

Level 1: Africa's progress in the energy sector

Over 620 million Africans are living without the benefits of an electricity connection, a situation that limits both their quality of life and their livelihood opportunities. African businesses suffer from high energy costs and unreliable connections that limit their competitiveness. Extending access to affordable and reliable energy is fundamental to achieving inclusive growth.

This chapter summarises Africa's progress towards universal energy access. It looks at electrification rates across the continent; the rate of expansion of national power grids and innovative, off-grid solutions for remote areas; Africa's abundant clean energy potential and what is required to develop it; measures to improve energy efficiency and to foster regional cooperation in energy; institutional development in the sector; and the emergence of new approaches to financing energy infrastructure.

In this chapter we draw on the indicators from the first level of our Results Measurement Framework. Each one is presented with a traffic-light rating, comparing Africa's progress with the 2005 baseline.

Energy and poverty reduction

Energy can transform lives. Africa's poor people have far greater prospects of lifting themselves out of poverty if they have access to affordable power. Energy usage affects all aspects of domestic life, from employment and livelihood activities to improved health and education services. It is also essential for private sector development: reliable power is needed for the development of industries and enterprises, to create jobs and increase incomes. The modernisation of agriculture requires energy at every level—for irrigation, the operation of farming equipment and the processing of crops. Energy therefore underpins Africa's ambitions for structural transformation and poverty reduction (see Figure 1.1).

Enabling private sector development

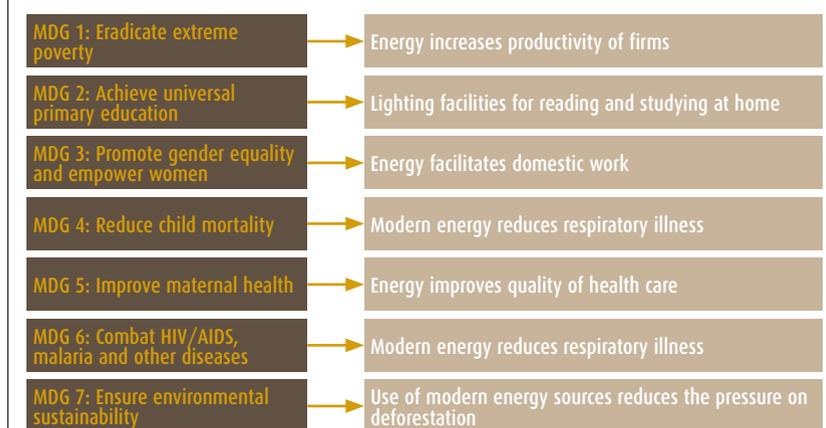
Access to electricity is a precondition for many business activities. It enables businesses to grow and produce higher-value products through the use of equipment and technology in the manufacturing and commercial sectors. It raises the productivity of traders and other small businesses, encouraging investment and employment growth. By providing lighting in the evening, it allows productive activities to continue for much longer.

According to the World Bank Enterprise Surveys, firms in 89 developing countries consider the availability, reliability and cost of electricity to be a major constraint on their business. In Africa, it is often cited as the single biggest constraint (see Figure 1.2). African businesses have to wait an average of 159 days

"How do you transform the economy? You've got to provide the basic infrastructure for people to transform their own lives. If people have power, the welder in a rural area can make money, children can read, health centres can have cold storage facilities"

Nigerian finance minister Ngozi Okonjo-Iweala

Figure 1.1 Energy and the Millennium Development Goals



While infrastructure and specifically energy was not included as one of the United Nations Millennium Development Goals (MDGs), most of the MDGs cannot be achieved if the infrastructure gap is not bridged.

Source: ODI

Table 1: Energy sector development in Africa (Level 1)

The table summarizes Africa progress in the energy sector between 2005 and 2013. For each indicator, we compare Africa's progress against 2005 baseline data is, as follows:

- Progress against the baseline;
 ● No progress compared to baseline;
 ● Regression against the baseline;
 ● Data is not available to measure progress.

INDICATOR	ALL AFRICAN COUNTRIES		LOW INCOME AFRICAN COUNTRIES (ADF)	
	Baseline 2005	Latest 2013 ^A	Baseline 2005	Latest 2013
ENERGY POVERTY				
● Schools with access to electricity (%)	22 ¹	33.5	14	19
● Doing Business – Getting electricity (days)	159	159
INCREASING ACCESS TO MODERN ENERGY				
● Electrification rate (%)	37.5	41.8	25.9	30.5
● Total population without access to electricity (million)	554	587
● Total household energy consumption (KWh)	666	690	159	170
● Total electricity installed (GWh)	113	136	31	39
PROMOTING CLEAN ENERGY				
● Combustible renewable and waste (% of total energy)	46	44	79	80
● Average carbon dioxide emissions from the consumption of energy (million metric tonnes)	19.4 ²	20.6	5.6	5.4
IMPROVING ENERGY EFFICIENCY				
● Energy intensity - total primary energy consumption per dollar of GDP (BTU per year, 2005 US dollars)	4061	3574
FOSTERING REGIONAL ENERGY COOPERATION				
● Energy traded (Billions of KWh)	64	73	39	43
● Import dependence – energy imports, net (% energy use)	-108	-96	-67.9	-67.2
STRENGTHENING GOVERNANCE IN THE ENERGY SECTOR				
● Quality of public administration (CPIA) (index)	3.3	3.5	3.2	3.5
● Quality of regulator (P-Rank) (index)	29	31	25	27
COLLABORATIVE FINANCING FOR ENERGY				
● Investment in energy with private sector participation ³ (billion current USD)	5	11	3.5	2.8

.. = data not available; KWh: Kilowatt hours; GWh: Giga Watt hours BTU: British thermal units (joules); GDP = gross domestic product; USD= United States dollars; CPIA: Country Policy and Institutional Assessment

Available baseline year is ¹=2010, ²=2007 ³=baseline is 2004–2005 and latest 2010–2012

^A: Where data are not available for 2013, the latest available values are used.

Notes: ADF countries are the 39 lower-income AfDB member countries that qualify for concessional funding: Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo Republic, Democratic Republic of the Congo, Côte d'Ivoire, Djibouti, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Somalia, Sudan, South Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. Cape Verde is in transition.

Source: African Development Bank, World Bank, United Nations Conference on Trade and Development, United Nations Educational, Scientific and Cultural Organization, US energy information agency, International Energy Agency, Sustainable Energy Fund for Africa, world Economic Forum, Alliance for rural electrification.

to **receive an energy connection**¹ – a figure that has not improved over the past eight years. Those with a connection complain of unreliable service, with frequent blackouts. Many of them choose to install backup generators, which account for 6% of generation capacity in Sub-Saharan Africa. Yet they are very costly for small-scale entrepreneurs, resulting in productivity losses and other significant constraints on private sector development.

Facilitating education

Electricity is also key to better education. It frees up time for school and study. It enables schools to use modern teaching equipment and methods, helps motivate teachers, and helps attract teachers to schools in remote locations. It also enhances opportunities for learning, allowing pupils to study in the evenings for children and making adult literacy classes possible. Electricity also opens up access to the internet and web-based learning.

A study of 5,610 schools in South Africa showed that access to services such as electricity can have a major impact on the quality of education received. Schools without electricity are excluded from fully engaging with modern electricity-dependent technologies in the classroom, while a lack of electricity may also hamper administrative efficiency.

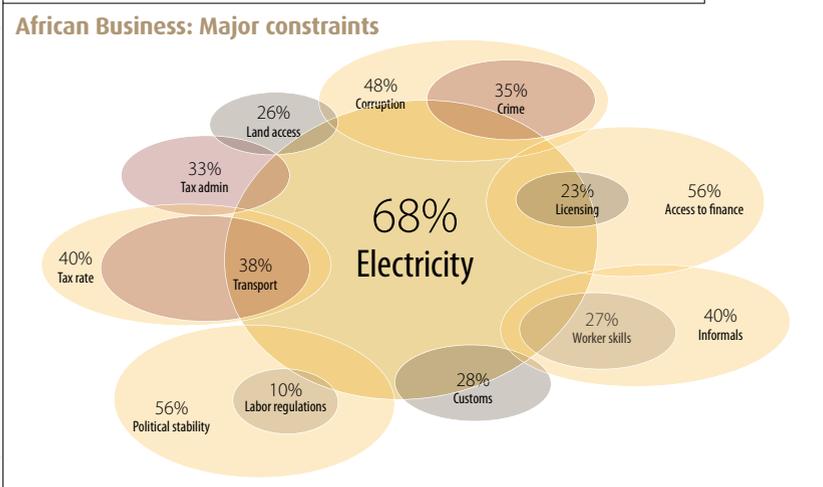
Yet in sub-Saharan Africa, only a fifth of **primary schools have access to electricity**². This is an improvement from 15% in 2005, but it still compares very poorly with comparator regions: nearly half the schools in South Asia and 93% in Latin America have electricity. Moreover, some African countries lag far behind the average. In Burundi, for example, only 2% of primary schools can access electricity. Across the board, it is children in rural areas whose education is most likely to suffer from the lack of power.

Enhanced health

The delivery of modern health services is heavily dependent on electricity. It enables clinical services to be delivered after sunset and provides better lighting for critical procedures. Refrigerated storage is essential for many vaccines and medications. Medical implements can be sterilised, and modern equipment like x-ray machines can be installed. Health officers are more easily attracted to rural settings when there is electricity. In Kenya, a 10 point increase in electricity provision to health facilities – from 62% in 2004 to 72% in 2010 – led to a doubling in the number of incubators, which in turn contributed to a major decrease in the national neonatal mortality rates, from 40 to 28 per 1000 births.

The supply of electricity to health facilities needs to be reliable. One of the major differences between health centres in many African countries is between having a physical connection to the electricity grid and having a reliable power supply.

Figure 1.2 How important is lack of electricity for African business?



Source: ONE

Improving women's quality of life

Increasing access to energy offers particular benefits for African women and girls. Across the continent, women and children bear the burden of cooking and collecting water and fuel. Electricity and modern cooking fuels can offer them substantial time savings each day, while relieving them of the health risks posed by fumes from traditional stoves. Refrigeration saves time spent on preserving perishable foods and helps to boost nutrition. Yet all too often, even those African households with an electricity connection continue to use wood or dung for cooking, because of the high cost of appliances and the lack of reliable and affordable power.

African businesses have to wait an average of 159 days to receive an energy connection

Reliable energy also enables women to earn livelihoods through small businesses, giving them greater independence and social status. It also has a significant impact on child welfare, as women are likely to invest their extra income in the family.

In Kenya, a 10 point increase in electricity provision to health facilities contributed to a decrease in the neonatal mortality rates, from 40 to 28 per 1000 births, as a results of more incubators

Increasing access to modern energy

The challenge of meeting Africa's energy needs

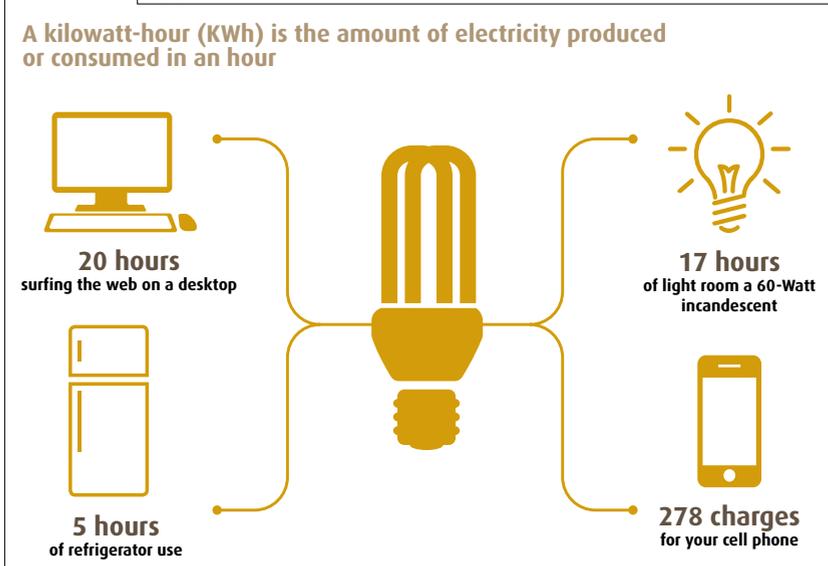
Nearly 6 out of every 10 Africans have no access to reliable energy, and over 620 million people in Africa live each day without the benefits of an electricity connection³. The situation is markedly

1 A yellow bullet indicates no progress compared to baseline.
 2 A green bullet indicates good progress has been made and we are on track to meet our target.
 3 For comparison: 2 out of 10 people in the world and 4 out of 10 people in developing Asia (2011).

worse in rural areas: rural electrification rates are just 10% across sub-Saharan Africa.

Even people with connections often find that electricity is simply too expensive. Faced with high prices and the extra cost of appliances, many African households with access to electricity are using as little as 250 kilowatt-hours (KWh) per year – enough to power a floor fan, mobile telephone and two compact fluorescent lights for five hours a day – while continuing to use traditional biomass for cooking (see Figure 1.3). Collecting wood and other solid fuel is time-consuming and damaging to the environment, while traditional stoves or open fires cause indoor air pollution that in 2013 accounted for some 600 000 deaths in Africa, the majority of them women and children.

Figure 1.3 How much is a KWh?



Moreover, electricity supplies can be very erratic. Growth in demand is placing heavy pressure on national electricity systems, and 30 African countries now face regular power shortages. This constitutes a major impediment to their development, imposing financial costs on businesses and a range of other costs on households, including a reduced quality of education.

Progress is nonetheless being made. Africa's **electrification rate** increased from 37.5% in 2005 to 41.8% in 2013, despite rapid population growth. Overall, 100 million people gained access to electricity over 1990–2010, mainly because of expansion in urban networks. Electrification in urban areas has only just kept pace with rapid urbanisation, increasing from 94% to 95% over the 8-year period. Overall, **total household electricity consumption** across Africa has gradually increased, from 666 KWh/year in 2005 to 690 in 2013. However, it remains very low compared to other developing regions and far behind the 14 000 KWh used by an average American household each year.

Towards universal access

The International Energy Agency estimates that Africa needs investments of more than \$60 billion each year to achieve universal access to electricity by 2040. The Agency has identified 12 African countries as needing major investment in their energy sectors—among them Africa's two most populous countries: Nigeria, where 82 million people lack access to electricity (47% of population), and Ethiopia, where 64 million lack access (68% of population).

Yet finance is only one part of the solution. Countries need clear strategies for expanding access to energy that are fully integrated with their wider development plans. A satisfactory legal and regulatory framework, a robust financial sector and stronger institutional capacity in the sector will all help to attract the necessary private investment. Furthermore, any price subsidies must be well designed and targeted to the people who need them most.

The other key ingredient is innovation. Energy technologies are developing rapidly, in response to the pressures of climate change and the need for sustainability. The expansion of traditional energy grids needs to be supplemented by off-grid and micro-grid solutions. These smaller-scale technologies, using green sources such as wind and solar power, will be key to meeting Africa's energy needs, particularly in remote areas. They often involve high initial capital costs, but are cost-effective over the longer term. Overall, around half of the necessary expansion in energy generation in Africa can come from renewable technologies, especially hydropower. As a result, the impact of universal energy access on global climate emissions would be an increase of just 0.6% by 2030. Related to this, this year's Africa Progress Report will examine climate change issues and opportunities, including African requirements for a fair climate deal in December 2015 and the right policy mix to boost investment in renewable energy (See Box 1.1).

Box 1.1 Africa Progress Report to challenge narrative on climate-energy links

As the clock races towards December 2015, when a new global treaty on climate change is due, African leaders face competing priorities. Already suffering the effects of climate change, they naturally support efforts to minimise the emissions of global greenhouse gases. On the other hand, they urgently need power to boost and transform their economies.

Their challenge is to adopt a judicious energy mix, the right balance between fossil and renewable energies that will meet these two priorities. Chaired by Kofi Annan, the Africa Progress Panel will examine that challenge this year through its flagship Africa Progress Report. With minimal responsibility for global climate change, for example, African countries cannot be expected to adopt low-carbon strategies immediately, because that would undermine social and economic progress so far.

The continent's significant potential for renewable energy, however, could help accelerate African growth and contribute to global innovations in the same way that mobile phones leapfrogged existing technologies.

Source: Africa Progress Panel

Promoting clean energy

Africa's clean energy potential

Africa is richly endowed with sources of renewable energy. The continent has more than half of the world's renewable energy potential: hydropower, bio-energy, geothermal, aero-thermal, solar, wind and ocean. Over the next 20 years, renewable energy will account for nearly 40% of total energy generation in Africa, rising from just 16% in 2008.

Yet this is just a beginning. With the right investments, Africa's hydro and solar potential could secure energy supply across the continent at many times the current level. Cross-country analysis has revealed huge opportunities, using known technologies. For example, in Chad, current energy consumption could be met 77.3 times over if all renewable energy sources were tapped.

Developing this potential requires a strong package of policy measures, which include active government support for energy efficiency and the elimination of fossil fuel subsidies. Looking to the future, sustained support is needed for research and development on renewable energy, as well as on advanced transport fuels and technologies.

Currently, average **carbon dioxide emissions from energy consumption** in Africa are at 20.6 million tonnes, just 6% higher than in 2007⁴. CO₂ emissions from low-income countries in Africa have actually fallen over this period, from 5.6 to 5.4 million tonnes. This shows the value of investing in renewable sources and natural gas, as energy generation capacity expands across Africa.

Hydro energy potential

Africa has vast potential for hydroelectric power, of which 60% lies in Central Africa's high-density river network. Yet only 5% of this potential is currently being tapped. Its development would enable the expansion of Africa's energy generation capacity on a large scale, potentially meeting the continent's entire future energy needs. It would also deliver a range of other benefits through the management of water resources for domestic, industrial and irrigation purposes.

The Democratic Republic of the Congo (DRC) and Ethiopia both have huge potential to generate and export energy: these two countries alone could supply most of Africa's energy needs. Ethiopia's electricity output from hydropower in 2008 was around 3000 GWh, yet it could generate as much as 162 000 GWh. Accordingly, significant efforts are under way in both these countries to harness the hydropower potential. The Inga Dam project in DRC, a priority investment in the New Partnership for Africa's Development (NEPAD)/Central Africa infrastructure programme, entails rehabilitating the existing facilities to restore their generation capacity to 1775 MW. Plans are to boost generation capacity at the site to 40 000 MW, with connections to Nigeria, South Africa and Egypt.

Yet the obstacles to delivering large-scale hydropower across Africa remain substantial, largely because the need for multinational investments increases the risk. The social and environmental impacts of large hydro investments will also need to be carefully managed. Major projects can involve the displacement of people from their homes, ecosystem losses and the diversion of water flows, affecting supplies to consumers downstream, including in other countries. Close attention must also be paid to changes in rainfall patterns that result from climate change, which could affect the economic viability of hydropower investments. Given these challenges, many African countries have preferred to undertake smaller-scale hydropower investments, with lower generating capacity. To give confidence to investors, there needs to be a clear political vision that is shared across national boundaries. This is where the role of regional economic communities becomes particularly important.

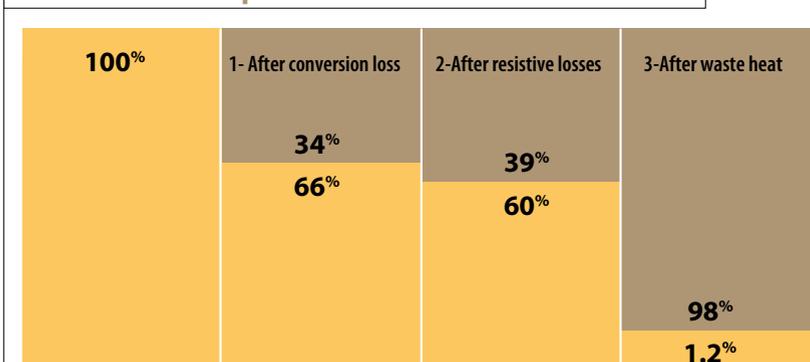
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Geothermal fields

Geothermal, another important source of renewable energy now represents only 3% of the world's total power generation.

Apart from Pacific Asia, the East African Rift Valley is the region with the strongest geothermal potential. In this region, Kenya leads in developing geothermal power; it is planning to add 2000 MW of capacity by the end of this decade. Djibouti and Ethiopia are likely to increase their installed capacity by 50 to 200 MW. Such development, however, still depends on the ability to exploit new geothermal fields, and information about the resources there is limited.

Figure 1.4 Energy efficiency of a 60 Watt incandescent lamp



Much of the energy content of the available energy sources is wasted by inefficiencies in energy conversion and distribution processes. Considering domestic electric lighting as a typical example, less than 1% of the energy consumed to provide the electricity is ultimately converted into light energy. The other 99% is wasted in the supply chain.

Source: Electropaedia

⁴ For comparison: Asia and Oceania, excluding China had an average of 135 million tonnes.

Improving energy efficiency

Energy efficiency is low across Africa, with heavy losses throughout the generation, transmission and distribution process (see Figure 1.4). Losses range from 5% in South Africa to 10% in Botswana and as much as 40% in Uganda and Sudan. ● **Energy intensity**⁵ in Africa is however declining, down from 4061 BTU (British thermal units) per dollar of GDP in 2005 to 3574 BTU in 2013. With improved efficiency, Africa's generation capacity would be sufficient to deliver much better service levels to households and industry.

A number of countries have taken action to make their energy systems more efficient. Algeria, Morocco and Tunisia have all established national agencies to focus on energy efficiency and implement targeted programmes. Energy generating plants need regular maintenance to ensure that they are able to operate at full capacity, as well as periodic upgrades that draw on the latest technologies. Investing in the development and maintenance of transmission and distribution networks can also deliver major efficiency savings.

A transmission line running through Kenya, Tanzania and Zambia will connect the Southern African and Eastern Africa Power Pools, making it possible to trade energy among 24 countries

Consumer measures can also promote more efficient use of electricity. For example, a number of African countries, including Ethiopia, Malawi and Uganda, have achieved significant cost savings through programmes promoting the use of energy-efficient light bulbs. Subsidies can be offered to encourage the adoption of energy-efficient stoves, which reduce household energy demand and provide health benefits. More efficient appliances allow consumers to receive more for their electricity charges.

In Southern Africa, joint regional planning of investments will result in savings of at least \$4 billion (equivalent to 5% of total system costs) over a 20-year period

Energy access, efficiency and renewable energy are all interconnected concepts

The objectives of improving the efficiency of generation and transmission, promoting the use of renewable energy and increasing people's access to electricity are all closely connected. Greater energy efficiency results in increases in total supply and reduced energy costs, making it more affordable for households to connect to the system. At the same time, increased use of power creates opportunities for economies of scale, leading to higher efficiency and lower unit costs. Renewable energy technologies, such as mini-grids and home systems using wind or solar energy,

allow people in remote and dispersed locations to use electricity, increasing the overall access rate.

Fostering regional energy cooperation

Because energy resources are distributed unequally across Africa, trade in electricity across national boundaries is essential to providing power across the continent. Hence, Africa is developing regional power pools to enable energy-rich countries to export to other countries. The Bank is also leading on the implementation of the NEPAD Programme for Infrastructure Development in Africa (PIDA), which sets out priority power-sector investment needs for the next three decades at the regional level (see Figure 1.5).

There are substantial benefits to participating in regional power pools, particularly for smaller and less densely populated countries. Member countries can plan their networks jointly, increasing overall capacity and achieving economies of scale, which translate into cheaper energy for consumers. Regional power pooling also helps to manage the risks associated with major investments in hydropower, as countries can import more power during periods of reduced rainfall.

Africa now has five regional power pools, signalling widespread political interest. So far, however, only 2% of the energy in Southern Africa passes through a competitive regional power market. In Central, East and West Africa, there is bilateral electricity trade, but power pools are at various stages from planning to implementation. ● **Total energy traded** in Africa has therefore increased fairly slowly since 2005, from 64 to 73 billion of KWh, while ● **import dependence** has decreased from 108 to 96% of energy use.

Regional power pools need strong institutional structures; therefore, national power regulations need to be reformed and harmonised. At present, policymakers in some countries are concerned about the implications of depending on other countries for their power needs. A clear political consensus and strong regulatory arrangements can help to reduce the political risk.

Africa's Regional Economic Communities also have an important role to play. Their capacity needs to be strengthened so that they can oversee the development of power pools and help to structure and negotiate power purchasing agreements with the private sector. Legal and regulatory frameworks must be put in place to enable specialist power pool organisations to work on behalf of national governments and Regional Economic Communities, particularly when negotiating power deals.

To raise the substantial finance needed for intra-regional infrastructure, some countries and Regional Economic Communities are assessing the possibility of issuing infrastructure bonds or drawing on pension funds or central bank reserves. According to PIDA

⁵ Energy intensity (the quantity of energy used per unit of economic output) is a standard measure of energy efficiency. Energy efficiency is defined as the ratio between useful outputs and associated energy inputs.

plans, power grids in East and Southern Africa will be interconnected by 2040. A transmission line running through Kenya, Tanzania and Zambia will connect the Southern African Power Pool and Eastern African Power Pool, making it possible to trade energy among 24 countries. An enlarged power pool will enable member countries to share, and in some cases postpone, investments in generating capacity and to maintain narrower reserve margins, thereby lowering operating costs. It will also enable burden-sharing and back-up support, providing more reliable power supply for millions of people.

Where growth in electricity demand is high, joint regional planning of investments can generate enormous savings. In Southern Africa, it is expected to result in savings of at least \$4 billion (equivalent to 5% of total system costs) over a 20-year period. However, not all power needs can be planned at the regional level: regional power pools must be built on a foundation of sound national and local planning.

Strengthening governance in the energy sector

In African countries the energy sector has historically been characterised by public sector monopolies that are often highly inefficient, leading to inadequate and unreliable supplies, poor access rates and high prices. Since the 1980s, there have been efforts to restructure African power sectors to overcome these problems. Many countries have introduced greater market orientation through reforms to their policies and institutions, to attract the levels of private investment that are needed.

So far, these reforms have met with mixed success. Only a few countries attempted full privatisation or the complete unbundling of generation and distribution functions, and some, such as Mali and Senegal, have now returned privatised utilities to public ownership. The majority of African countries now have a hybrid energy market, with a state-owned utility both buying electricity from independent producers and running its own power generation facilities.

Slow progress on reform is one of the causes of high electricity costs in Africa. Electricity prices average \$0.15 per KWh across sub-Saharan Africa, and as much as \$0.21 in countries that depend on thermal generation. Other causes include the inefficiency of small, national markets and dependence on costly emergency supplies in some countries.

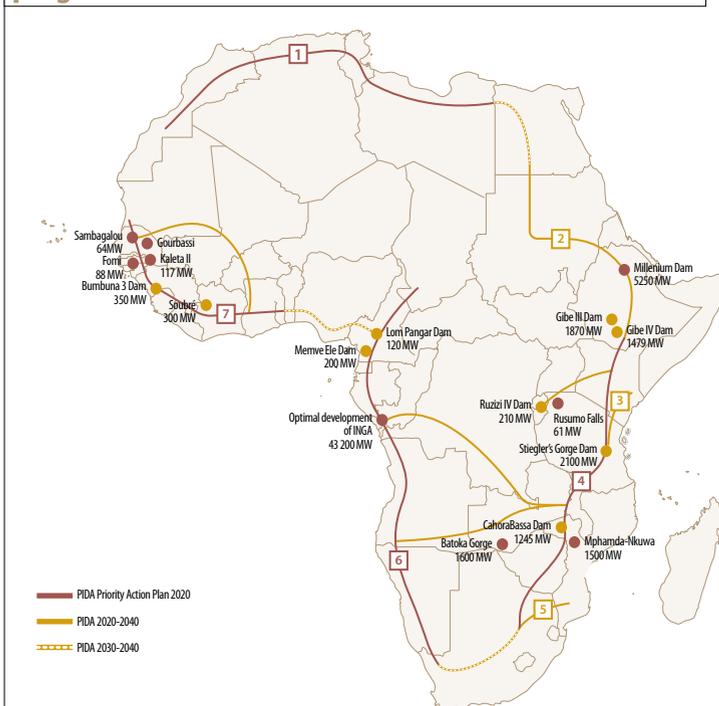
One of the key reform challenges is the widespread use of generalised energy subsidies that shift part of the cost of energy from the consumer to the government budget (see Figure 1.6). While making power more affordable to the public, these subsidies are highly regressive in nature, disproportionately benefiting not poor people, but wealthier households and businesses, which use more electricity. Most experts therefore advocate a system of full cost recovery, supplemented by more targeted subsidies for the poorest households. Once people have become accustomed to subsidies, however, the political costs of removing them are high.

In this context, Africa needs effective national regulators that are able to put in place a fairer subsidy structure, reducing the burden on national budgets while helping to increase poor people's access to electricity.

Electricity prices in Africa average \$0.15 per KWh across sub-Saharan Africa compared to \$0.061 in Indonesia

Many national regulatory bodies have been strengthened by the work of the African Forum for Utility Regulators, which builds capacity and facilitates knowledge-sharing across the continent.

Figure 1.5 PIDA—generation and transmission programme



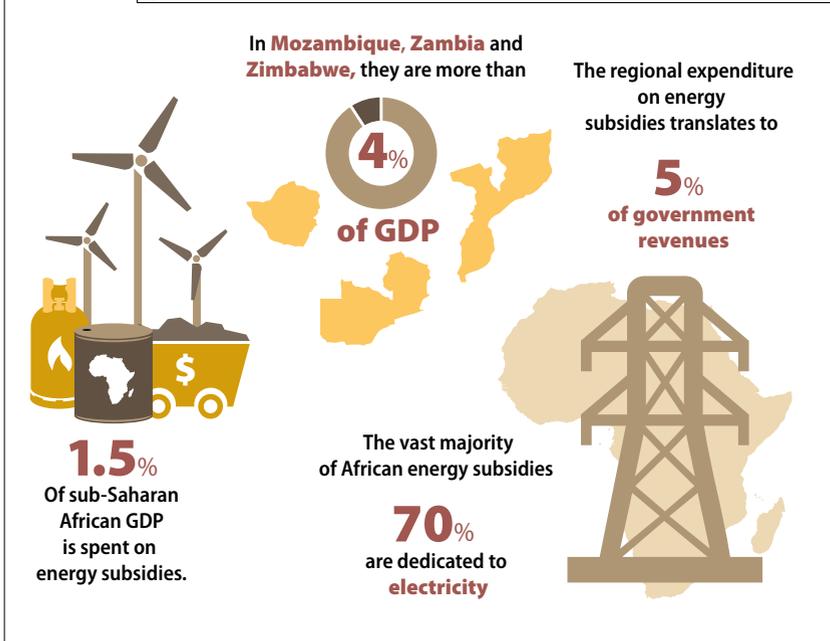
- 1 North Africa transmission; 2 Sudan-Ethiopia transmission; 3 Tanzania-Kenya transmission;
- 4 North South transmission corridor; 5 South Africa Mozambique transmission;
- 6 Central Africa transmission; 7 West Africa power transmission corridor

NEPAD's Programme for Infrastructure Development in Africa provides a strategic framework for the development of regional and continental infrastructure in Africa. Its Priority Action Programme sets out the most urgent investments in the coming period. Its energy projects, once implemented, will help to boost trade within and between power pools. The expected benefits include reduced costs through economies of scale, a better energy mix among countries that depend on hydropower and those where thermal energy predominates, and increased access to modern energy services for the private sector, for public service delivery and for households.

Source AfDB, PIDA

6 For comparison: Indonesia \$0.061 (2008), Finland \$0.172 (2008).

Figure 1.6 Energy subsidies cost sub-Saharan African governments 5% of their revenues



Source: GroIntel

Since 2005, the **regulatory quality index** for Africa has improved from 29 to 31. Looking at governance across the energy sector, there has also been a gradual improvement in the **quality of public administration index**. However, the lack of strong and independent regulators is slowing the development of the sector.

Overcoming the deficits in Africa's energy infrastructure calls for investments of more than \$60 billion annually until 2040

Collaborative financing for energy

Overcoming the deficits in Africa's energy infrastructure calls for investments of more than \$60 billion annually until 2040. A range of partnerships will be required to supplement countries' public investments with the necessary investment and technical capacity. At various summits, the G20 and the BRIC countries (Brazil, Russia, India and China) have pledged to help Africa develop the power and other infrastructure it needs to participate in the global economy (see Box 1.2).

Since 2005, investment in energy with private participation increased across Africa from \$5 billion to \$11 billion, despite the financial crisis

The key to accelerating the development of power infrastructure is to select the investments with the greatest transformative potential that are already part of national and regional development plans, and for which the institutional capacity required for effective

delivery is already in place. Projects must also be attractive to private sector investors.

So far, the record on attracting private investment has been disappointing. Over the decade ending in 2013, sub-Saharan Africa accounted for only 2% of private sector investment in energy infrastructure in developing regions. Four-fifths of this investment is concentrated in six countries: Cameroon, Ghana, Kenya, Nigeria, Tanzania and Uganda. However, since 2005, the level of **investment in energy with private participation** increased across Africa from \$5 billion to \$11 billion, despite the financial crisis.

While a number of African countries have public-private partnerships for power infrastructure, in most countries the main constraint on private sector investment is a lack of well-prepared, bankable projects. Project preparation facilities, such as those provided by the AfDB and other development partners, will therefore play an important role, helping to fund the substantial costs involved in preparing viable regional energy projects, so as to attract investment from public and private sources.

Box 1.2 Multilateral Development Banks: Infrastructure Action Plan

The Multilateral Development Banks Working Group on Infrastructure has developed a joint Infrastructure Action Plan for Africa that sets out a strategy for increasing private sector participation and boosting the efficiency of infrastructure spending. Its four main recommendations for Africa's power sector, taking the PIDA into account, are as follows:

- ▶ West Africa Power Pool: construct a 1400 km transmission line connecting Côte d'Ivoire, Liberia, Sierra Leone and Guinea.
- ▶ East Africa Power Pool: strengthen connections between the power systems of Ethiopia and Kenya.
- ▶ Inga Dam and the Central and Southern Africa Power Pools: double capacity at the Inga Dam in the Democratic Republic of the Congo and construct transmission lines to reach 16 countries.
- ▶ North Africa: scale up solar energy through the solar power plant under construction in Morocco and other planned plants for possible exports to European markets.

Another promising strategy that African countries can consider in their national power strategies is to attract independent power producers to construct power plants, enabling expanded generation capacity without major public investments. Electricity prices can be set through long-term power purchasing agreements. In South Africa, to help build an uninterrupted supply of electricity for the country, the government has introduced a renewable energy and independent power producer programme with a target of 3725 MW. This introduces an element of competition into the sector, without the need for major restructuring.

Many African countries also have the potential to mobilise domestic capital markets to finance energy infrastructure. In Cameroon's Kribi Gas Project, for example, loans from the International Finance Corporation, African Development Bank and World Bank were used to leverage investments from the private sector. Local Cameroonian banks participated in the financing and lent some \$82 million—about 31% of overall project debt. As capital markets develop across Africa, domestic banks and pension funds could become key players in financing energy infrastructure. In addition, finance can be sought from sovereign wealth funds, resource-rich countries, and non-traditional donors and emerging financiers.

Conclusion

Africa continues to face many challenges in providing reliable and affordable energy to a large proportion of the population. With rural electrification rates of just 10% across sub-Saharan Africa, about 6 of every 10 Africans are forced to live without reliable access to electricity. As a result, they are severely constrained in their ability to pursue livelihood opportunities, access public

services and lift themselves out of poverty. Affordable and reliable electricity is an essential foundation for many of Africa's development goals and aspirations.

More than \$60 billion in annual investments are needed to close the infrastructure gap and achieve universal electricity access by 2040. There are positive signs: around half of this finance is already available, with a growing share coming from national revenues and financial markets. The development of regional power pools will help both to mobilise new investments and to boost the efficiency of existing networks, lowering the costs of electricity provision.

Equally important is the spread of clean energy technologies, including off-grid and micro-grid solutions to supplement traditional energy supplies. These solutions may have higher up-front costs, but they offer significant returns over the longer term, helping to boost the supply of power without compromising sustainability. With over half of the world's renewable energy sources, Africa has significant potential to leapfrog older technologies and become a global leader on clean energy ■