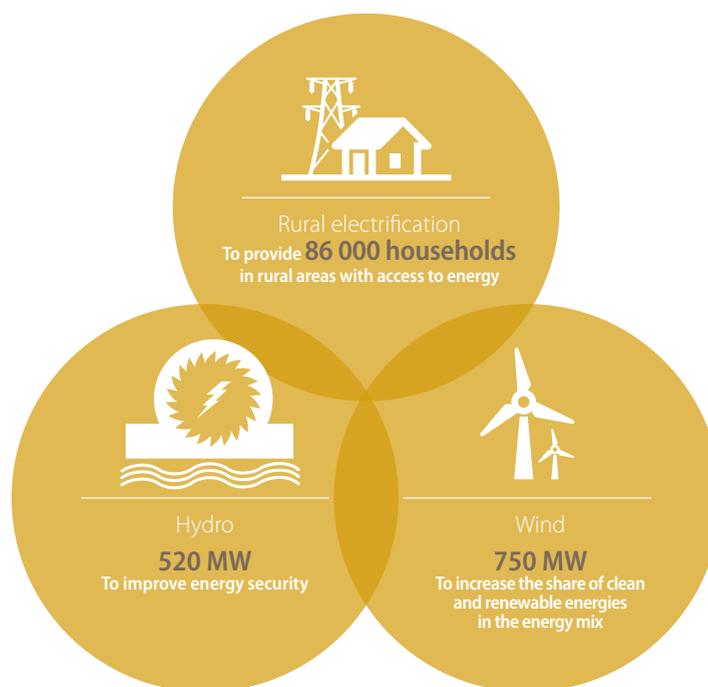
Overall, our support since 2009 has provided over 567 000 **people with a new electricity connection**. Cost efficiencies allowed us to exceed our target of 222 000 people. Over 14 million **people benefitted** from our energy investments, exceeding our target of 13 million. Having built up a robust pipeline of power sector projects, we expect to provide reliable and affordable electricity to an additional 33.7 million people in 2014–18.

Promoting clean energy

Clean energy has become an increasingly important part of the Bank's portfolio. We are helping to develop Africa's vast hydropower potential and other forms of renewable energy (see Figures 2.1 and 2.2 for examples) and to promote clean technologies such as gas-powered generating plants. We encourage our partner countries to mainstream clean energy into their national development plans, and through our Clean Energy Investment Framework we are helping them to secure funding from the Clean Development Mechanism. As a result, during 2009–13, our projects have financed the installation of 324 MW of **renewable energy** and are expected to install five times this capacity and achieve **emission reductions** equivalent to 12 million tonnes of carbon dioxide during 2014–18.

Since 2009, over 14 million people benefitted from our energy investments

Figure 2.1 Morocco integrated project



In Morocco, we are supporting an innovative investment in renewable energy—wind and hydropower—through a public-private partnership that will expand generation capacity, providing new electricity connections for 86 000 households in the 25 most remote and vulnerable districts. The combination of wind and hydropower is an efficient technical solution: when electricity consumption is low, surplus wind energy is stored by pumping water to a higher level in the storage power station, which can then be released through turbines when demand is high. This technology improves efficiency and lowers generation costs. This investment in clean energy avoids the release of 65 million tonnes of carbon dioxide over the life of the facility, while creating 4200 temporary jobs during construction and 700 permanent jobs in maintaining the wind farms.

For example, our investment in the Bumbuna hydroelectric power project in Sierra Leone transformed the lives of 55 000 people by providing them with sustainable electricity at barely a quarter of the cost of oil-fired power in Freetown. We financed a 50 MW hydroelectric power station, a 200 km transmission line, interconnection to the grid and a number of substations. The electricity opened up new opportunities for schools, health clinics and private-sector activity. It also reduced the need for expensive and environmentally harmful diesel fuel imports.

Figure 2.2 Full steam ahead with geothermal energy in Kenya



In Menengai, some 180 km northwest of Nairobi and on the eastern edge of Africa's geologically active Rift Valley, Kenya is making an exciting new investment in clean energy. The total project cost of \$740 million is supported by \$150 million from the AfDB and the Climate Investment Fund and co-financing from France, the European Investment Bank and the Kenyan government. This geothermal steam field project, expected to be completed in 2017, will help to meet Kenya's growing demand for energy in an environmentally sustainable manner.

Source: USGS

In Morocco, we have invested in a combined thermal and solar power plant at Ain Ben Mathar, increasing the country's clean energy generation capacity by 472 MW. The plant will produce 33 500 fewer tonnes of carbon dioxide than a heavy oil-powered plant. The investment required drilling to access water, which is now available to irrigate local agricultural land. The access road to the plan also enables local people to reach services and markets. The project itself

employed 500 people, while the demand for support services from local enterprises has helped promote development in the region.

Another Moroccan project is the concentrated solar power plant at Ouarzazate, the first of its kind in Africa. One of the largest solar power plants in the world (500 MW when completed), it is co-financed by the Bank, the Clean Technology Fund, the World Bank, the French Development Agency, the European Investment Bank, German Cooperation and the Moroccan government. Eventually it will become part of a network of solar power plants, connected through a transmission infrastructure with Algeria, Tunisia, Egypt and Jordan. As a result of the project, Morocco is able to avoid 240 000 tonnes of carbon dioxide emissions each year, while reducing its heavy dependence on energy imports. The plant will also reduce the cost of electricity and will pilot a new business model that could attract private sector backing for other concentrated solar power plants.

Improving energy efficiency

In addition to expanding generation and distribution capacity, increasing the efficiency of electricity networks is a highly strategic investment. For the same generation capacity, it enables the provision of more electricity at a cheaper unit cost. Several of our investments have helped reduce power losses in transmission and distribution networks, where leakages are common. For example, our work on energy reforms in Nigeria and Mozambique included energy efficiency audits and strengthened the capacity of national institutions in this area.

In Ethiopia, one component of the Bank's support to the national electrification plan focused on reducing high transmission losses in the system. Technical solutions were introduced, including the installation of capacitors to store energy in the industrial sector. On the consumer side, we funded the distribution of over 11 million compact fluorescent lamps to households, producing significant energy savings. These measures were an integral part of the larger project, which, through the construction of transmission lines and substations, has enabled 1.5 million people to benefit from new electricity connections.

Fostering regional energy cooperation

Regional cooperation is vital to achieve energy security in Africa. Chapter 1 discussed the importance of regional power pools, which enable participating countries to coordinate and rationalise their investments in the energy sector. Many African countries are simply too small to develop efficient national grids, and some landlocked countries become dependent on imported oil to fire thermal plants—an extremely costly and unsustainable approach. African countries have a great deal to gain from joining together into efficient regional arrangements for sharing electricity.

We have therefore worked with the African Union Commission and NEPAD to develop a continental Programme for Infrastructure Development in Africa (PIDA), which sets out the priority regional power infrastructure development required over the next three

decades. We are leading on the implementation of PIDA and have secured agreement on a \$360 billion Priority Action Plan.

To match the Bank's regional investments to the specific needs of each region, we have prepared Regional Integration Strategy Papers for four regions (East, South, West and Central Africa). These strategies highlight the critical importance of energy infrastructure for development and define the catalytic role the Bank will play in leveraging financing, including from the private sector.

Our regional energy investments are designed to promote energy trade, both within and between the regional power pools, by helping neighbouring countries connect their power grids into a single transmission network. This allows participants to share, and in some cases postpone, investments in new capacity through burden-sharing and back-up support, improving efficiency and lowering operating costs. Energy trade also reduces costs through economies of scale. It shifts the energy mix away from thermal towards hydropower, while increasing access to electricity.

Since 2009, we have achieved our energy trade target of 78 MW **traded in multinational projects**. We have accomplished this through the construction or rehabilitation of 465 km of **cross-border transmission lines**, and we plan another 734 km for 2014–18. Our cross-border investments have created power connections between Algeria, Morocco and Spain, between Ethiopia and Djibouti, and across West Africa. We also contributed to the development of cross-border generation projects, such as the Manantali dam project with Mali, Mauritania and Senegal, completed in 2006.

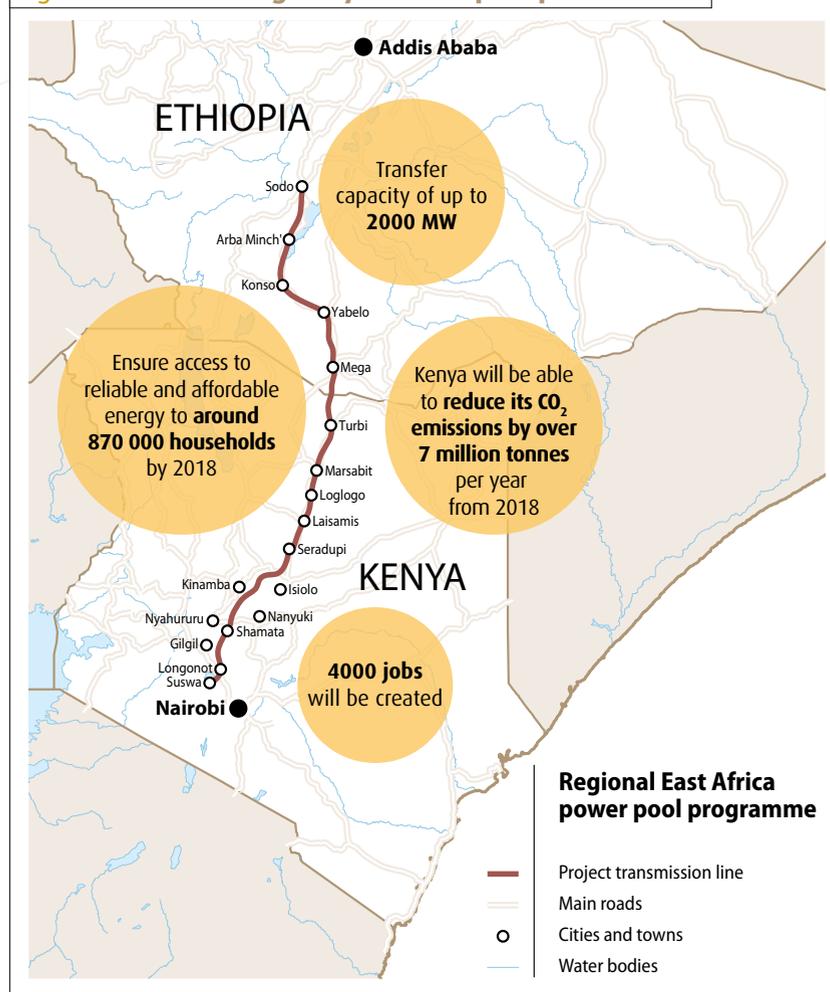
Building capacity at the regional level is critical. Strong regional institutions are needed to work with national authorities on energy sector reforms and to help harmonise energy standards and regulations within each region. For this reason, we help strengthen regional institutions to facilitate regional decision-making and integration and to attract investment for cross-border infrastructure developments from both public and private sources.

An example of an initiative to promote regional energy trade is the Power Interconnection Project in West Africa, which NEPAD identified as a priority. The project will create a shared electricity market among Nigeria, Benin and Togo. Private investment in gas-fired power stations in Nigeria will provide power for export as part of the West African Power Pool, providing 3 million people in all three countries with access to cheaper electricity. In Benin, the price per kWh will be less than half what is currently charged for domestically produced thermally generated power. In due course the project will be extended across West Africa by expanding the transmission and distribution networks, allowing greater power exchange and extending access to affordable electricity.

The Bank is also providing \$330 million to finance a 1000 km transmission line connecting Ethiopia and Kenya, which will position Ethiopia, with its massive hydropower potential, as the main powerhouse for the region and Kenya as the main hub for East African

power trade (see Figure 2.3). The transmission line will replace higher-cost fossil fuel power in Kenya with lower-cost and more reliable hydropower from Ethiopia, and will increase energy efficiency across the system. As a result, over 1.4 million Kenyans—a fifth of whom are in rural areas—will for the first time have access to electricity at affordable rates. Businesses will also have cheaper, more reliable energy supplies, and Kenya will be able to reduce its CO₂ emissions by over 7 million tonnes over four years. This investment complements our support to the regional interconnection of the electric grids of the Nile Equatorial Lakes countries – Kenya, Uganda, Rwanda, Burundi and the Democratic Republic of the Congo.

Figure 2.3 Connecting Kenya to Ethiopia's powerhouse



SOURCE: AfDB, WORLD BANK

Strengthening governance in the energy sector

In addition to supporting the development of Africa's energy infrastructure, the Bank will invest in the "soft" infrastructure of institutions and regulations to ensure the efficient delivery of electricity services to households and businesses. A sound regulatory system requires regulatory bodies that are able to oversee standards ensuring the setting of fair tariffs, so that the system can be economically viable without placing an undue burden on consumers. Harmonised national regulations are also the foundation for the development of regional power pools.

Soft infrastructure is also key to attracting finance into the energy sector. We believe the private sector should play a central role in the financing and development of Africa's power infrastructure. If investors are to have the confidence to participate, effective governance and regulation are needed to ensure transparency and to hold energy providers to their commitments.

Our promotion of private sector participation in energy infrastructure is set to deliver major returns in 2014–18, with 20 million people reached. It will also create over 22 000 new jobs.

The Climate Investment Funds (CIFs) have mobilised a total of \$7.6 billion to support Africa and other developing countries with climate change mitigation and adaptation

In cooperation with the African Legal Facility, we advise African countries on legal and regulatory issues, stressing the importance of communicating reforms to ensure public understanding and confidence. We also advise on the structure of energy projects, and we have provided equity and loans, advice and technical assistance to help private investors become established as independent power producers. In Madagascar, for example, we financed the Sahanivotry hydropower project, the country's first privately owned and operated hydropower plant, which now supplies 10% of the island's electricity. In Cape Verde we supported a public-private partnership between the government and an independent power producer to develop the onshore Cabeolica wind farm.

In several power projects, we have built capacity in electricity institutions by strengthening management and technical skills. Since 2009, through our efforts nearly 1700 **staff have been trained in or recruited for the maintenance of energy facilities.**

Our largest sector operation in Africa is the National Economic and Power Sector Reform Programme in Nigeria, amounting to \$500 million. Alongside some major infrastructure investments, we are supporting changes to the legal framework and pricing structures, and enhancing the corporate governance of the institutions involved. The overall result of this very substantial investment will be an increase in access to electricity from 45% to 55% of the population and significantly reduced production costs for industries, as they shift from using individual generators to drawing power from the national grid.

A useful indicator showing whether businesses are accessing electricity more quickly is the **Doing Business – Getting Electricity** index, which tracks the procedures, time and cost required for a business to obtain a permanent electricity connection for a newly constructed warehouse. While this rating varies significantly between countries, the average across countries in which the Bank engages in the energy sector has now been reduced from 53 to 45 days (see Figure 2.4).

Collaborative financing for energy

A key element of our strategy to address the massive financing needs of Africa's energy sector is helping African countries access investment finance from other sources. Africa has historically funded most of its own power infrastructure from countries' national budgets. However, a number of innovative funds are now available, including those linked to the international agenda on climate change. The Bank is helping African countries expand their access to international climate change finance for energy projects that promote climate resilience and low-carbon energy generation.

The Climate Investment Funds (CIFs) have mobilised a total of \$7.6 billion to support developing countries around the world with climate change mitigation and adaptation.

The Bank has committed to helping Africa secure \$1.15 billion from the global CIFs. To make low-emission solutions more affordable, we help African countries and regions develop investment plans for CIF funding and then co-finance the investments with our own funds. Since 2011, we have helped leverage resources from other partners and approved \$566 million of CIF finance for projects in Kenya, Mozambique, Morocco, Niger and South Africa.

We act as an implementing agency for the Global Environmental Facility, which invests in energy efficiency and renewable energy for climate change mitigation. We also host the Sustainable Energy Fund for Africa and the African Carbon Support programme.

Box 2.1 Converging initiatives

Power Africa

President Obama launched the Power Africa Initiative in June 2013, which aims at doubling access to electricity in sub-Saharan Africa, especially in Tanzania, Kenya, Ethiopia, Ghana, Liberia, and Nigeria. President Obama acknowledged the Bank as a partner, with \$3 billion expected to be allocated over the next 5 years to the 6 countries.

Sustainable Energy Fund for Africa (SEFA)

SEFA, established in 2011 as a bilateral Trust Fund with a \$57 million contribution from Denmark to unlock investments in medium renewable projects, was converted into a multi-donor fund following a \$5 million commitment by the US as part of a multi-year financial engagement under the Power Africa Initiative. The new component will also align SEFA with the SE4All Initiative.

Sustainable Energy for All Initiative

The UN Secretary General's Sustainable Energy for All (SE4ALL) Initiative was launched in 2011 with the aim of achieving three main goals by 2030: ensuring universal access to modern energy services, doubling the global rate of improvement in energy efficiency and doubling the share of renewable energy in the global energy mix. The Bank hosts the SE4All Africa Hub since May 2013 in partnership with the African Union Commission and the NEPAD Planning and coordination agency (NPCA) along with the support of United Nations Development Program.

Encouraging Private Financing and Public-Private Partnerships

Our Private Sector Development Strategy (2012–2017) sets out a central role for the private sector in the development of Africa’s infrastructure, including in the energy sector. Our private sector power operations cover support for both governments and corporate projects, through our private sector window. We have approved more than \$1 billion in private sector energy projects since 1998. For example, we provided \$14 million to construct the Azito power plant and electricity transmission system in Côte d’Ivoire under a build, own, operate and transfer (BOOT) contract.

To attract private investment into the energy sector on a much larger scale, we encourage public-private partnerships. We are helping countries build the capacity to design and manage these more complex investments. With the right policy and legal framework, such partnerships can attract efficient and innovative private sector solutions to energy challenges. To support independent power producers and government contributions to public-private partnerships, our partial risk guarantees (see Box 2.2) provide additional confidence for private investors. For projects that have the effect of reducing greenhouse gas emissions, we can provide concessional funding from international climate funds. All these measures help to leverage private sector financing.

Box 2.2 Partial risk guarantees to stimulate private investment

Partial risk guarantees are financial instruments that mitigate the risk for private investors. They are pledges to cover a portion of the losses to investors if a government or government-owned agency fails to deliver on its agreed obligations. This instrument is useful for governments embarking on public-private partnerships for the first time, without a track record of working successfully with the private sector.

The AfDB has made partial risk guarantees available to investors in middle-income countries since 2004 and to low-income countries since 2011. The partial risk guarantee was first used in 2013 in the Lake Turkana Project to mitigate the risk that the Kenyan government would be unable to deliver a transmission line in a timely way.

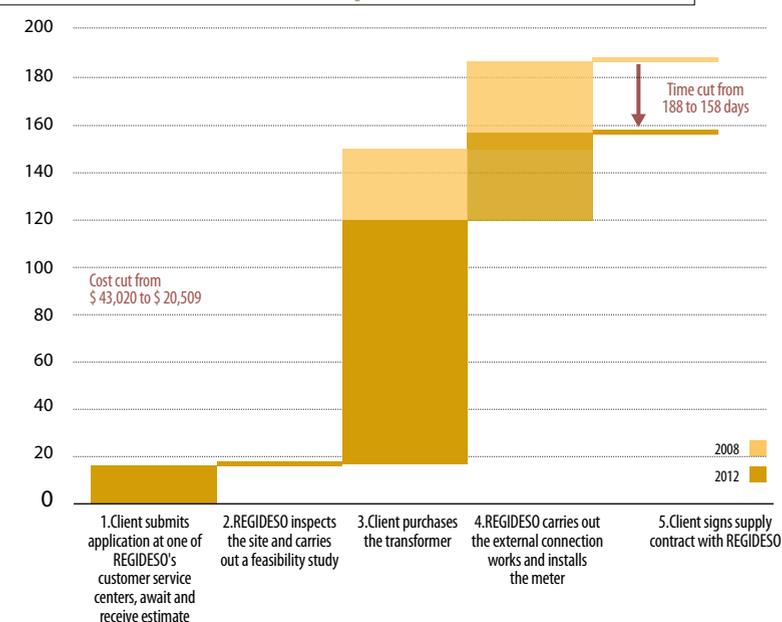
Financing studies and technical assistance to generate bankable projects for member countries

If African countries are to make effective use of new sources of finance for energy infrastructure, they need the capacity to develop and implement bankable projects. This is an important area of support for AfDB, and we have financed a number of studies to identify and prepare promising projects. One example is the 2006 feasibility studies for the transmission lines of the Rusumo Falls hydroelectric plant, which paved the way in 2013 for the Rusumo Falls project located between Rwanda and Tanzania, a Programme for Infrastructure Development for Africa (PIDA) priority project. We also provided \$5 million to prepare technical and financial plans for the third stage of the major Inga Dam project (see Box 2.3).

Box 2.3 Technical assistance for the Inga Dam

In 2013, AfDB renewed its support to the Inga Hydro-power Project in the Democratic Republic of the Congo with a \$73 million technical assistance grant to finance the multinational Inga Site. The grant supports the development phase of a new dam on the Congo River by contributing to the financing of the technical design, the development of an institutional structure to manage the investment and the negotiation of a public-private partnership. The AfDB’s commitment for technical assistance to the Inga project now amounts to \$90 million. This preparatory work will lay the foundation for further investment operations which will install a new plant with a 4800 MW capacity. This ambitious initiative is expected to boost electricity access in DRC from the current 9% to over 40% in 2022.

Figure 2.4 Burundi made obtaining an electricity connection faster and cheaper



An electricity connection is essential if a business is to conduct its most basic operations. In many economies the connection process is complicated by multiple laws and regulations—covering service quality, general safety, technical standards, procurement practices and internal wiring installations. Burundi was among the economies improving the most in 2012–13 in areas tracked by *Doing Business*. The electricity utility Regideso ended its monopoly on the sale of transformers and other equipment needed for electricity connections. Since June 2012 this change has decreased the time to obtain a connection by 30 days because customers can now import materials instead of buying them from Regideso if the materials are not in the company’s stock. The utility also opened a centre that combines all its internal services involving new connections.

The Bank has also developed an online platform to alert potential investors in both the private sector and international donor agencies to national and regional capital projects requiring financiers. This innovative tool, known as “Sokoni,” or trading

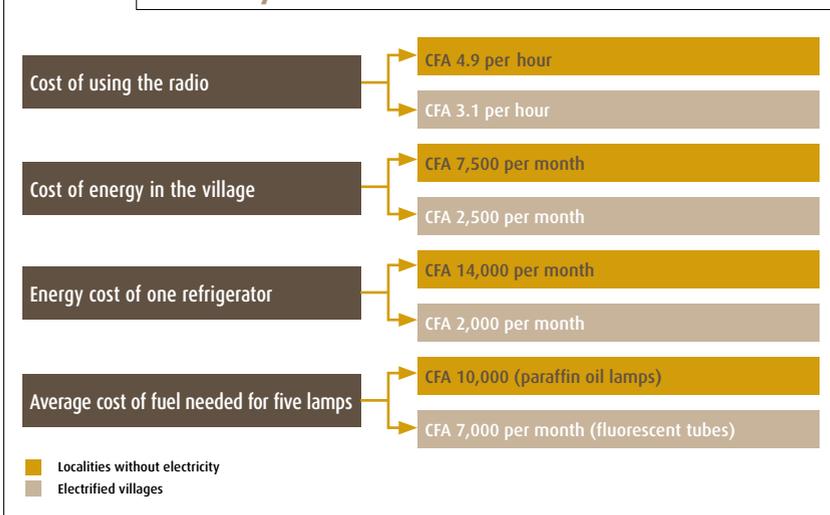
centre, will reduce the asymmetries in information between African governments and potential private and public sponsors, helping to lower transaction costs.

Energy and poverty reduction

One of the core objectives of our energy portfolio is to expand poor people's access to electricity, mainly in the rural areas. An affordable supply can provide poor communities and households with the means to raise themselves out of poverty and transform their lives. To that end, over the past three years we have invested more than \$100 million in rural electricity infrastructure.

In Benin, for example, we have supported rural energy projects since 2002, covering 10 of the country's 12 provinces. The electrification rate has increased from 20% to 28%, benefiting over 870 000 people as well as thousands of small and medium-sized enterprises. (Figure 2.5 depicts the economic advantages of electrification.) Thanks to our investments, over 85 primary schools and 38 health centres now have electricity, transforming their capacity to provide services to their communities.

Figure 2.5 Cost comparison with and without electricity in Benin



Source : OPEV Benin: Project for the Electrification of 17 Rural Centres Project Performance Evaluation Report (PPER)

As part of rural infrastructure projects, we have constructed or rehabilitated 140 social facilities for activities such as video clubs, cinemas and libraries, which help to build the quality of life in rural areas and slow the pace of urbanisation. We have even found that the provision of electricity is leading to the growth of new villages, as households and businesses relocate to take advantage of the facilities electricity makes possible.

Learning lessons from our energy operations

To help us derive lessons to improve future programming, we have put in place a number of systems to assess the results of our operations. Project Completion Reports (PCRs) provide one

means of capturing lessons. We have collated the results from our PCRs over the past 10 years, together with results from project and thematic evaluations, to take a systematic look at lessons from our energy portfolio. Over the last years, all our PCRs were rated satisfactory in the energy sector, though the percentage of exiting projects with a timely PCR fell to 66% from 90% with the adjustments to a new PCR format. PCRs with gender-disaggregated data improved from one-quarter of energy projects to 40% by 2013, although this is below our target of 75%.

We have gained considerable experience on how to prepare the ground for private investment in energy projects and to develop financial instruments that reduce the risks for private sector investors. One example is the Menengai geothermal project in East Africa, for which the Bank established a financing model for other agencies and the private sector. We also funded the up-front drilling, taking on a risk that the private sector was reluctant to assume. In Turkana in Kenya, we made innovative use of a partial risk guarantee of \$27 million for the transmission line.

The Itzhi-Tezhi Dam project on the Kafue River in Zambia was another innovation. We used ADF funds to develop a public-private partnership in hydroelectric generation (see Box 2.4), which serves as a model for other ADF countries. A key lesson was the importance of flexibility in working with the private sector. For the hydropower project at Sahanivotry, Madagascar, we worked closely with the private operator to achieve financial closure, adhering to the Bank's risk management policies and financing 43%, or \$8 million. This led to the successful development of a privately owned and operated hydropower project that delivers many benefits for Madagascar, with an approach that has the potential for expansion to other projects.

Box 2.4 One Bank in action: Combining ADF concessional resources with equity investment

The Itzhi-Tezhi Hydro Power Plant and Transmission Project in Zambia, approved in 2012, is funded through a public-private partnership. This major investment will create new connections for 60 000 people, increasing access to affordable and reliable clean energy. It will also enable exports of clean energy to the Southern African Power Pool.

An innovative financing arrangement is supporting this investment: for the first time in the energy sector, three different AfDB instruments – ADF concessional funding, the Nigeria Trust Fund and the private sector window – were combined in the financing of the 120 MW plant and a 142 km transmission line, for a total investment of over \$90 million. This was the Bank's first effort to promote public-private partnerships by using the ADF window to support government equity participation. This also enabled us to leverage additional finance at 10 times the level of the Bank's contribution.

We have learnt lessons on project design and procurement from our investments in Egyptian power plants. **Cost savings of 15-20% can be achieved when the construction of a power plant is tendered in the form of a large number of small components, because they can be designed in more detail;** however, this approach could be challenging to apply in low-income countries with limited implementation and technical capacity. We also learnt that using the Egyptian company's procurement systems for the plant made it difficult for the Bank to track the benefits generated for local manufacturing and the local economy. From the tendering process for the Bumbuna hydroelectric project in Sierra Leone, which was delayed because of slow implementation and cost overruns, **we learnt lessons on the value of advance tendering to reduce delays.**

The importance of regular Bank supervision to ensure timely procurement and project implementation was a lesson that emerged from the Ethiopia- Djibouti Transmission line, which experienced delays throughout the project cycle. On the positive side, for a multinational project involving different government systems and languages, the obstacles can be overcome with strong commitment from governments, institutions and project implementation units.

Finally, we have made use of lessons in the design of new projects (see Box 2.5).

Box 2.5 Using lessons learnt in Benin to improve project design

The Second Rural Electrification Project, which ran from 2004 to 2011, was the Bank's seventh operation in Benin's energy sector. It was designed in close collaboration with the Government, taking into account lessons learnt from an earlier rural electrification project. Weaknesses from the earlier project had included a long delay before loan effectiveness, slow progress with establishing the project implementation unit and poor mastery of AfDB rules and procedures.

To counter these problems, the project implementation unit was strengthened and attached directly to the Benin Power Utility Company for greater efficiency. Training on procurement and disbursement procedures was organised for unit staff during Bank launch and supervision missions. A consulting engineering firm was engaged to support the unit with procurement, validation of technical studies, works control and supervision.

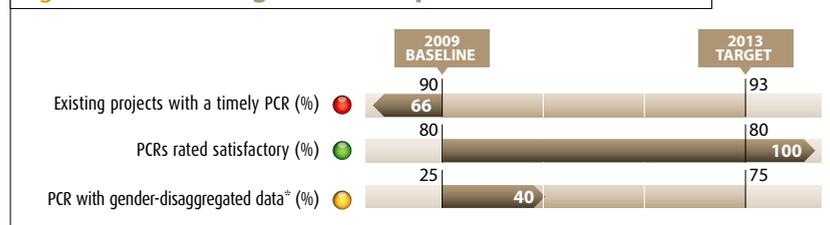
Conclusion

The Bank takes a multi-pronged approach to supporting Africa's energy sector. We are one of the major investors in the sector: between 2009 and 2013 we provided some \$3 billion in energy finance, and our equity investments provided additional finance to the private sector. Because we also recognise that the need for investment far exceeds our own resources, we have focused on helping African countries access other sources of finance, including international climate finance, and leverage private investments through innovative financing instruments and partnerships. This in turn requires ambitious reforms to national energy laws and institutions. We are also helping to support the development of regional power pools, linking up national grids to enable coordinated investments and economies of scale and the delivery of cheaper and more reliable energy to customers.

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We recognise the importance of moving progressively towards a green growth pathway. Therefore we are helping to develop Africa's vast potential in clean and renewable energy, with major investments in hydropower and other innovative clean energy solutions.

Figure 2.6 Learning from our operations



Our operations have helped expand the many benefits of affordable energy to growing numbers of Africans, with a particular emphasis on those living in remote and rural areas. By providing new energy solutions for households, businesses and local service providers, we are helping to transform the lives and livelihoods of millions of people ■