Chapter 2
Light up and power Africa

Access to energy is critical for industrialisation to take hold in Africa, creating jobs and unlocking economic potential. It is also key to improving people’s health, education and quality of life. Yet access to energy remains unacceptably low across the continent. Reliable, affordable power is urgently needed to transform Africa’s economy and achieve the Sustainable Development Goals.

In this chapter we show that Africa is making progress towards addressing its enormous power deficit and meeting the private sector’s growing demand for energy. In 2017, for example, the rate of access to energy outpaced population growth in Africa for the first time. Major investments are under way in power generation and transmission, and Africa is at the forefront in implementing off-grid and clean energy solutions. However, lack of power remains a significant constraint on industrial development, forcing firms to rely on costly back-up generators—estimated to cost Africa 2–4% of GDP each year. The Bank is committed to scaling up its investment in energy, working with a range of public and private sector partners to raise finance.

Powering businesses and households
There are enormous power deficits across Africa. Yet change is happening. Africa’s strong economic growth since 2000 has resulted in a marked increase in demand for energy from the private sector, and major investments are taking place in power generation and transmission. A considerable push toward cleaner, lower-carbon energy is promoting investment in Africa’s huge renewable resources (solar and hydropower), drawing on significant technological advances. Africa—and especially East Africa—has been at the forefront of the revolution in decentralized energy access solutions. African countries have also been implementing the institutional reforms in the energy sector that are necessary to deliver sustainable energy services.

Electricity for industrialisation
The growth of private sector investment and industrial development across the continent depends heavily on the availability of energy supplies. The lack of power undermines investment, employment creation and economic growth, costing Africa 2–4% of its GDP each year. In Tanzania and Ghana, companies lose 15% of sales value to power outages, according to McKinsey company. In South Africa, severe limitations in generation capacity and frequent “load shedding” have hobbled economic growth.

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In practice, the lack of reliable power forces firms to rely on back-up generators running on diesel or gasoline—at costs that are four times the price of grid power. Over 40% of businesses in Tanzania and Ethiopia, and 57% of those in Kenya, own generators. Since power is a precondition for developing and adopting many innovative technologies,
small and medium-sized enterprises are often unable to boost their competitiveness and grow their business.

The industrial sector is responsible for more than two-thirds of sub-Saharan Africa’s total energy use, although it employs far fewer people than agriculture and generates less value-added to the economy than services. Extractive industries are particularly energy-intensive, and many countries have significant mining sectors: copper in Zambia, copper and cobalt in the Democratic Republic of the Congo, gold in Ghana, diamonds in Botswana, uranium in Namibia and Guinea and iron ore in Liberia and Sierra Leone. Other key energy-intensive industries include cement production, petrochemicals, aluminium smelting and South Africa’s automotive and iron and steel sectors.

Access to energy by households

Overall, the share of the population with access to electricity in Africa has risen—from 42% in 2015 to 51% today, and for low-income countries from 24% in 2015 to 34%. In fact, the growing electrification rate outpaced for the first time Africa’s high population growth; indeed, in some countries the number of people without access to electricity may have however increased. Figure 7 illustrates the level of access to electricity in Africa by country, colour-coded by region. North Africa—except for Mauritania—is the region closest to reaching universal access to electricity.

The use of energy in sub-Saharan Africa is the lowest in the world. Excluding South Africa, annual energy consumption is about 175 kilowatt-hours (kWh) per capita, compared to a global average of 2855 kWh per capita.

The share of population with access to electricity in Africa has risen from 42% in 2015 to 51% today.

The share of population with access to clean cooking solutions is 31% across Africa, and just 10% in low-income countries. In sub-Saharan Africa 80% of households use solid biomass, mainly fuelwood and charcoal, for cooking and warmth. But burning biomass brings serious health hazards that have major impacts, particularly on women and children; 600 000 Africans die each year from the effects of household air pollution, of whom half are under five years old; and lung and eye diseases are widespread. In addition, foraging for fuel takes time, especially for women and children, who may therefore miss out on opportunities to undertake more productive activities, such as schooling and livelihood activities. In some places, climate change and deforestation are compounding the problem of finding suitable biomass for fuel.
Increasing power capacity

The continent is endowed with abundant natural resources that could power industrialisation and lift many people out of poverty. Huge investments in infrastructure are urgently needed to develop these resources and expand Africa’s power generation capacity for current and future generations in an environmentally sustainable way. Therefore, Africa needs to be innovative in raising finance and using new technologies.

Planning and implementing regional energy infrastructure is critical. Regional power pools enable countries to develop their energy systems more collaboratively and undertake cross-border energy trade. Avoiding the inefficiencies of small national markets lowers costs and increases access to energy.

Investment in power generation and energy systems is expanding, but the pace needs to accelerate further. In 2017, Africa reached 175 GW ● total installed electricity capacity, of which 35 GW was ● installed renewable capacity.

Electricity loss is a key component in measuring the efficiency and financial sustainability of the power sector. Lower electricity losses are associated with greater financial sustainability of utilities, as additional revenues increase cost recovery, enhance the capitalisation of the power sector, and improve the sector’s capacity to invest. ● Electricity losses through transmission, distribution and collection averaged 17.1% of energy production, much higher than Africa’s target of 14%, reflecting weaknesses in utility companies across the continent.

In the coming years, major investments will be made in renewable energy capacity—for example, in hydroelectric energy in Ethiopia; solar energy in South Africa, Nigeria and Namibia; and wind energy in such countries as South Africa and Ethiopia. Ten countries already rely on renewables for more than half of their energy mix and are spearheading Africa’s contribution to lower emissions (see Figure 8).

The use of solar and wind energy solutions in off-grid systems and mini-grids is increasing rapidly, as new technologies are developed and costs continue to come down. The cost is also decreasing for solar parks (see Figure 9). For example, for solar photovoltaic projects, costs have fallen considerably, from $3.4–$6.9 per Watt in 2012 to $1.3–$4.1 per Watt in 2015–16.

Large-scale investments in solar capacity are being developed with the Bank’s support, mainly in North and Southern Africa. In Morocco, the world’s largest concentrated solar plant is now...
providing electricity to more than half a million Moroccans, producing 520 GW per hour at costs comparable to those of less clean energy sources. In South Africa, the Xina Solar One power plant is now in commercial activity with an installed capacity of 100 MW.

The Bank’s impact in increasing access to energy

The Bank’s Ten-Year Strategy (2013–22) recognises that meeting Africa’s energy needs is critical to economic development and poverty reduction. Therefore, to expand Africa’s power generation and increase access to energy, the Bank has invested in a wide range of energy projects across the continent, working closely with public and private sector partners to raise finance for these projects.

In 2016, we launched the New Deal on Energy for Africa to drive reform and investment in the sector, challenging the public and private sectors to take urgent and major action to address Africa’s need for energy. Intensifying and scaling up our work in the energy sector is a key High 5 priority for the Bank.

Figure 9 The cost of renewables is declining across Africa

Cost of installed operating and proposed utility-scale solar PV project in Africa, 2011–2018

|$ per Watt, 2015

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The Bank has installed new power generating capacity in various countries, increasingly drawing on the continent’s vast renewable resources. In 2017, we installed 460 MW of new total power capacity, compared to 490 MW in 2015; of this, 151 MW was new renewable power capacity. This is not enough to achieve the targets set in Africa’s New Deal on Energy. To build up a pipeline of power projects, governments must provide leadership, transparency, stable institutions, and a positive business and regulatory environment, and must build capacity to structure and negotiate agreements. At the same time, developers, like the Bank, must be technically and financially strong, leverage qualified local partners, offer competitive project terms, and work with other development finance institutions to deploy the right financial instruments.

Our investments reduced CO₂ emissions by 157 000 tonnes, well above the 17 300 tonnes in 2015, but below our target. We delivered 2730 km of new or improved power distribution lines, compared to 875 km in 2015, and delivered 510 km of new or improved power transmission lines compared to just 69 km in 2015. Overall, 597 000 people received new electricity connections, of which 272 000 were women.

We have yet to complete operations that connect people through off-grid systems or provide people with clean-cooking solutions. We are, however, working in these areas. We recently used our convening power to launch the Off-grid Revolution Initiative to explore innovative financing arrangements and new business models for decentralised renewable technologies. We are also supporting countries such as Togo with technical assistance in this area and will finance energy service companies starting in 2018. In the area of clean cooking—which is a relatively new area for the Bank—the AfDB is working closely with entities such as the Global Alliance on Clean Cookstoves to put in place technical assistance and investment operations that will facilitate a transition towards the use of improved cookstoves and modern fuels.

Providing increased access to energy in fragile situations has significant social and economic benefits

We funded rural electrification projects, so that remote communities benefited from accessing energy. In Burkina Faso, we provided equipment and materials to 159 rural areas, connecting 16 035 new customers and local cotton industries to the national network. Our rural project in Senegal delivered on-grid and off-grid electricity, connecting nearly 6000 users in 218 localities to the national grid and providing solar home systems to 398 households in 128 locations. This project was structured as a public-private partnership under a subsidy arrangement with the Government.

To ensure sustainable energy provision, many countries need to reform their energy sectors. Our projects help improve sector policies and transform utility companies. In Angola, we supported reforms to legislation, regulation, procurement and financing to ensure a better climate for private sector participation in the sector. This resulted
What has worked well

Boosting investor confidence by improving the energy supply
Power sector projects are expected to provide reliable, affordable energy. In Rwanda, the Bank’s loan to the KivuWatt methane gas project delivered secure, cheaper energy and boosted investment. This demonstrated the benefits that result from the Bank’s ability to manage complex power investments.

Managing risks for effective and timely project delivery
Experienced project management is essential to assess and manage risks in complex projects. In Egypt, skilled project managers ensured that the Ain El-Sokhna project was completed in a timely way despite facing unanticipated external risks due to political unrest. This showed that Bank should ensure that skilled project managers are in place and give them autonomy and backing.

What has not worked so well

Arranging timely delivery of project components when cofinancing
Cofinanciers may fund different, although interdependent, components of energy projects. In Botswana, the Bank constructed 215 km of transmission lines and a substation, but the generation component was delayed. The Bank must coordinate closely with cofinanciers to minimise the risk that project benefits may be delayed.

Employing women in power construction projects
Kenya introduced a target to recruit women for at least 20% of unskilled jobs. In a power transmission project, only half of the target was reached, a low result that was attributed to cultural attitudes and a shortage of available staff. Affirmative action measures need to be taken to achieve this gender target; and the Bank’s gender marker system will help track this, making more operations sensitive to gender.

The Bank’s New Deal on Energy in Africa establishes a transformative partnership to achieve universal access to energy in Africa by 2025, mobilising domestic and international capital for substantial innovative financing in the sector. The New Deal also supports African governments in strengthening energy policy, regulation and sector governance and commits to increasing the Bank’s own investments in energy and climate financing.

Under the New Deal, we are accelerating our investments to make rapid progress in increasing access to energy. In partnership with African governments, international donor agencies and the private sector, we are raising finance to invest in critical strategic and innovative power infrastructure, with a strong focus on clean production sensitive to gender.

Box 6  Turning a threat into prosperity in Rwanda’s Lake Kivu

The Bank invested in an innovative methane gas-fired power plant in Rwanda, addressing a substantial energy shortfall whilst also reducing the risk of methane explosions. The potentially explosive methane trapped in Lake Kivu was putting 2 million people at risk, but is now generating electricity.

The KivuWatt project at Lake Kivu includes a gas extraction facility on a barge that is 12.5 km offshore, a submerged pipeline carrying compressed gas to the shore and a 25 MW power plant. The Bank provided a loan of $25 million, just under one-fifth of the overall budget. The project was cofinanced with public and private financiers as a public-private partnership and is operated by an independent power producer.

The investment increased Rwanda’s power generation capacity by 16% to 186 MW and provides cheaper energy than the country’s other sources of power. This methane gas plant, together with Rwanda’s increasing use of solar energy, has led to an energy mix that is less reliant on diesel fuel. Phase II of the project will increase the capacity of the power plant by a further 75 MW.

The project’s success shows that costly and complex projects can be delivered in Rwanda and has enhanced Rwanda’s reputation as a destination for private sector investment.
and renewable energy solutions. Specifically, we have developed plans to benefit an additional 3.8 million Africans through regional power infrastructure that exploits economies of scale, creates efficiencies and provides affordable access to energy.

Under the New Deal, we are accelerating our investments to make rapid progress in increasing access to energy

The Bank remains committed to renewable power investments. In 2017, 100% of our investment in power generation supported renewable energy projects that will generate 1.4 GW of additional capacity while reducing greenhouse gas emissions by over 2.3 million tonnes annually.

Highlights and innovative programmes

Over the last year, under the New Deal on Energy in Africa, we approved projects to deliver access to energy for citizens, businesses and industry. Some of our investments were targeted to the “bottom of the pyramid” — that is, to the poorest and most vulnerable groups, including girls and women (see Box 7).

Among our recently approved projects was a $150 million investment for an innovative hydroelectric project — constructing a power plant on the river at Nachitgal in the south of Cameroon. This $1.1 billion project will increase national installed generation capacity by one-third, transforming Cameroon’s energy security, and will avoid the equivalent of 1.35 million tonnes of greenhouse gas emissions per year.

In Mali, we committed $25 million to cofinance — with Climate Investment Funds and the International Finance Corporation — a utility-scale solar PV power plant, one of the first in sub-Saharan Africa. The plant will increase the country’s generation capacity by one-tenth, providing sustainable energy services to citizens. The project demonstrates a business model for private investment in solar PV markets that could be replicated across West Africa.

The Sustainable Energy Fund for Africa, a multidonor trust fund administered by the Bank, approved seven project preparation grants for private sector innovations in renewable energy, as well as five grants focusing on off-grid and mini-grid projects. In Mauritius, a private sector company aims to develop an innovative low-carbon technology to provide air conditioning in the city business area using seawater. If successful, this could save significant electrical power at peak times and reduce emissions, and could be widely replicated. In Ethiopia, a technology company is preparing a project to design, develop and produce smart grid solutions to generate and distribute energy.

We are supporting the second phase of a private equity fund, the Evolution II Fund, which supports low-cost small- and medium-scale clean energy generation across Africa. The first phase generated wind and solar energy and avoided 1.19 million tonnes of CO2 emissions each year. We have also established implementation arrangements for the Facility for Energy Inclusion (FEI) through two funds — the $100 million FEI Off-Grid and the $400 million FEI On-Grid — for which the Bank approved a $100 million anchor investment to close funding gaps in the small-scale energy infrastructure sector and catalyze growth in last-mile energy access solutions.

With the Sustainable Energy Fund for Africa and the Infrastructure Consortium for Africa, the Bank worked with UN Environment to produce the Atlas of Africa Energy Resources. The atlas brings together regional and national data to provide a comprehensive picture of Africa’s energy resources, its production and consumption trends, and the potential for expanding energy supplies in a sustainable way.

Box 7 Powering rural homes in Tanzania with solar power

In Tanzania, many of the poorest and most vulnerable people live in rural areas where their lack of access to energy limits their educational and economic opportunities and affects their day-to-day quality of life.

On the outskirts of Babati in the Manyara region, 11-year-old Asha Juma explained how access to light is helping her to study: “Since my parents have a solar panel, I can now use a lamp to do my homework after going to the Kiongozi school.” Asha’s family no longer needs to use kerosene lamps or candles, which generate fumes and cause health problems. This change came about when Asha’s family acquired an 80-watt battery from Mobisol. The battery provides enough power for lights, a fan and a television. The family pays for the lamp and its services using their mobile phone, transferring money in affordable monthly instalments through a pay-as-you-go system. After three years, the product will be theirs and no more payments will be made.

The Bank is committed to work with its partners to connect 30 million African people to electricity through off-grid systems by 2025. These efforts will serve homes, schools, businesses and health centres, including in many counties in Tanzania. To reach beneficiaries, the Bank will leverage the work of such private sector players as Mobisol, M-Kopa Solar, Tigo and Off-Grid Electric.
The Bank is strengthening the implementation of its operations to meet the challenge of *Light up and power Africa*. We delivered projects to increase the generation of energy—particularly renewable energy—at regional and national levels. We provided distribution and transmission systems across borders and within countries. To meet our targets, we will accelerate our efforts, using more Bank resources and crowding in finance from the public and private sectors in line with the New Deal. Our focus is to scale up our joint efforts and deliver modern, affordable, and sustainable energy to Africa’s people, wherever they live, promoting industrialisation and creating jobs.