

Chapter 2

Light up and power Africa

Scaling up energy capacity, a key condition for sustainable development, is one of the most urgent challenges Africa faces today. Reliable and affordable energy enables industries and small businesses to compete and trade in regional and global markets. This promotes economic growth and creates jobs and livelihoods, so that people can lift themselves out of poverty. Increasing access to energy to meet the higher energy demand brought about by rapid economic growth will transform the lives of millions of people, ensuring that African countries make real and timely progress toward the UN Sustainable Development Goals.

In this chapter, we take stock of Africa's energy sector, using Level 1 of our new Results Measurement Framework (RMF). We examine our Bank results in the sector using Level 2 of the RMF. In line with this year's ADER theme, we show how improvements in access to energy will help unlock Africa's agricultural potential. Finally, we set out our plans for scaling up our investments to deliver on our ambitious priority: Light Up and Power Africa.

Making Africa an economic powerhouse with modern energy services

Over the last 15 years, Africa's unprecedented economic growth has been underpinned by significant investments in power generation and transmission, combined with institutional reforms in the energy sector. Private sector finance, including public-private partnerships, and innovative technologies have driven these investments and enabled Africa to leapfrog over older technologies and move to cleaner and renewable sources.

More than 645 million Africans are trapped in energy poverty

In 2016, Africa reached 168 GW **total installed electricity capacity**, of which 33 GW was **installed renewable capacity**. These investments are increasingly anchored in the development of regional power pools, which enable countries to develop their energy systems collaboratively and avoid the inefficiencies of small national markets.

However, Africa's electricity deficit remains enormous. Though access is improving, just 45% of Africa's population and 28% of people in lower-income ADF countries have **access to electricity**. In fact, only northern Africa has reached almost full access to electricity and clean cooking solutions. This leaves more than 645 million Africans trapped in energy poverty—a key driver of inequality (see Figure 5).

Indeed, the comparison with more developed regions is stark: power consumption in sub-Saharan Africa is 181 kWh per person each year, compared to 6500 kWh in Europe and 13 000 kWh in the United

States alone. Power consumption varies considerably across the continent—South Africa and northern Africa use three-quarters of all Africa's power, while some of the low-income ADF countries lag far behind. Rural access to electricity is low across the continent.

Access to reliable, affordable energy is key to a more productive agriculture sector

Moreover, underinvestment in transmission, distribution and collection systems leads to serious inefficiencies, with **electricity losses** averaging 14.8% of energy production. Manufacturing and

Figure 5 The distance to achieve universal access to energy and clean cooking in African regions

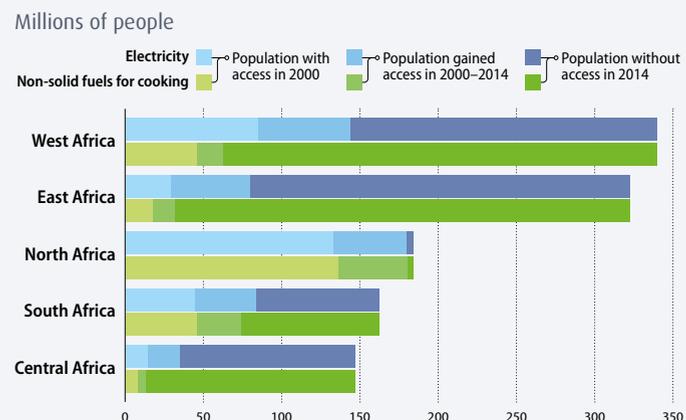


Table 2 Light up and power Africa indicators (Level 1 & Level 2)

LIGHT UP AND POWER AFRICA INDICATORS—PROGRESS IN AFRICA (LEVEL 1)	ALL AFRICAN COUNTRIES				ADF COUNTRIES	
	Baseline 2015	Latest 2016	Target		Baseline 2015	Latest 2016
			2016	2025		
● Share of population with access to electricity (% population)	42	45	48	97	24	28
● Share of population with access to clean cooking solutions (% population)	32	31	39	97	9.9	10.1
● Total installed electricity capacity (GW)	168	168	184	330	31	31
● Installed renewable capacity (GW)	33	33	49	92	20	20
● Electricity losses through transmission, distribution and collection (%)	15	14.8	14.5	<10	16.8	18.4
LIGHT UP AND POWER AFRICA INDICATORS—AfDB CONTRIBUTIONS (LEVEL 2)	Baseline 2015	Delivered 2016	Target		Baseline 2015	Delivered 2016
● New total power capacity installed (MW)	490	540	880	8800	80	53
● New renewable power capacity installed (MW)	24	41	560	5600	20	13
● People with new electricity connections (thousands)	72.5	364.8	2400	24 000	72.5	364.8
● — of which women	36.3	182.4	1200	12 000	36.3	182.4
● People connected through off-grid systems (thousands)	..	..	1200	12 000	..	..
● — of which women	..	..	600	6000	..	..
● People provided with clean cooking access (thousands)	..	..	3200	32 000	..	..
● — of which women	..	..	1600	16 000	..	..
● New or improved power distribution lines (km)	875	2600	3520	35 200	875	2600
● New or improved power transmission lines (km)	69	230	576	5760	69	190
● Emissions reduction in energy (thousand tons CO ₂)	17.3	69	1800	18 000	10.2	61.8

● Achieved 95% or higher of the 2016 target ● Achieved less than 95% of the 2016 target but above baseline value ● Achieved less than the baseline ● Data are not available to measure progress

smaller businesses are seriously affected by power shortages and high energy tariffs, which constrain industrial growth and competitiveness and result in losses of 2–4% of GDP each year.

In the transition towards a more productive agriculture sector, access to reliable, affordable energy is key. Commercial agriculture depends upon energy for irrigation, storage and processing. For the 7 out of 10 Africans who rely on agricultural resources for their livelihoods, access to energy determines what their mode of production is and whether they are able

to bring their produce to market (see Box 3). This in turn determines what level of returns is available to them, and whether they are able to reinvest in improving productivity and creating jobs.

Similarly, households that lack access to electricity have to use the sources of energy available to them—wood, charcoal, and other forms of biomass. Biomass fuel poses major health risks, affecting women and children the most in both rural and urban settings. It is thought to be the cause of around 600 000 deaths each year.

Box 3 Powering farmers and agripreneurs to boost production

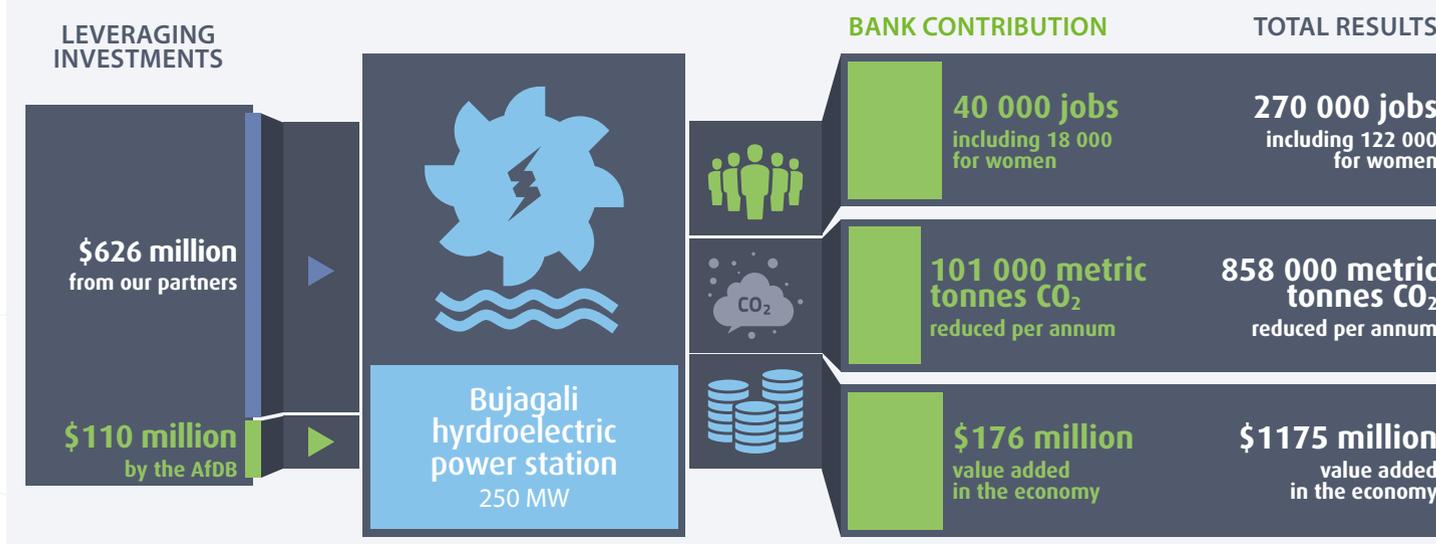
All across Africa people and companies are taking advantage of better access to electricity to expand food businesses.

Mali—In the rural regions of Koulikoro, Ségou and Mopti, where only one-fifth of the population has access to electricity, women are turning ginger, hibiscus flowers and millet into jam, flour and dry biscuits thanks to solar panels that power equipment to produce processed food and gas lamps that light the work site. This source of energy allows for the use of mills, freezers and dryers—the necessary equipment provided by UN Women and the Food and Agriculture Organisation to produce processed food. Women are now honing their business management skills through training in accounting and marketing to further grow their businesses.

Morocco—An AfDB study commissioned with the Global Environment Facility found that the food industry is Morocco's second most energy-intensive sector, using 16% of the total electricity consumed by industries. Investments in large power plants allow for the reliable supply of energy that enables agro-industries to produce dairy products and package quality vegetables. The country's 8 GW of total installed power capacity make Morocco North Africa's first recipient of foreign direct investments in the agri-food sector.

As Africa moves up in the agricultural value chain, it faces continually expanding needs for electricity to make compressors, refrigeration, water pumping, processing units and ventilation systems work to deliver food products.

Figure 6 How our investment in hydropower is delivering jobs and GDP growth in Uganda



In low-income ADF countries, only 1 person in 10 has **access to clean cooking solutions**—a share that has barely improved in recent years. Access to electricity also helps reduce poverty in other ways: it reduces the time women and children need to spend collecting fuel, enabling them to work and study, and it also reduces damage to forests and land from the collection of biomass.

Africa is richly endowed with solar, hydroelectric, wind and geothermal resources

Fortunately, Africa is richly endowed with solar, hydroelectric, wind and geothermal resources, as well as gas and oil. Exploiting this huge renewable energy potential, combining renewable with conventional energy resources, will power the continent and have a transformative impact on the lives and livelihoods of Africans.

The Bank's contribution to enhancing access to energy

As the Bank affirmed in its Ten-Year Strategy (2013–22), access to energy is central to promoting inclusive and sustainable growth. Over the past decade, the Bank has been one of Africa's significant investors in power generation and access to energy.

Over the last three years, we installed an average of 540 MW per year of **new total power capacity**, of which 41 MW of **new renewable power capacity**. We delivered new **electricity connections** to 364.8 thousand people. Overall, these investments provided 3.3 million people with new or improved electricity connections, of whom 1.7 million were women. With our renewed focus on the sector, our aim is to reach over 15 million people in the next three years. As our new operations reach completion, we will also deliver on our commitment to connect every year

1.2 million **people to off-grid systems** and provide **access to clean cooking solutions** to 3.2 million people.

One example of our investment in power generation capacity is the 1300 MW Abu Qir thermal power plant in Egypt, which increased the country's grid capacity by 4%. This project both supported the Government's plans for a greener economy and helped meet growing energy demand from businesses and households. The work also directly created 3600 jobs.

Our investments provided 3.3 million people with new or improved electricity connections

With the Global Environment Facility, we cofinanced Morocco's Integrated Solar Combined Cycle Project, which provides 472 MW through concentrated solar power technology coupled to a gas-fired plant. This innovative project is now a case study for both national and international energy companies and experts learning from the technologies.

In Uganda, we provided \$110 million in private finance alongside \$625 million from six other development finance Institutions, with the sponsors and government providing equity, to nearly double Uganda's peak capacity (see Figure 6). This investment has replaced thermal energy with lower-cost hydropower and has increased generation capacity, providing reliable power to meet demand and reduce load-shedding and power shortages.

In Ethiopia, we are providing power supply and electrification in the Tigray and Afar regions, to provide affordable, reliable electricity for households, small businesses and industries. By 2019, 36 rural towns and villages will enjoy improved access to electricity and basic social services.



What has worked well

A sound compensation system

The Santiago power project in Cape Verde put in place a compensation system for people whose land was expropriated for the project. Conducting a census early to ascertain the landowners' names, communicating the system clearly, and having a committee dedicated to assessing claims and title deeds were important aspects of the effective system.

Valuing expertise

External expertise, added to the considerable national expertise in conventional thermal plant projects in Morocco, played a key role in delivering the Ain Beni Mathar solar thermal plant. Validating engineering and execution studies, approving plans, supervising the works and validating factory tests and the commissioning of the facilities all gave assurance to the client and donors.



What has not worked so well

Promoting timeliness in projects

If project timetables are not realistic, implementation is disrupted and costs increase. In the Abu Qir thermal power plant in Egypt overambitious scheduling, along with political instability and insecurity, caused delays in construction, procurement and subcontractor work. However, procurement can be speeded up by effective market engagement at an early stage, as in the Moroccan solar energy programme.

Funding for maintenance

If local governments do not maintain new local facilities, communities cannot benefit from project investments. In Uganda, the Bujagali Hydro Power project constructed schools, health centres and market structures, yet some of these buildings were in a state of disrepair within two years. To ensure sustained benefits for communities, local government funds must be earmarked to maintain social facilities.

Box 5 Reaching universal access to electricity by 2020 in Kenya

Kenya's share of households with access to electricity is growing rapidly. The country added 1.3 million households to its electricity grid in 2016, raising the percentage of connected Kenyans to 55%, from just 27% three years ago.

Non-fossil-fuel sources make the bulk of the grid extension—more than 60% of installed capacity comes from hydro and geothermal power. The Bank is working with Kenya and private sector investors on financing arrangements for the Menengai geothermal plant. It also supports the building of large wind energy farms around Lake Turkana in the Great Rift Valley. Together these investments will boost Kenya's power grid by over 400 MW.

These changes have had an impact on everyday Kenyans. They help people expand their business hours, allow children to study in the evening, and reduce electricity blackouts. While nearly half of today's lighting comes from electricity and solar energy, just a decade ago about 80% of Kenyan households used kerosene and firewood.

To meet its goal of reaching universal access to electricity by 2020, Kenya has set a target of connecting an additional one million customers to the grid each year as part of its Last Mile Connectivity project, and the Bank has already provided over \$270 million to support this goal. It will also use solar off-grid energy systems to reach rural households, benefitting farmers and helping to end energy poverty.

In Cameroon, our support through a public-private partnership increased energy generation capacity at Dibamba power plant and addressed a critical energy shortage, whilst creating 480 direct jobs and many indirect jobs with local suppliers. In line with the New Deal, we are expanding our investment in connecting households to the grid. In Côte d'Ivoire, a Bank-funded project is constructing 3000 km of electricity lines and connecting 20 000 households.

Our investments have reduced ● CO₂ emissions by 69 000 tonnes per year over the last three years, which was below target. However, as more of our investments come to fruition in the coming years, and as we increase momentum in the energy sector, we expect emissions to fall by 22.8 million tonnes over the next three years.



Investments on the order of \$65–90 billion per year will be required to achieve universal access to electricity

For communities that are unable to access the main grid, we also provide considerable support to off-grid and mini-grid innovations that increase rural access to electricity and improve agriculture and agribusiness. The African Water Facility is installing 52 sets of solarpowered water pumps in Ethiopia. This pilot will be scaled up with long-term investment under the Government's Universal Access Programme.

The Bank hosts the Sustainable Energy for All Africa Hub, which launched a Green Mini-Grid Help Desk for renewable energy minigrid project developers in 2016. Through tutorials and knowledge products, this portal provides technical, legal and compliance advice about setting up and operating clean energy mini-grids.

We are supporting energy sector governance. In the Democratic Republic of Congo, we are establishing an institutional framework for regulation and rural electrification to attract private sector investment, including public-private partnerships.

As the Bank steps up its work in Africa's energy sector, we will strive to increase our effectiveness and impact by applying key lessons from our energy programmes (see Box 4).

The New Deal on Energy for Africa to power the continent

Building on our strong experience in Africa's energy sector, in 2016, the Bank launched the New Deal on Energy for Africa, setting out what needs to be done to achieve universal access to electricity across Africa by 2025. The challenge is massive: investments on the order of \$65–90 billion per year will be required to add 160 GW of new capacity to electricity grids across Africa, expand transmission systems, connect 130 million new households and businesses, and expand off-grid generation twenty-fold, thereby adding 75 million new connections and increasing access to clean cooking energy for around 150 million households. Around 70% of new rural electricity supply in Africa will come from off-grid or mini-grids, while two-thirds will be powered by renewables.



A conducive policy environment is key to attracting substantial private sector investment

As one of Africa's significant investors in the energy sector, the Bank has a strong comparative advantage in terms of experience and expertise to rapidly scale up our investments in the sector over the coming years. Drawing on our successful programmes, staff expertise and strategic partnerships, the New Deal is driving the rapid expansion of Bank energy services, including on-grid and off-grid solutions, innovative financial instruments and new global technologies and industries (see Box 5).

Using clean energy for food production and cooking

By 2025 the New Deal will enable 150 million households to use clean energy for cooking, by introducing improved stoves and modern fuels, including electricity. Using innovative, market-based approaches, we are drawing on lessons from Nigeria's scale-up of production and distribution of renewable cooking fuel, funded by the Sustainable Energy Fund for Africa. We are developing innovative distribution and marketing mechanisms to reach households, recognising that removing financial, behavioural and logistical barriers for rural homes in the market segment at the bottom of the pyramid is key to the adoption of clean energy for cooking.

A partnership-driven strategy

Clearly, no single institution can supply all that is needed for Africa to achieve universal access to electricity by 2025. Therefore the New Deal is based on working in partnerships—with African governments, international donors and the private sector.

For example, the New Deal actively encourages innovative financing in the African energy sector. We are delivering infrastructure using independent power producer procurement programmes for independent power producers in South Africa and

Box 6 Boosting Africa's power generation capacity

The Bank has provided \$1.34 billion for South Africa's power utility, Eskom, which is expanding its generation capacity and transmission systems. By 2020, electricity generation will have increased by 11 000 MW and the transmission network by over 9500 km of power lines, serving both South Africa and the southern African region and expanding Africa's overall electricity generation capacity by nearly 10%.

By leveraging its AAA credit rating, AfDB arranged \$965 million through participation arrangements with nine commercial banks. This represents the largest syndicated loan ever arranged in Africa. It is also an important milestone for AfDB, as it increases the level of ambition of its investments in Africa's energy sector under the New Deal on Energy for Africa.

Morocco. We are also leveraging substantial private sector finance through a syndicate loan for South Africa's power utility, Eskom, through participation arrangements with nine commercial banks (see Box 6). Replication of these new financing approaches at local, national and regional levels is critical for achieving the scale of investment that is required.



Around 70% of new rural electricity supply in Africa will come from off-grid or mini-grids

To attract substantial private sector investment, a conducive policy environment is key. We are helping African countries establish the legal and regulatory environments, effective cost-recovery systems and efficient, strong utilities to build modern energy sectors that are socially, economically and environmentally sustainable. We also facilitate sound regional governance arrangements to support regional energy sector investments.

One important partnership is the Africa Renewable Energy Initiative, which enables African countries to invest in renewable generation capacity to support their low-carbon strategies and deliver improved energy services. Launched in 2015 at the Paris climate change conference, the initiative is managed by the Bank and receives strong international donor support. It aims to deliver at least 10 GW of new and additional renewable energy generation capacity by 2020, and at least 300 GW by 2030.

Overall, the New Deal on Africa represents a bold vision and an ambitious strategy—one that will truly transform the continent. The Bank is acting as a catalyst in achieving this vision, working with partners to turn the vision into reality, adding megawatt after megawatt, across the continent. ■