

Development Effectiveness **Review 2014**

ENERGY

Thematic review



ACKNOWLEDGEMENTS

This issue of the African Development Bank (AfDB)'s Development Effectiveness Review 2014 on Energy is the product of strong collaboration between the Energy, Environment and Climate Change Department (ONEC), the Private Sector Operations Department (OPSM) and the Quality Assurance and Results Department (ORQR). Within ORQR, under the overall guidance of Victoria Chisala, Division Manager, Olivier Shingiro was the task manager of this report, Helmi Hmaidi and Mariem Khelifi provided valuable statistical support. Within ONEC, contributions were provided by Audrey Rojkoff, OPSM guidance was provided by Angela Nalikka and Alli Dimple Mukasa. We also would like to recognise Zakou Amadou, Youssef Arfaoui, May Ali Babiker, Aimee Bella-Corbin, Mafalda Duarte, Tanja Gabriele Faller, Anouk Fouich, Gisela Geisler, Azza Gharbi, Samia Gharbi, Samer Hachem, Kurt Lonsway, Ihcen Naceur, Meissa Gueye Ndir, Engedasew Habtemichael Negash, Elise Ouattara, Monojeet Pal, Pénélope Pontet de Fouquières, Joshua Powell, Egidia Rukundo, Foday Turay, Y.K Vyas, Blandine Wu Chebili, and Nawa Yeo.

We especially acknowledge the contributions of chief writer Marcus Cox (Agulhas Applied Knowledge), graphic designer Nadim Guelbi (Belmakett), and editor Patricia Rogers, all consultants.

Emmanuel Ebot Mbi

Chief Operating Officer and First Vice-President
African Development Bank

Simon Mizrahi

Director, Quality Assurance
and Results Department
African Development Bank

Alex Rugamba

Director, Energy, Environment
and Climate Change Department
African Development Bank

Cover photo: Renewable energy technologies, such as wind energy, allow people in remote and dispersed locations in South Africa to use electricity, increasing the overall access rate. — © L. Pop

© 2014 African Development Bank Group

All rights reserved. Published March 2015.
Printed in Abidjan.

Development Effectiveness Review 2014 – Energy

The views expressed in this book are those of the authors and do not necessarily reflect the views and policies of the African Development Bank (AfDB) or its Board of Governors or its Board of Directors or the governments they represent.

AfDB and its Board of Directors do not guarantee the accuracy of the data included in this publication and accept no responsibility for any consequence of their use.

By making any designation of or reference to a particular territory or geographic area, or by using the term “country” in this document, AfDB does not intend to make any judgments as to the legal or other status of any territory or area.

AfDB encourages printing or copying information exclusively for personal and non-commercial use with proper acknowledgment of AfDB. Users are restricted from reselling, redistributing, or creating derivative works for commercial purposes without the express, written consent of AfDB.

Note: In this report, “\$” refers to US dollars.

African Development Bank Group

Statutory headquarters:
Immeuble du Centre de commerce International d’Abidjan (CCIA)
Avenue Jean-Paul II 01 BP 1387, Abidjan 01 Côte d’Ivoire

www.afdb.org

Contents

Foreword	1
Executive summary	3
Introduction	9
Level 1: Africa's progress in the energy sector	11
Energy and poverty reduction	11
Increasing access to modern energy	13
Promoting clean energy	15
Improving energy efficiency	16
Fostering regional energy cooperation	16
Strengthening governance in the energy sector	17
Collaborative financing for energy	18
Conclusion	19
Level 2: The Bank's contribution to the energy sector	21
The evolution of our energy policy	21
Increasing access to modern energy	22
Promoting clean energy	23
Improving energy efficiency	24
Fostering regional energy cooperation	24
Strengthening governance in the energy sector	25
Collaborative financing for energy	26
Energy and poverty reduction	28
Learning lessons from our energy operations	28
Conclusion	29
Level 3: How well is the Bank managing its energy portfolio?	31
Designing quality projects	31
Effective implementation	34
Engaging with partner countries	34
Conclusion	34
Level 4: How efficient is the Bank in supporting its energy operations?	37
Organisation, instruments and processes	37
Client-oriented human resources	39
Conclusion	39
Conclusion and outlook	41

List of tables

Table 0: Energy sector Results Measurement Framework	9
Table 1: Energy sector development in Africa (Level 1)	12
Table 2: How the Bank contributes to energy sector development in Africa (Level 2)	22
Table 3: How well is the Bank managing its energy portfolio? (Level 3)	32
Table 4: How efficient is the Bank in supporting its energy operations? (Level 4)	38

List of figures

Figure 1.1 Energy and the Millennium Development Goals	11
Figure 1.2 How important is lack of electricity for African business?	13
Figure 1.3 How much is a KWh?	14
Figure 1.4 Energy efficiency of a 60 Watt incandescent lamp	15
Figure 1.5 PIDA—generation and transmission programme	17
Figure 1.6 Energy subsidies cost sub Saharan African governments 5% of their revenues	18
Figure 2.1 Morocco integrated project	23
Figure 2.2 Full steam ahead with geothermal energy in Kenya	24
Figure 2.3 Connecting Kenya to Ethiopia's powerhouse	25
Figure 2.4 Burundi made obtaining an electricity connection faster and cheaper	27
Figure 2.5 Cost comparison with and without electricity in Benin	28
Figure 2.6 Learning from our operations	29
Figure 3.1 Designing better informed and quality projects	33
Figure 3.2 Implementing performing and effective projects	34
Figure 3.3 Bank's current energy portfolio	35
Figure 4.1 An effective structure to implement ONEC strategy	37
Figure 4.2 Client oriented human resources	39

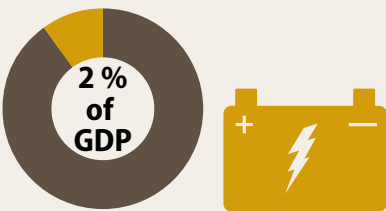
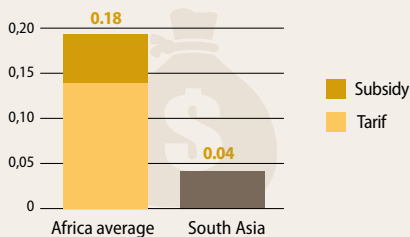
List of boxes

Box 1.1 Africa Progress Report to challenge narrative on climate-energy links	14
Box 1.2 Multilateral Development Banks: Infrastructure Action Plan	18
Box 2.1 Converging initiatives	26
Box 2.2 Partial risk guarantees to stimulate private investment	27
Box 2.3 Technical assistance for the Inga Dam	27
Box 2.4 One Bank in action: Combining ADF concessional resources with equity investment	28
Box 2.5 Using lessons learnt in Benin to improve project design	29
Box 3.1 Joint achievements of AfDB and Climate Investment Funds	33

Africa energy challenges and opportunities

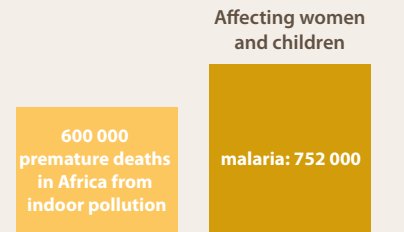
Africa has enormous clean energy potential but is faced with big challenges in providing its people with energy access. Over 620 million people in Sub-Saharan Africa—60% of the population—are without access to electricity.

Africa has a high electricity production cost (\$/KwH)

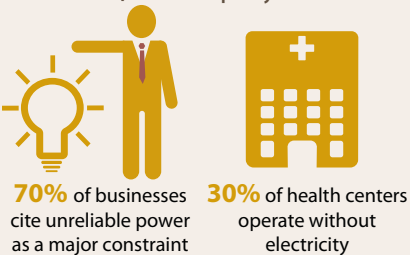


... And unreliable power is the opportunity cost of outage and load shedding, leading to emergency energy generation

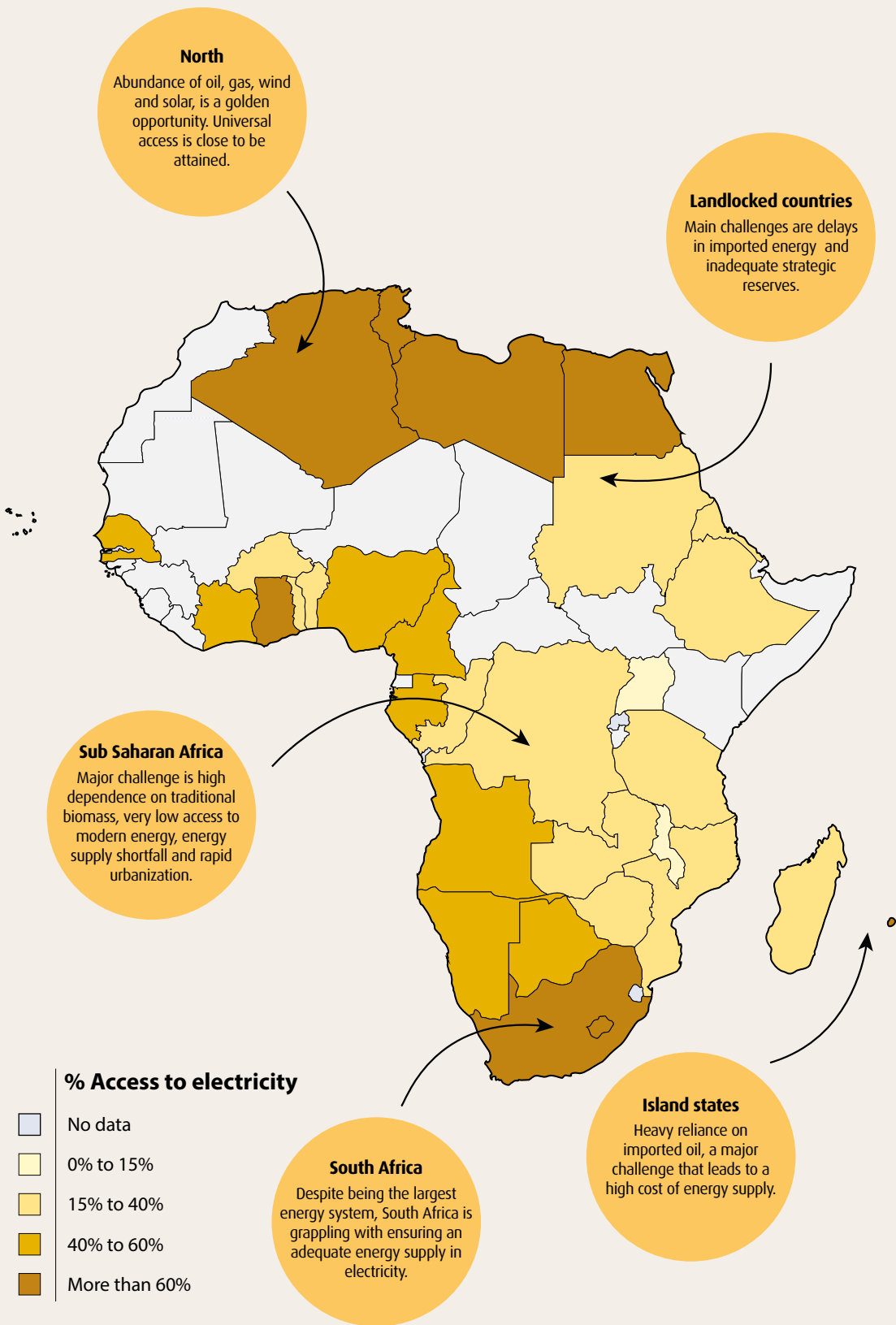
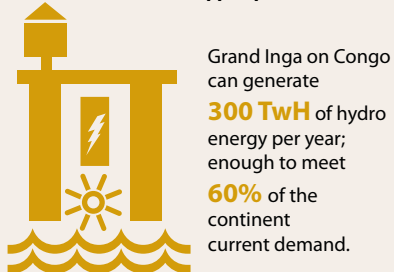
This creates energy poverty



Limiting private sector development Hindering the delivery of quality health services



Africa has however untapped potential





Providing energy to key productive sectors

Access to electricity enables small businesses such as *Burn Manufacturing Company* in Kenya to grow and produce higher-value products through the use of equipment and technology.

Foreword

Energy is one of the most essential requirements for Africa's development. In the 21st century, it is a matter of concern that over 620 million Africans still live without the benefits of an electricity connection. A reliable and affordable energy supply is key to generating the broad-based and inclusive economic growth needed to make major inroads into poverty; it can transform the lives and livelihoods of Africans, helping them to take charge of their own development.

Energy is also a field of opportunity for Africa. The continent has significant share of the world's renewable energy sources, of which only a fraction is under development. Africa has the potential to leapfrog over carbon-intensive technologies and meet most of its future energy needs from renewable sources, putting it firmly on the path to green and inclusive growth.

The African Development Bank has therefore placed energy at the heart of its portfolio. Over the past four decades, we have invested over \$13 billion in the energy sector, to boost generation capacity and rural electrification. Under our new Energy Policy 2012, we help African countries build modern energy sectors that are socially, economically and environmentally sustainable. We will support regional investments that link national electricity systems into regional power pools, to enable power-sharing across national borders and promote more efficient regional planning of energy infrastructure.

The Bank also helps develop Africa's potential in clean energy. From the vast hydropower potential of Central Africa's river systems, to some of the world's largest solar power installations in North Africa, to innovative, small-scale renewable energy solutions for remote areas, we will help African countries move towards a green development pathway.

However, the investment needs are very large: overcoming Africa's energy deficits will require investments of more than \$60 billion a year until 2040. As this amount is far beyond the capacity of any single institution, we are working to leverage other sources of finance and establish strategic partnerships with other development partners. We are also helping our member states to develop public-private partnerships for power infrastructure and to access sources of climate change finance.

Working closely with our member states and international partners, the Bank will help the continent and its people realise the vision of reliable, affordable and sustainable power for all Africans.



A handwritten signature in black ink, appearing to read 'S. Asamoah', with a long horizontal line extending from the end of the signature.

Solomon Asamoah

Vice President Operations in charge of Infrastructure,
Private Sector & Regional Integration



Energy transforms lives

The Bank financed the Côte d'Ivoire-Liberia-Sierra Leone-Guinea Electricity Interconnection which will link these four countries belonging to the Mano River Union, allowing them to benefit from cheaper energy and greater solidarity.

Executive summary

The Development Effectiveness Reviews are a series of publications that examine the contribution of the African Development Bank (AfDB, or the Bank) to Africa's development. They are presented in an accessible way, for a general audience. This Development Effectiveness Review examines the challenges Africa faces in providing affordable and sustainable energy to its citizens, and the Bank's contribution to meeting those challenges during 2009–13¹

The Bank is a leading investor in African infrastructure, and energy projects are a major part of our portfolio. Over the past 40 years, we have invested \$13 billion in building up power generation capacity and distribution networks across Africa, together with the institutions required to manage them. Our Strategy for 2013–2022 emphasises promoting growth that is inclusive and increasingly green in nature. For the energy sector, this means focusing on rural and peri-urban electrification; installing off-grid, decentralised electrification using renewable energy options to spread livelihood opportunities to remote areas; and helping to develop Africa's vast clean energy potential.

This review is organised in four chapters, corresponding to the four levels of our Results Measurement Framework. The first chapter describes the nature of the energy challenges Africa faces and the progress it has made in addressing them. The second chapter looks at the Bank's contribution to that progress, presenting aggregate results data from our energy portfolio and describing some of our more innovative operations. The third chapter looks at how well we manage our energy portfolio, and the fourth chapter assesses some of the measures we have taken to enhance our own capacity to deliver effectively in this important area.

Africa's progress in the energy sector

Nearly 60% of Africans have no access to reliable energy, and over 620 million people live without the benefits of an electricity connection. In rural areas in sub-Saharan Africa, electrification rates can be as low as 10%. The businesses and households that do have a connection often find that the electricity supply is both expensive and unreliable. As economic development and high population growth nurture demand, 30 African countries now face regular power shortages.

Energy poverty carries a heavy human cost. Many African households continue to use traditional solid fuels (wood fuel, charcoal) for cooking. Collecting fuel is time-consuming and

damaging to the environment, while traditional stoves cause widespread health problems—burdens that fall disproportionately on women and children. Additionally, the development of the industrial market is lagging because private investors are unwilling to risk investing in Africa while the supply of electricity is unreliable.

The Bank has invested \$13 billion in building up power generation capacity and distribution networks across Africa over the last 40 years

Africa is making gradual progress, but the energy deficit remains very large. The overall electrification rate increased from 38%² in 2005 to 42% in 2013, even as populations grew at a faster rate. Average electricity consumption also edged up, from 666 to 690 KWh/year. However, Africa is still far behind other developing regions.

Nearly 60% of Africans have no access to reliable energy, and over 620 million people live without the benefits of an electricity connection

At the same time, Africa's untapped clean energy potential is one of its most important development resources. The continent has a significant share of the world's renewable energy potential: hydropower, bio-energy, geothermal, solar and wind power. Within 20 years, renewables are expected to account for 40% of total energy generation in Africa. Clean energy solutions involve high initial capital costs, but are cost-effective over the longer term. Innovative, small-scale and off-grid clean energy technologies will play a key role in bringing power to remote areas.

Only 5% of Africa's vast hydropower resources are currently being tapped

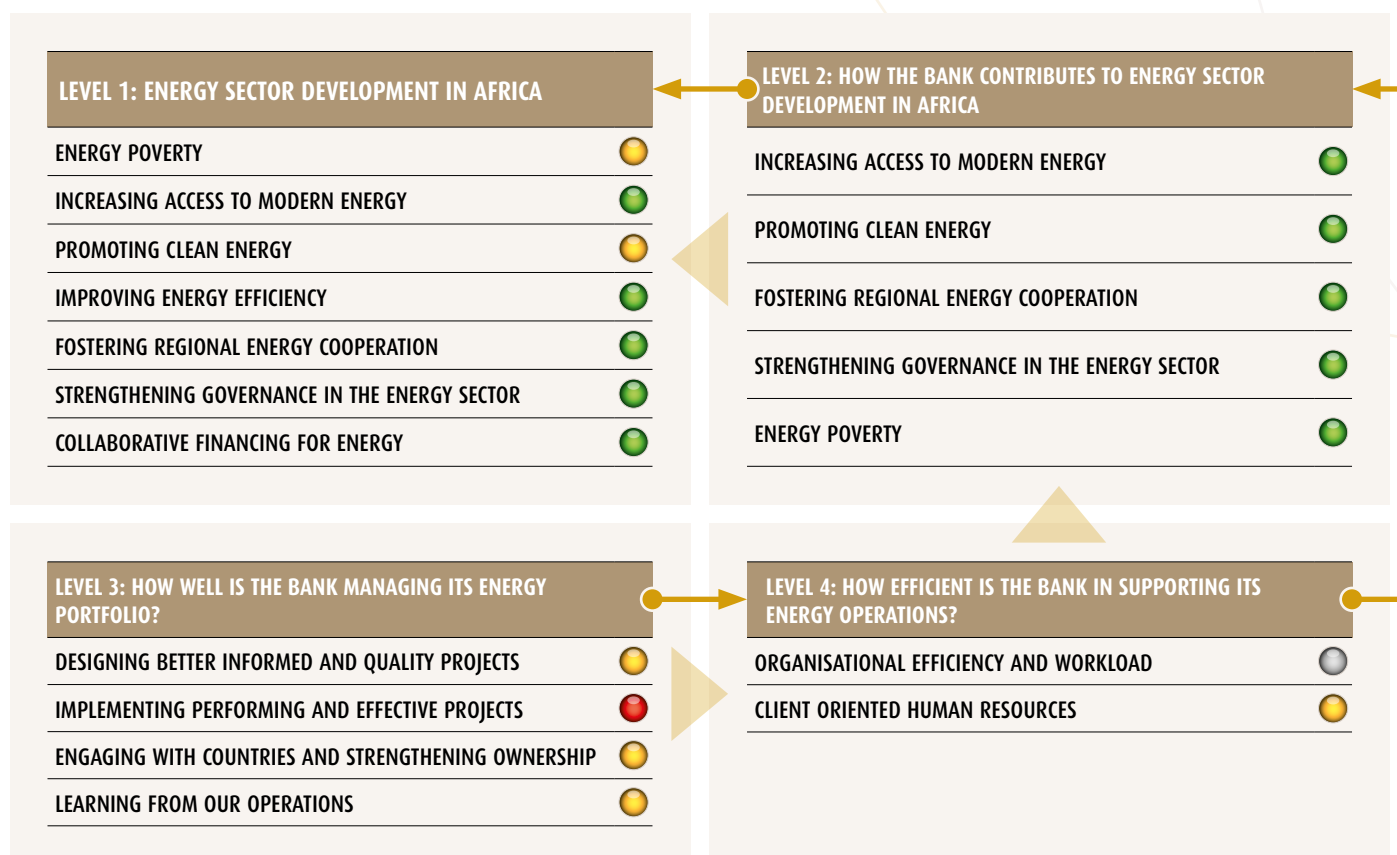
Only 5% of Africa's vast hydropower resources are currently being tapped³. The Democratic Republic of the Congo and Ethiopia alone—with their dense river networks—would have the capacity to supply most of Africa's energy needs, if regional interconnection energy networks were in place to enable the trading of electricity. The environmental and social impacts of such development will need to be carefully managed, to avoid damaging fragile ecosystems and affecting downstream communities.

1 Energy in this report includes electricity and gas and excludes oil.

2 IEA, World Energy Outlook 2013.

3 Challenges and trends in the African energy sector, AfDB and GIZ initiative.

Summary performance scorecard 2013



For Level 1, Africa's energy sector relative performance is measured by comparing its progress against 2005 baselines; for Level 2 the Bank's performance is measured by comparing expected and actual achievements for all operations that have been completed; for Levels 3 and 4 the Bank's progress is measured against its progress in achieving its 2013 targets set out in the Bank's Results Measurement Framework.

- **Made progress:** More than half of the indicators in the group improved over baselines.
- **Little progress:** Results are mixed, with equal numbers of indicators showing improvement or little/no progress.
- **Progress stalled or regressed:** More than half of the indicators in the group stalled or regressed over two or more review periods.
- **Progress could not be measured because of lack of data**

Africa urgently needs to improve its energy efficiency. In some cases as much as 40% of power generated is lost in transmission and distribution. Countries such as Algeria, Morocco and Tunisia have made good progress on energy efficiency through improvements in planning, network upgrading, maintenance and investments in modern technology. Major cost savings can also be made at the consumer end, often through such simple measures as using low-energy light bulbs.

Africa needs more than \$60 billion in annual investments to achieve universal electricity access by 2040.

With energy resources distributed unevenly across Africa, regional energy cooperation will be critical. Africa is pressing ahead with the

development of regional power pools to enable energy-rich countries to export power to their neighbours. These pools allow participating countries to plan their networks jointly, achieving economies of scale that translate into cheaper prices for consumers. Africa now has five regional power pools, although only Southern Africa has made the transition to a limited competitive regional power market. Substantial challenges are involved in building strong regional institutions with robust procedures for managing disputes. The Regional Economic Communities have a key role to play in this area.

The International Energy Agency estimated that Africa needs more than \$60 billion in annual investments to achieve universal electricity access by 2040. Africa therefore urgently needs to attract private investment into the energy sector. So far, progress in this area has been slow. A few countries have succeeded in developing

workable public-private partnerships for power infrastructure. Some are also attracting private investment in independent power producers, to construct and operate smaller-scale plants.

AfDB's contribution to the energy sector

The Bank's approach to supporting the energy sector has evolved over the years. The 1994 Energy Sector Policy concentrated primarily on institutional reforms and capacity development in the energy sector, with the goal of helping to unlock private investment. We helped to improve pricing policies, management practices and maintenance regimes. After a few years, however, it became clear that private investment was not forthcoming. We therefore decided to support regional member countries by scaling up our investments in major infrastructure development.

For the past two decades, some 12% of AfDB investments have gone into the energy sector. Most went towards building national generation capacity and distribution networks, with an emphasis on rural electrification to promote inclusive growth. Since 2009, the Bank has contributed to financing over 1900 MW of new generation capacity and over 15 000 km of transmission lines. Through these efforts, we have provided 567 000 people with new electricity connections and over 14 million people with improved access to electricity. Having built up a strong pipeline of new energy projects, we expect to double these results by 2018.

We are strongly committed to supporting Africa's transition towards clean energy. The Bank has helped to develop Africa's hydropower potential through major projects in the Democratic Republic of the Congo, Sierra Leone, Uganda and Madagascar. We have supported wind farms in Cape Verde, solar plants in Morocco and geothermal energy in Kenya.

We are working closely with the African Union and the New Partnership for Africa's Development (NEPAD) to strengthen the planning of energy and infrastructure at the regional and continental levels. We lead on the implementation of the Programme for Infrastructure Development in Africa, which sets out priority power-sector investment needs for the next three decades. We are supporting the development of cross-border power connections, in support of regional energy trade. We have helped to build connections between Algeria and Morocco, between Ethiopia and Djibouti, and across West Africa. We are working closely with the Regional Economic Communities to build their capacity to support regional planning of energy networks.

We are helping to build the "soft" infrastructure of institutions and regulations required for efficient energy markets. We have helped reform regulatory arrangements and pricing structures, to ensure sustainable energy markets without placing undue burdens on consumers. Since 2009, we have supported national power utilities in recruiting and/or training nearly 1700 staff in the maintenance of energy facilities.

A key element of our work is attracting new sources of investment into the energy sector. Since 2011, we have helped to secure \$566 million in funding from the global Climate Investment Funds for projects in Kenya, Mozambique, Morocco, South Africa and Niger. Since 1998, we have approved more than \$1 billion in private sector energy projects that are designed to leverage additional private sector funding. We are helping to build national capacity to design and manage complex public-private partnerships in energy.

We have provided 567 000 people with new electricity connections and over 14 million people with improved access to electricity

How well is the Bank managing its energy portfolio?

We use a range of tools to ensure that our energy projects are well designed, to maximise their development impact. Our quality-at-entry standards have been steadily improving, and in 2013 92% of our new public sector energy operations were rated satisfactory. However, the delay from approval to first disbursement has grown from 11 to 16.5 months, reflecting the complexity of co-financing major infrastructure projects with a range of partners, among other factors.

Our environmental and social safeguards are rigorously applied. We have recently adopted a new Integrated Safeguards System with a strong focus on sustainable development. The system takes into account wider challenges such as climate change, environmental pollution and population growth. All our environmental and social assessments are disclosed before projects begin, to give members of the public an opportunity to comment.

We have approved more than \$1 billion in private sector energy projects that are designed to leverage additional funding

We invest substantial resources in building and sharing knowledge of the energy sector in Africa. In 2013, we produced 12 reports and studies on the energy sector, including in-depth studies of particular countries, which serve as a platform for discussing policy priorities with governments. For example, we helped to prepare Burundi's Infrastructure Action Plan, which looked at the country's future energy needs and assessed the investment options. We also provide analytical support to governments in developing renewable energy strategies.

The Bank is working to mainstream gender equality into its portfolio. All of our energy projects offer important direct or indirect benefits to African women, and they should include gender analysis and special measures to benefit women and girls, as well as monitoring arrangements that identify different impacts on women and men. However, so far only half of them have specific gender indicators.

We are making steady progress on “climate-proofing” our energy operations. Under our Climate Change Action Plan 2011–15, we have set a target of building an additional 5 gigawatts of clean energy generation capacity, which will entail Bank investments of up to \$9.6 billion. We are helping African governments to integrate climate change planning into their energy strategies and to access international climate finance. We have introduced new tools and staff training programmes to ensure that our own investments can withstand the impacts of climate change.

We have established an Energy Sector Network within the Bank to pool knowledge and resources across our public- and private-sector teams

Overall, our energy portfolio is moving from strength to strength. In 2013, our energy portfolio totalled over \$10 billion, with projects that were on average twice the size of those in other sectors. Despite the technical complexity of energy projects, through robust supervision we have eliminated underperforming projects from the portfolio. Our disbursement ratio has increased from 10% in 2009 to 20% in 2013, indicating that projects are being completed in 5 years rather than 10. However, this progress has been mainly in the middle-income countries; in low-income countries, capacity bottlenecks continue to cause lengthy delays.

Africa has forecast 4% annual growth in energy demand, as a result of strong economic and population growth and rapid urbanisation.

How efficient is the Bank in supporting its energy operations?

In recent years, we have launched a number of initiatives to strengthen our own capacity in the energy sector. In 2010, we created the Energy, Environment and Climate Change Department (ONEC), which leads on the delivery of the energy agenda, along with climate change and the environment. We have established an Energy Sector Network to pool knowledge and resources across our public and private-sector teams.

Our indicative operational plans for 2014–16 comprise energy sector investments in excess of \$5 billion that are closely aligned with the Bank’s Strategy

We have developed new financing instruments to attract private investment into the energy sector. Our partial risk guarantees help

protect investors against African governments’ failure to deliver on their contractual obligations. They proved key in the \$20 million financing of the Lake Turkana wind power transmission line and in support to the Nigerian energy sector. Another useful financing instrument is equity for public-private partnerships, which provides concessional resources for African governments to use as their contribution to such partnerships.

We have been working to build up a cadre of energy experts.

We now have 37 energy experts with a wide range of relevant expertise—including in renewable energy and in environmental and social impact—plus another 11 professionals in the private sector department who specialise in infrastructure financing. We will continue to invest in the development of our staff, ensuring that they can identify and apply best practices in the energy field from across Africa and around the world.

Conclusion and outlook

Africa’s energy needs continue to grow rapidly. For the coming years, the International Energy Agency has forecast 4% annual growth in energy demand for Africa, as a result of strong economic and population growth and rapid urbanisation. Per capita energy consumption will grow at an unprecedented 3.7% per annum. Electricity generation capacity will grow at 6%, but will fall well short of what is required, causing power shortages to become more common. The Bank will therefore work to accelerate the rate of investment in energy infrastructure, both using our own resources and leveraging other investments.

The Bank has developed a new energy policy to guide its interventions in the energy sector. The policy sets out two broad objectives: to help African countries develop modern, affordable and reliable energy services; and to do so in a socially, economically and environmentally sustainable manner. We will work to provide access to energy for all Africans, wherever they live, and to develop a clean energy path for Africa that makes use of its abundant renewable energy resources.

We will continue to maintain high levels of ambition in this critical sector. Our indicative operational plans for 2014–16 comprise energy sector investments in excess of \$5 billion that are closely aligned with the Bank’s Strategy for 2013–2022, with its focus on private-sector development, regional integration and inclusive and green growth. We are determined to make the best use of our resources to help Africa overcome one of the most pressing constraints to its development ■



Investing in clean energy

Africa's hydro and solar potential could secure energy supply across the continent at many times the current level. In Egypt, abundance of solar is a golden opportunity to reach universal access.

Introduction

The Development Effectiveness Review series of publications presents the work of the African Development Bank (AfDB, or the Bank) to our partners and stakeholders and the general public. Each year, we publish an Annual Development Effectiveness Review, which summarises Africa’s development results and our contribution, based on our corporate Results Management Framework. We also publish a number of reviews on particular themes, sectors or countries.

This Development Effectiveness Review presents the Bank’s work in the energy sector for the 2009–13 period¹. The Bank is Africa’s premier development finance institution, and a significant share of our investment portfolio is in energy, including power generation infrastructure, distribution networks, and the institutions required to manage them. Under our Strategy for 2013–2022, we are committed to promoting growth that is inclusive and increasingly green in nature. For the energy sector, this means a focus on rural electrification, to bring the benefits of reliable and affordable power to Africans wherever they live. It also means increasing our investments in clean energy, to help develop Africa’s huge potential in renewable energy.

Africa’s energy needs are vast. It is estimated that investments of more than \$60 billion a year would be required to overcome the deficits in energy infrastructure and keep pace with rapidly growing demand. We therefore use our financial expertise to leverage finance from other sources, particularly the private sector.

This review is organised into four chapters, each corresponding to one of the levels of our Results Measurement Framework. The first chapter provides an overview of the challenges Africa faces in providing affordable and reliable energy and the progress it has made in addressing those challenges. The second chapter examines the Bank’s contribution to that progress. It presents aggregate results data from our energy portfolio and describes

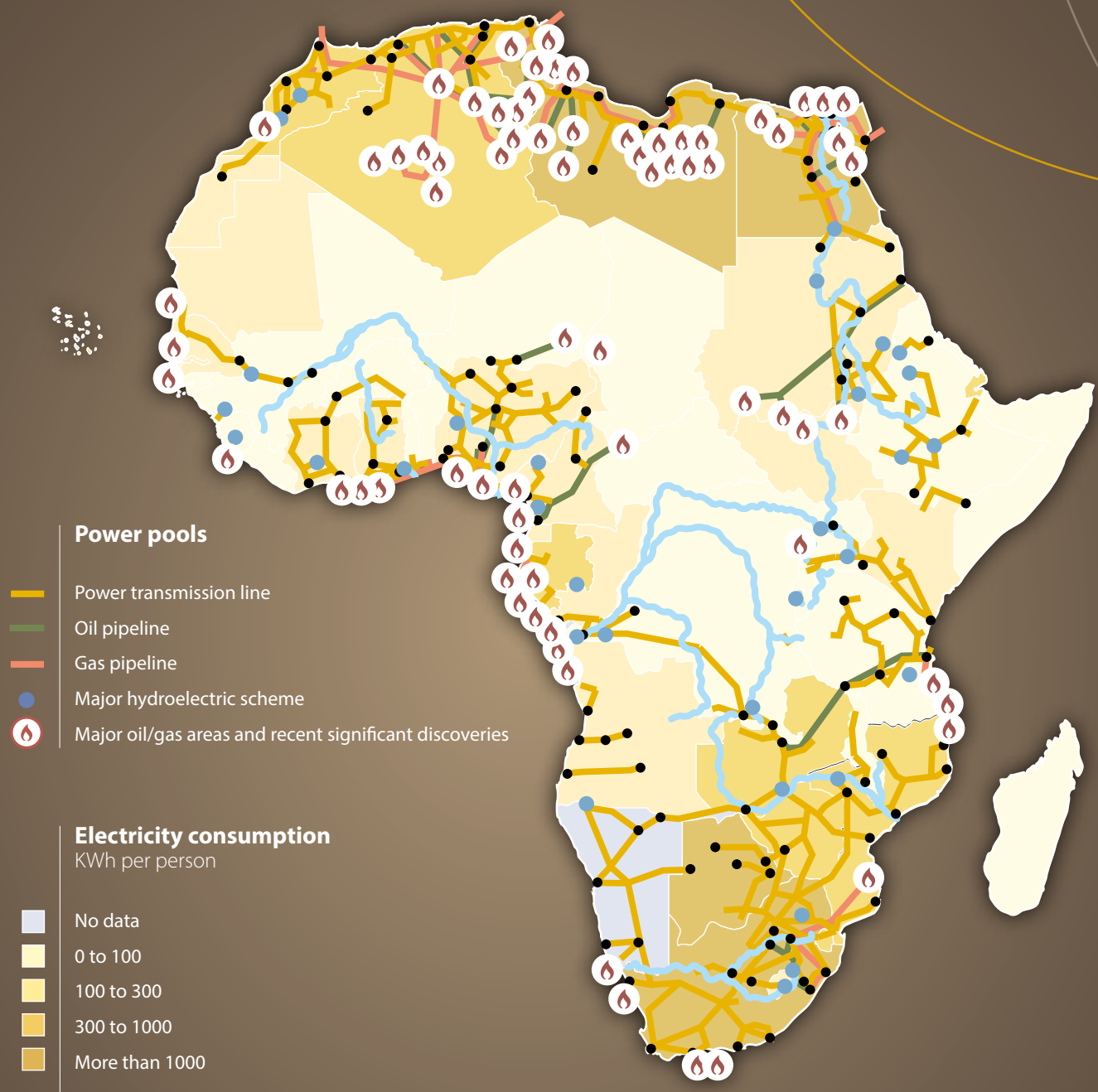
some of our more innovative projects and approaches. The third chapter examines how well we manage our energy portfolio, and the fourth chapter discusses some of the steps we have taken to strengthen our own capacity as an institution to engage effectively in the complex challenges of promoting sustainable energy solutions for Africa ■

Table 0: **Energy sector Results Measurement Framework**



1 Energy in this report includes electricity and gas and excludes oil.

Building a sustainable energy infrastructure is key to fuel Africa's growth and development



Source: African Energy Atlas (2012)

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

MDG 1: Eradicate extreme poverty	→	Energy increases productivity of firms
MDG 2: Achieve universal primary education	→	Lighting facilities for reading and studying at home
MDG 3: Promote gender equality and empower women	→	Energy facilitates domestic work
MDG 4: Reduce child mortality	→	Modern energy reduces respiratory illness
MDG 5: Improve maternal health	→	Energy improves quality of health care
MDG 6: Combat HIV/AIDS, malaria and other diseases	→	Modern energy reduces respiratory illness
MDG 7: Ensure environmental sustainability	→	Use of modern energy sources reduces the pressure on deforestation

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;
● Regression against the baseline;
● No progress compared to 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.

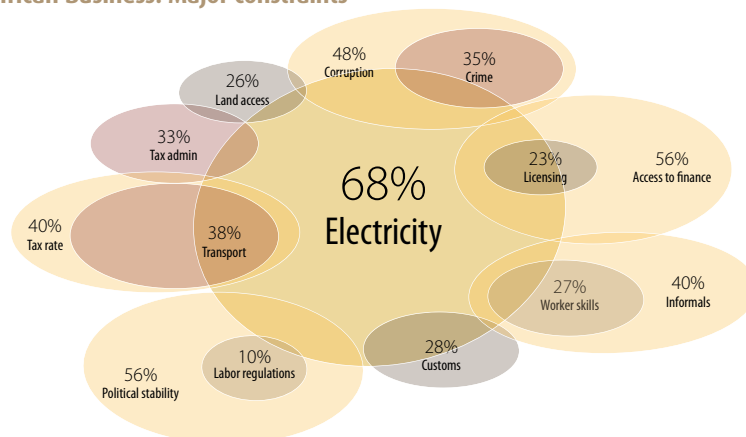
Enhanced health

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?

African Business: Major constraints



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

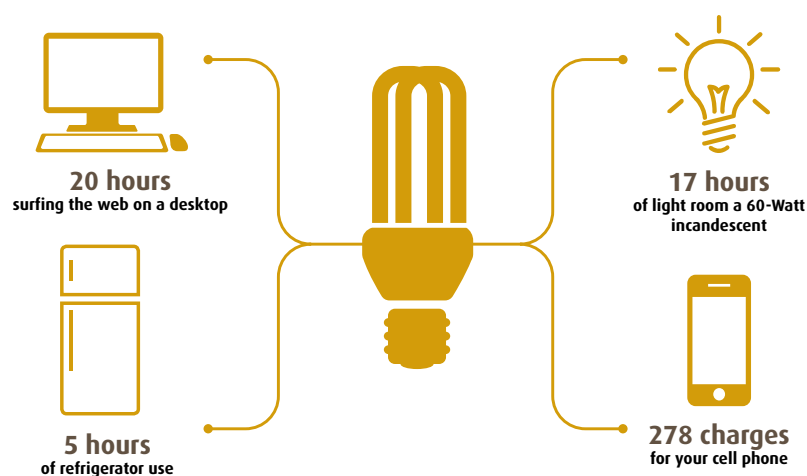
1 A yellow bullet indicates no progress compared to baseline.
 2 A green bullet indicates good progress has been made and we are on track to meet our target.
 3 For comparison: 2 out of 10 people in the world and 4 out of 10 people in developing Asia (2011).

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?

A kilowatt-hour (KWh) is the amount of electricity produced or consumed in an hour



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.

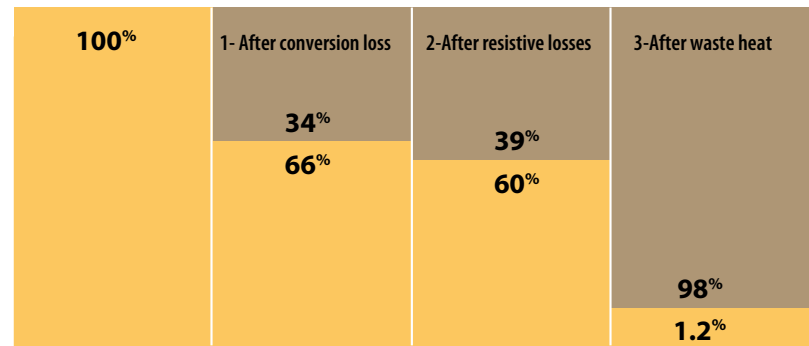
Africa has vast potential for hydroelectric power, of which 60% lies in Central Africa's high-density river network. Yet only 5% of this potential is currently being tapped

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 generation⁶. Other causes include the inefficiency of small, national markets and dependence on costly emergency supplies in some countries.

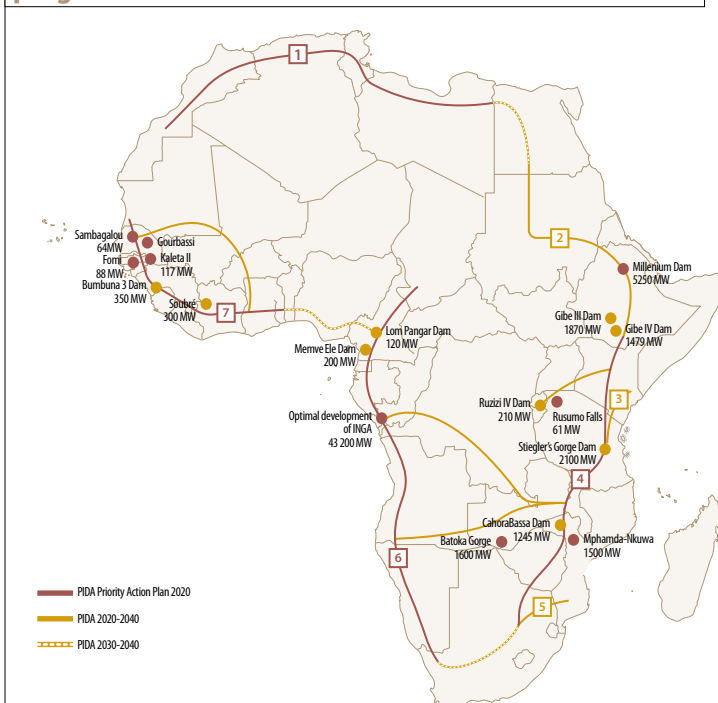
One of the key reform challenges is the widespread use of generalised energy subsidies that shift part of the cost of energy from the consumer to the government budget (see Figure 1.6). While making power more affordable to the public, these subsidies are highly regressive in nature, disproportionately 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



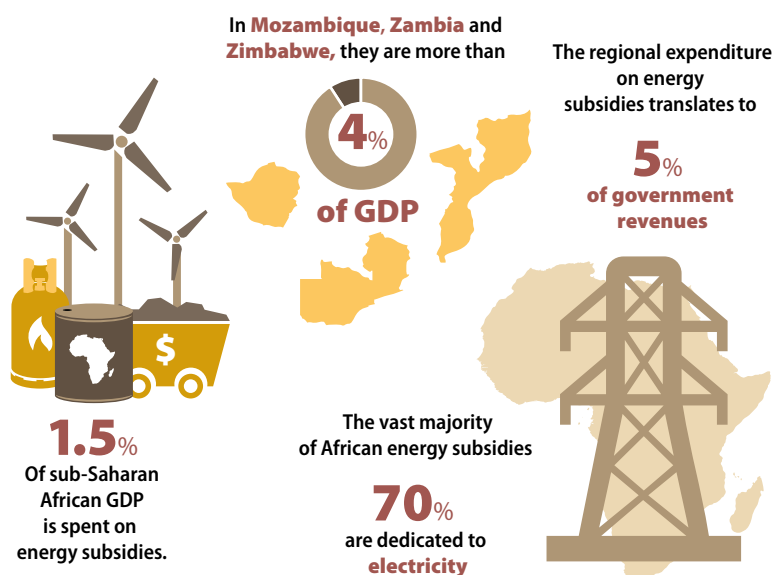
- 1 North Africa transmission; 2 Sudan-Ethiopia transmission; 3 Tanzania-Kenya transmission;
- 4 North South transmission corridor; 5 South Africa Mozambique transmission;
- 6 Central Africa transmission; 7 West Africa power transmission corridor

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

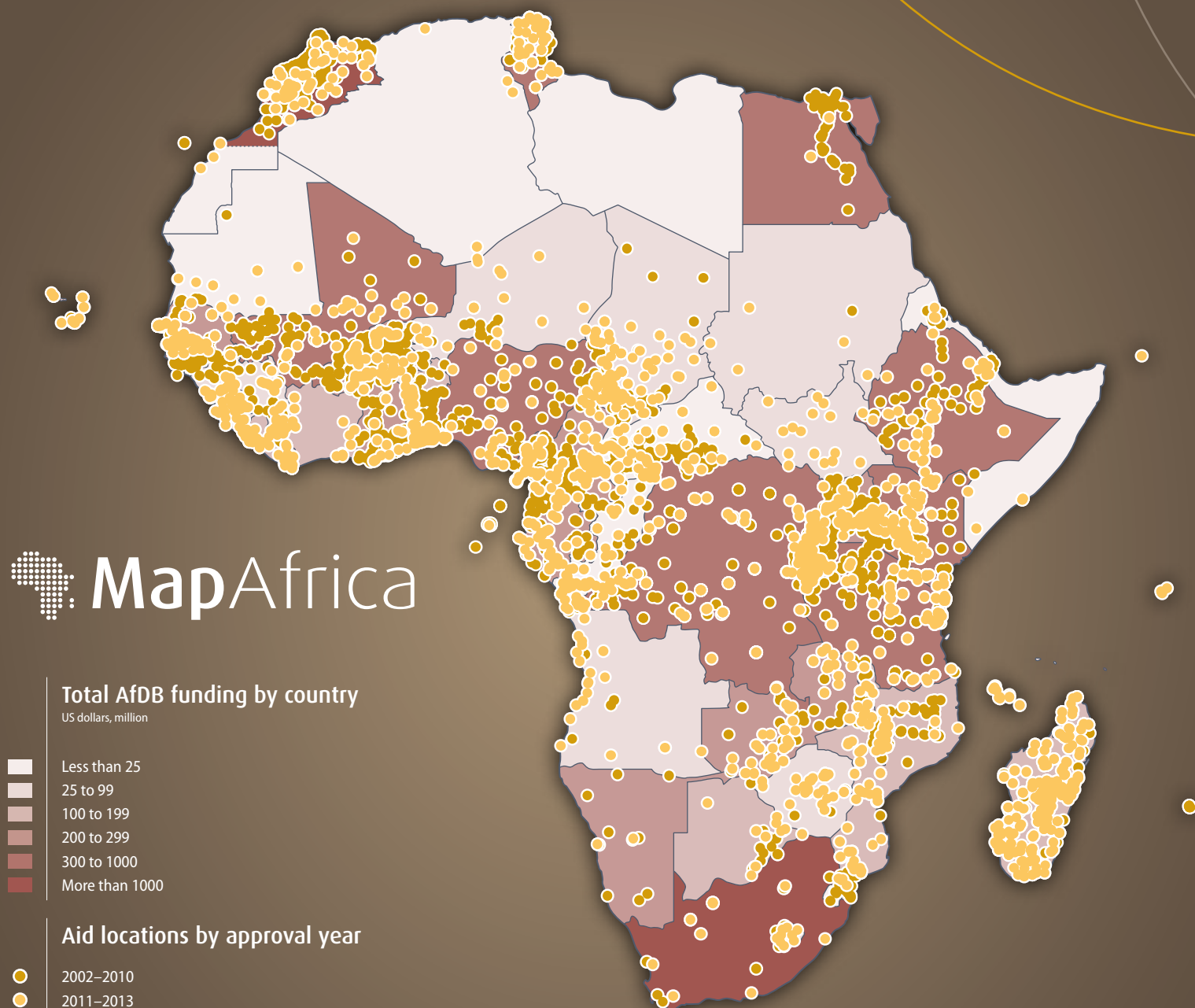
Africa continues to face many challenges in providing reliable and affordable energy to a large proportion of the population. With rural electrification rates of just 10% across sub-Saharan Africa, about 6 of every 10 Africans are forced to live without reliable access to electricity. As a result, they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

MapAfrica is showing how our projects are having an impact on people's lives



Enhancing transparency

The Bank is committed to increased transparency and demonstrating results. It has developed a new geocoding tool—MapAfrica—an interactive, online platform that maps the locations of the Bank's investments in Africa. Explore our 6000 project locations, including for the energy sector by visiting mapafrica.afdb.org.

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.

We 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

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.

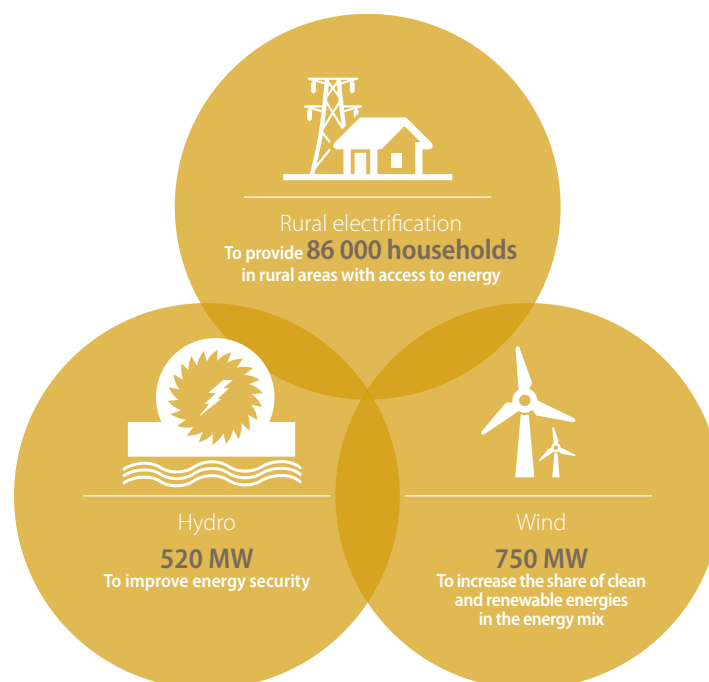
Overall, our support since 2009 has provided over 567 000 **people with a new electricity connection**. Cost efficiencies allowed us to exceed our target of 222 000 people. Over 14 million **people benefitted** from our energy investments, exceeding our target of 13 million. Having built up a robust 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.

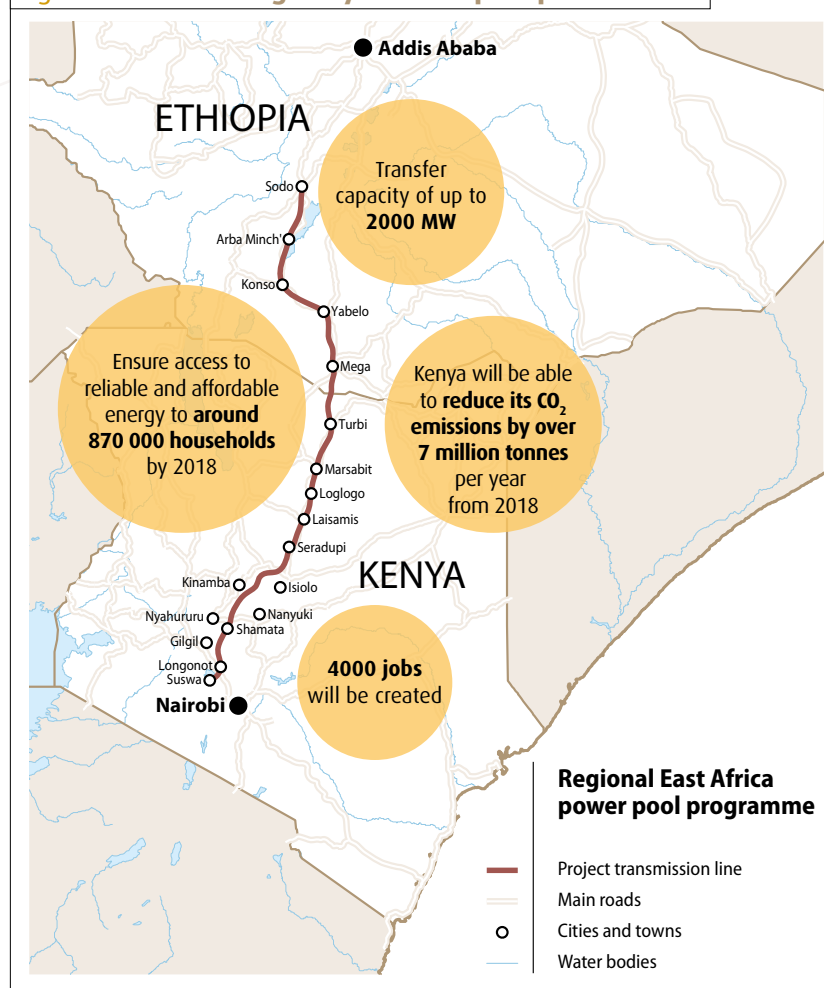
Building capacity at the regional level is critical. Strong regional institutions are needed to work with national authorities on energy sector reforms and to help harmonise energy standards and regulations within each region. For this reason, we help strengthen regional institutions to facilitate regional 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.

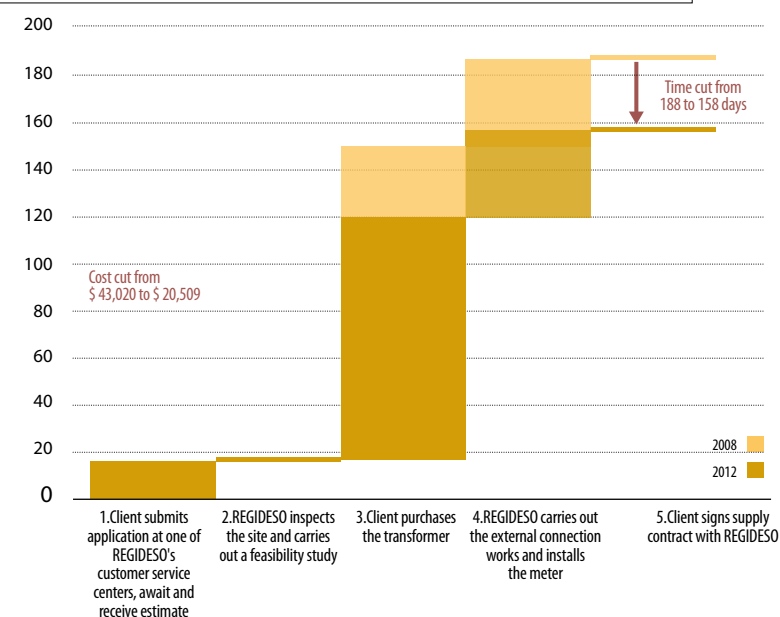
Financing studies and technical assistance to generate bankable projects for member countries

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

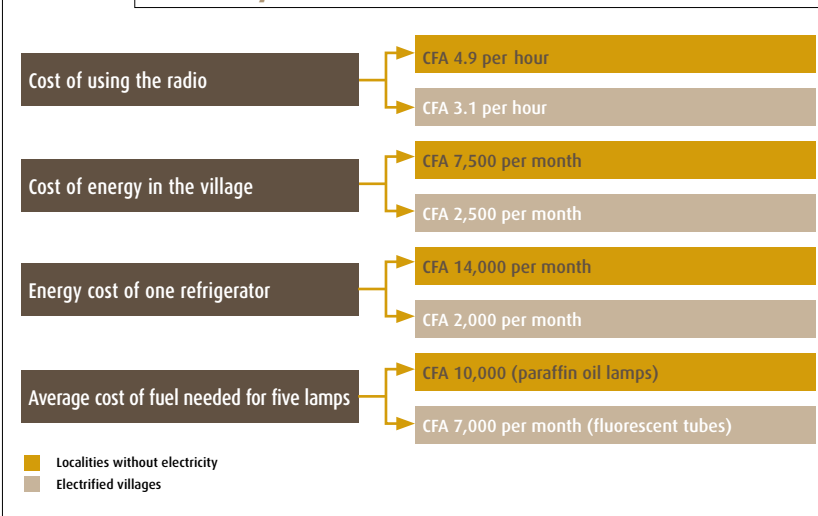
centre, will reduce the asymmetries in information between African governments and potential private and public sponsors, helping to lower transaction costs.

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 Itezhi-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 Itezhi-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.

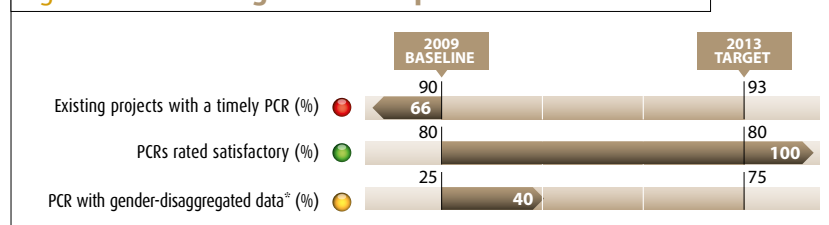
Conclusion

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.

The Bank is one of the major investors in the energy sector: between 2009 and 2013 we provided some \$3 billion in energy finance

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 ■



Powering rural areas

The Nigeria-Benin transmission line is powering and connecting rural centres to the national electricity grid. About 40% of Benin's electricity consumption now comes from its neighbour Nigeria at 1/6th of the cost of local power generation.


Level 3: How well is the Bank managing its energy portfolio?

This chapter reviews how well the African Development Bank manages its portfolio of operations in the energy sector, drawing on the 16 indicators in Level 3 of our Results Measurement Framework. We assess the quality of our project designs, our generation of new knowledge, our use of environmental and social safeguards, and our progress on addressing gender equality issues across the portfolio. We track whether projects are being implemented efficiently, and whether we are complying with our aid effectiveness commitments. We discuss our work to mitigate emissions through clean energy and energy efficiency savings, and examine how we are improving resilience to climate change impacts through our operations.


Designing quality projects

Improving project readiness

The Bank is committed to ensuring high standards by continuously improving the quality of its projects throughout the project cycle. In particular, the design of projects is important for effective implementation.

For the AfDB, quality at entry refers to whether our projects have sound technical designs and the broad-based country ownership that will give them the best possible chance of achieving their objectives. We use a quality-at-entry tool to review the readiness of all new projects. For public sector energy projects, our achievement of quality-at-entry standards has been steadily improving. In 2013, 92% of our new public energy  **operations were rated satisfactory**,¹ as compared to just 75% in 2009 – a very encouraging result.

An example of good quality at entry is the largest and best-rated project in our energy portfolio, the Eskom Renewable Energy Project in South Africa. The operation is well aligned to both South African and AfDB strategic priorities, and it complies with our environmental and social safeguards. The team responsible for the design and supervision of the project is well equipped, with an appropriate mix of skills. To replicate these results in other projects, we are training our staff in the use of participatory results frameworks and improving their skills in procurement and financial management.


One area of concern is the increase in the  **time elapsed from approval to first disbursement**,² for energy projects, which rose from 11 months in 2009 to 16.5 months in 2013—5 months more than the average across the sectors. The technical complexity of energy projects often causes internal delays. Delays are also

caused by the complexities of co-financing with other international development agencies, which involves meeting the schedules and procedures of several funders.


92% of our new public energy operations were rated satisfactory, as compared to just 75% in 2009 – a very encouraging result

Applying environmental and social safeguards

All our infrastructure operations, including those in the power sector, are required to comply with rigorous environmental and social safeguards. Environmental and social assessment procedures have been in place for many years, but recently a new Integrated Safeguards System with revised policies and procedures to ensure that we give greater attention to sustainable development was approved. We also publicise our assessments before commencing work, giving members of the public an opportunity to raise any concerns.

Under our safeguards methodology, we assess the social and environmental impacts of our planned energy investments, taking into account both immediate impact and future challenges such as climate change, environmental pollution and increased population. This enables us to design the project to avoid or minimise negative impact. By 2013, over three-quarters of our  **projects had satisfactory safeguard ratings**,³ a major improvement over 43% in 2009.

Analytical work

An important part of our work is building knowledge on the energy sector in Africa through studies and analysis, and advising African governments and international development agencies on their investments. In 2013, we produced 12  **reports and studies**

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

2 A red bullet indicates no progress has been made or we have moved even further away from our target.

3 A grey bullet indicates data are not available to measure performance.

Table 3: How well is the Bank managing its energy portfolio? (Level 3)

This table presents the Bank's progress in achieving its 2013 targets for portfolio management.

- Good progress has been made and we are on track to meet our target;
 ● Little progress has been made and we are at risk of not achieving our target;
 ● No progress has been made or we have moved even further away from our target;
 ● Data are not available to measure performance.

INDICATOR	ALL ENERGY OPERATIONS			ADF COUNTRIES	
	Baseline 2009	Latest 2013	Target 2013	Baseline 2009	Latest 2013
DESIGNING BETTER INFORMED AND QUALITY PROJECTS					
● Time elapsed from approval to first disbursement (months)	11	16.5	11	11	17
● Projects with satisfactory rating on the safeguard dimension (%)	43	75	..	50	75
● Operations rated satisfactory (%)	75 ^A	92	More than 95	71	92
● Number of new ESW (%)	..	12	..	..	8
● New projects with at least one gender indicator (%)	40 ^B	50	69	33	100
● Climate-proofed projects (Bank wide) (%)	0	70	70	0	70
IMPLEMENTING PERFORMING AND EFFECTIVE PROJECTS					
● Time for procurement (weeks)	37	41 ^{CD}	37	..	..
● Time for procurement for works (weeks)	62	39 ^C	..	..	..
● Problem projects in on-going portfolio (%)	9	0	5	11	0
● Disbursement ratio of on-going portfolio (%)	10	20	22	10	12
● Operations eligible for cancellation (%)	2	4	<8	2	9
ENGAGING WITH COUNTRIES AND STRENGTHENING OWNERSHIP^C					
● Predictable disbursements (%)	..	72	74	..	72
● Use of country systems (%)	..	62	59	..	62
LEARNING FROM OUR OPERATIONS					
● Exiting projects with a timely PCR (%)	90	66 ^E	93	100	100
● PCRs rated satisfactory (%)	80	100 ^E	80	100	100
● PCR with gender-disaggregated data* (%)	25 ^B	40	75	33	50

ADF = African Development Fund; ESW = economic and sector work; PCR = Project Completion Report; .. = Data not available.

^A Baseline 2010

^B Baseline 2008-2011 average

^C Latest available data: 2012-2013

^D Includes goods, works and services

^E Based on 2 PCRs

Source: African Development Bank

covering the energy sector, most of them in-depth assessments of the infrastructure needs of particular countries, to develop investment options. These studies provide us with the knowledge on the basis of which we can discuss policy priorities with governments, as well as the evidence we need to ensure that our own investments offer a strong development return.

For example, we helped to prepare Burundi's Infrastructure Action Plan, which sets out a range of possible investment solutions to meet the energy and other infrastructure needs of Burundi and the wider region. A recent evaluation of our knowledge products

across the Bank highlighted the success of this study in influencing policy-making and facilitating dialogue among the government, the private sector and donors.

Mainstreaming gender into energy projects

The AfDB is committed to ensuring that our energy investments benefit everyone, including women and girls. We try to address gender equality in our projects by undertaking a gender analysis, incorporating special measures to close identified gender gaps and ensuring that our results are disaggregated to identify different impacts on women and men.

We have made progress on promoting gender equality in our energy projects, but more needs to be done. In middle-income African countries, in 2013 only half of our **new projects had at least one sex-disaggregated indicator** in their results framework, which is below our target of 69%; in ADF countries, all new projects included gender indicators. In 2013 the Bank subjected 12 energy project appraisal reports to the readiness review and 41% were rated moderately satisfactory or higher—up from 0% in 2012. For the inclusion of a sex-disaggregated indicator.

In some good practice operations, the promotion of gender equality was factored in during the design stage. For example, when designing our Ethiopia Electricity Transmission System Improvement Project, we began with the collection of sex-disaggregated data and a detailed equality analysis of the sector. The project design included gender sensitisation and awareness-raising activities in communities along the transmission lines. Of the semi-skilled and unskilled jobs created by the project, 30% were reserved for women, as were 10% of the operational jobs at each of the 15 substations.

In Ethiopia, Kenya and Zambia, we are introducing gender-related activities into some ongoing energy projects; for example, we provided extra assistance to help women who were required to resettle as a result of the infrastructure development, and training to help them adopt new technologies when accessing electricity for the first time.

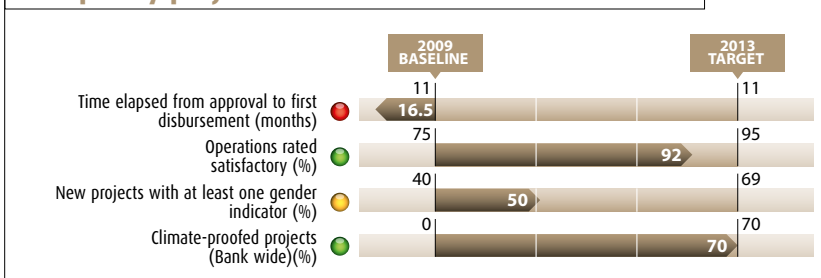
Addressing climate change

Climate change is one of the most serious threats facing African countries as they move toward sustainable growth and development. Our Climate Change Action Plan 2011–2015 sets out how we support our regional member countries with finance and advisory services. Our plan is to generate an additional 5 GW of clean energy or energy efficiency savings over this period. To achieve this, we will spend up to \$3 billion from our own resources, in addition to helping African governments mobilise finance from global climate funds, the private sector, international development funders and domestic resources.

We are determined that all our investments must be able to withstand the impacts of climate change into the future. To this end, we are training staff and developing tools so that our projects are designed, located and implemented in ways that minimise the risks. We have developed a new tool called the Climate Safeguard System, which we apply to every new project design to help us identify the risks to project outcomes from climate change and determine alternative options for addressing them. This system has been successfully piloted and is now being rolled out across the Bank. In 2013, 70% of all Bank projects across Africa were **climate-proofed**.

Our plan is to generate an additional 5 GW of clean energy or energy efficiency savings by 2015

Figure 3.1 Designing better informed and quality projects



Our Climate Change Action Plan set out targets for investments in different sectors. The Bank is on target with water projects, but in the energy sector we are on track to meet our targets, mainly because of the availability of CIF resources and other international finance. So far, we are implementing eight CIF-financed projects, helping our partner countries integrate climate change into their investment plans and move towards becoming low-carbon economies (see also Box 3.1).

Box 3.1 Joint achievements of AfDB and Climate Investment Funds

The AfDB and Climate Investment Funds are...

...helping to build multisectoral synergies

In Mozambique, funding from the Pilot Program for Climate Resilience is being used to intensify agricultural production and improve the livelihoods of 8000 households by introducing climate-resilient crop varieties, irrigation systems and all-weather roads for market access.

...helping break down barriers to change

In Niger, \$13 million is being used to provide hydro-meteorological data, an improved national climate observatory system and a pilot insurance scheme based on a weather index. These initiatives will enable the country to integrate more accurate information on climate and its effects into national planning and budgeting.

...helping turn potential into reality

In Kenya, \$25 million in grant and highly concessional debt funding is being spent on preparing the ground for the Menengai geothermal project, to enable multidonor finance to commence. It will help improve the resource capacity at Menengai, the second geothermal field to be developed of 14 identified along the Rift Valley.

...helping low-income countries revamp their energy mix

In Ethiopia, a \$20 million project is developing sustainable and affordable energy generation through wind power, whilst in Tanzania the government is considering tapping into geothermal resources and providing energy to off-grid rural areas where few people have access to modern energy.

Source: CIF

4 A yellow bullet indicates little progress has been made and we are at risk of not achieving our target.

Effective implementation

In 2013, our energy portfolio reached a peak of over \$10 billion (see Figure 3.3). The largest project was the Medupi Power project in South Africa, which at nearly \$2 billion represents a third of our energy portfolio. Another major investment is the \$500 million Suez Thermal Power Project in Egypt. The majority of our energy investments are in middle-income countries, which have greater capacity to plan and manage complex investments and the ability to mobilise finance from a range of sources.

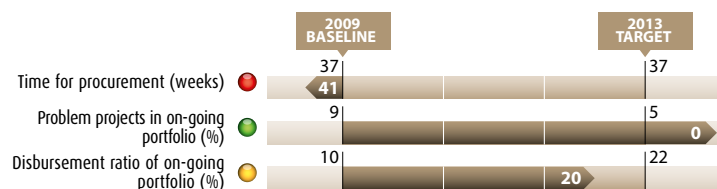
To help low-income African countries develop their energy sectors, we encourage co-financing with other international partners and private sector investors. We combine resources from our ADF funds and our private sector window to structure projects in ways that attract private finance. We also finance feasibility studies and other knowledge products to help our partner countries develop a pipeline of quality projects.

Our energy portfolio remains relatively young (only 3% of projects are 8 years or older), but it is growing fast. In 2009, 10% of our projects were classified as “problem projects”, in that their implementation required more time and closer supervision. By 2013, there were no longer any **problem projects** in the portfolio—a major achievement. However, over the same period the number of **operations eligible for cancellation** rose from 2 to 4 because of signing and effectiveness delays.

Our energy portfolio remains relatively young, but it is growing fast and moving from strength to strength

Our energy projects are on average twice the value of our projects in other sectors. Large infrastructure projects are usually able to disburse faster than other operations. The **disbursement ratio** for our energy operations rose from 10% in 2009 to 20%, which means that projects are completed in an average of 5 years, rather than 10. This is a key factor in our overall effectiveness, enabling us to deliver early results for our intended beneficiaries.

Figure 3.2 Implementing performing and effective projects



However, disbursement for energy projects in ADF countries is lagging at 12%, with the average project taking eight years to deliver. We continue to build implementation capacity in ADF

countries and to improve the quality of our project delivery by tracking implementation and ensuring regular supervision of projects. We are also working to improve public financial management services for regional member countries so that we can procure goods and services more quickly whilst still meeting exacting fiduciary standards.

Engaging with partner countries

The AfDB is committed to improving development effectiveness. We measure our progress through indicators taken from the Paris Declaration on Aid Effectiveness and its successor instruments. A key indicator for our energy sector is the predictability of our spending, which reduces waste and enables our partner countries to plan their infrastructure development more efficiently. From our energy projects, **predictable disbursements** – that is, disbursements made on schedule – increased from 61% of the total in 2011 to 72% in 2013. This improvement shows that, despite the complex nature of energy investments, we are planning and coordinating more effectively with our partners. We will continue to push towards our target of 80% in this important area.

Another area of progress is the **use of country systems** for our energy projects, which has increased by 24% since 2011 to 62%. This is above the 53% target for all Bank projects and also compares well against the average Bank performance of 58%. It indicates steady improvement in financial management capacity in our partner countries, enabling us to channel our funds through country systems. This improves both efficiency of delivery and country ownership.

The Bank has invested in establishing and maintaining a strategic dialogue with governments around our portfolio. For example, we agreed on a strategic aid framework for 2012-16 with the Kingdom of Morocco, which includes a range of measures to improve the management of the project portfolio. We went on to sign an agreement with Morocco to use national procurement systems and procedures.

In Rwanda, the Government, the Bank and other international development partners have developed a sector wide approach to attract investment into the energy sector.

Conclusion

The energy portfolio is a key strategic priority for both the Bank and its regional member countries. We have therefore invested significant efforts in improving the management of our portfolio, with significant results. By 2013, 92% of our new projects were rated satisfactory, thanks to more robust quality-at-entry standards, while the number of “problem projects” in the portfolio was reduced to zero. We have invested in a broad range of knowledge products, to boost understanding of energy challenges in Africa and enable us to design robust

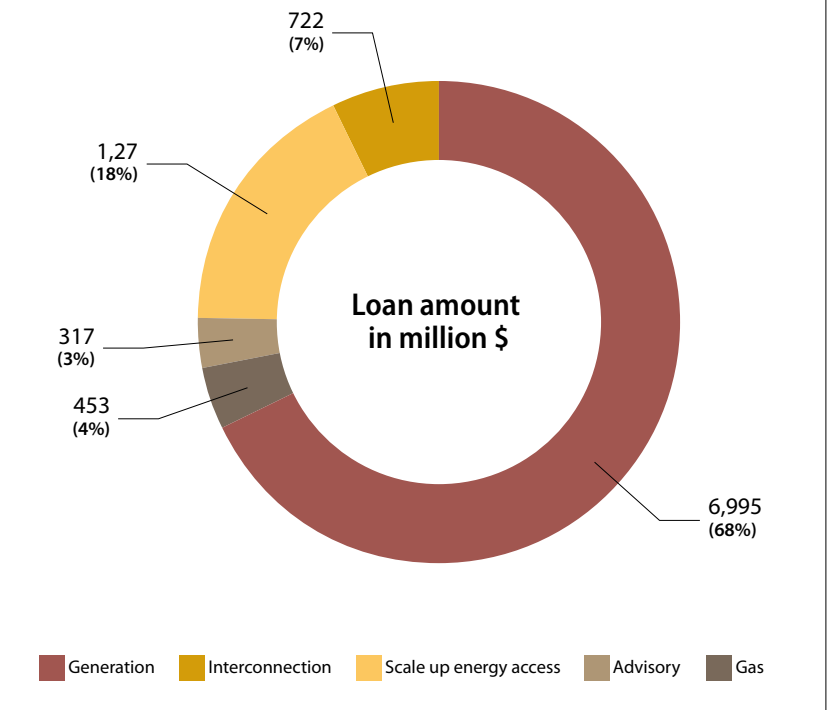
and cost-effective projects. Our environmental and social safeguards system has been strengthened, with three-quarters of our projects now achieving satisfactory ratings. We have taken measures to ensure that gender equality goals and climate resilience are built into our new projects. Our energy projects are nonetheless complex and challenging to implement, particularly those that cross national boundaries and involve a range of financiers. We will continue to learn lessons on how to improve their efficiency.

The Bank has been exploring innovative ways to finance and implement major energy projects by leveraging finance from other sources, including the private sector. Many of our energy projects have involved high leverage ratios, demonstrating to African countries how to partner effectively with private investors.

We are helping African countries to make the shift to a low-carbon pathway through our clean energy projects. We act as implementing partners for the Climate Investment Funds and a number of other international instruments and are advising many countries on how to develop clean energy strategies and select promising investments. The Bank has used innovative financing instruments to attract private investment, demonstrating the considerable commercial potential of small and medium-sized clean energy initiatives ■

Figure 3.3 Bank’s current energy portfolio

Our portfolio reflects our priority in providing countries with new generating capacity





Enabling private sector development

Access to electricity 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 at Marrakech's Jemaa el-Fnaa square.

Level 4: How efficient is the Bank in supporting its energy operations?

Level 4 of our Development Effectiveness Review tracks how well we manage our organisation in order to deliver our energy projects efficiently and effectively, using the eight indicators of our Results Measurement Framework. We set out the changes we have made to our organisational structure and describe the new financing instruments we have developed to promote investment in the sector. We assess progress in creating a conducive working environment. We also look at the placement of energy professionals in the context of the Bank’s wider decentralisation programme.

Organisation, instruments and processes

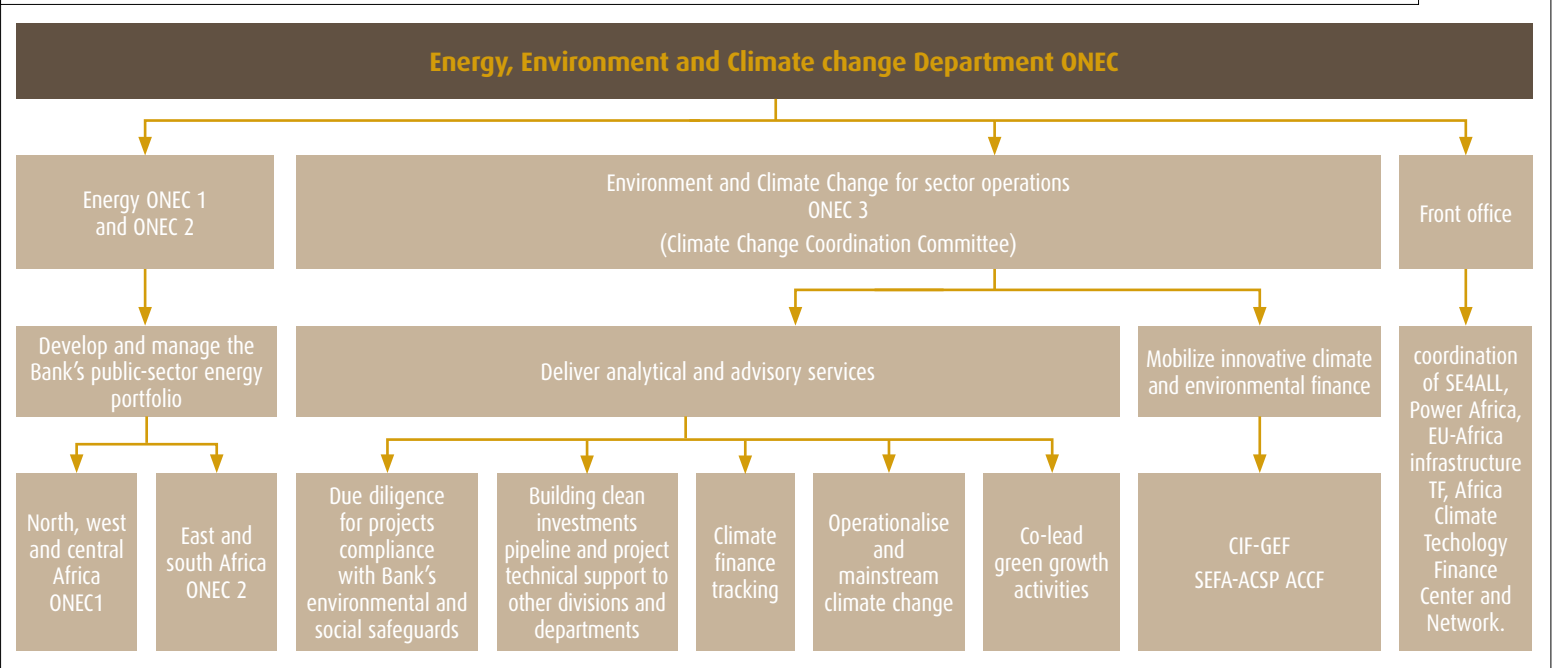
Organisational background

The Bank has made a number of organisational changes to be better equipped to expand our lending operations and strengthen our advice to African governments in the energy sector. In 2010, we created the Energy, Environment and Climate Change Department (ONEC), which lead on the delivery of our energy agenda and the mainstreaming of environmental and climate change activities across all Bank operations (Figure 4.1). To achieve high-quality results in our energy operations, the Bank’s public sector and private sector teams must collaborate closely. ONEC is a pilot for sector wide collaboration: our public sector

Our public and private sector teams increasingly pool their knowledge and resources from project concept stage onwards

and private sector teams increasingly pool their knowledge and resources from project concept stage onwards. The recently established Energy Sector Network will foster this collaboration by assessing proposed energy investments, testing them against the pillars of the Energy Policy and identifying opportunities for the blending of financial instruments. In particular, the Network will work on public-private partnerships, to help develop our expertise and share good practice.

Figure 4.1 An effective structure to implement ONEC strategy



Source :

Table 4: How efficient is the Bank in supporting its energy operations? (Level 4)

This table presents the Bank's progress in achieving its 2013 targets for organisational performance. It shows the achievements in both the public and private sector departments.

- Good progress has been made, and we are on track to meet our target;
● No progress has been made, or we have moved even further away from our target;

- Little progress has been made, and we are at risk of not achieving our target;
● Data are not available to measure performance (performance measured on average)

INDICATOR		Baseline 2010			Latest 2013 ^A			Target 2013
		Public	Private	Average	Public	Private	Average	
ORGANISATIONAL EFFICIENCY AND WORKLOAD ^A								
🕒 Administrative costs per UA 1 million disbursed	(UA thousands)	7.8	..	7.8	7.7	..	..	..
🕒 Workload : Number of projects per task manager	(number)	3.6	..	3.6	2.4	..	..	..
CLIENT ORIENTED HUMAN RESOURCES ^A								
👤 Operations professional staff based in field offices	(%)	13	10	11.5	28.2	0	14.1	38
👤 Projects task-managed from field offices	(%)	16	0	8	55	0	27.5	45
👤 Share of women in professional staff	(%)	29	40	34.5	30.6	27.3	28.9	35
👤 Net vacancy rate	(%)	5.1	15.4	10.25	1.8	0	0.9	<9
👤 Operations professional staff	(%)	66	91	79	83	85	84	79
👤 Staff engagement: Favorable responses in staff survey	(%) ^B	..	46	46	51	47	49	..

.. = Data not available; UA = Units of Account

^A Latest available data: 2012-2013

^B baseline 2007, latest data are from 2010. Private includes the whole private sector department.

Source: African Development Bank

Developing an effective mix of instruments that respond to countries' needs

The Bank draws the funds it invests in energy projects from a variety of sources. No single development institution could provide the funding Africa needs in this area; therefore one of the key objectives of our work on energy, climate change and the environment is to attract additional investments, particularly from the private sector. To increase investor confidence, we have developed financing mechanisms that reduce the risks and uncertainties involved in energy investments: the partial risk guarantee, which mitigates the risk that African governments might fail to deliver on their contractual obligations; and equity for public-private partnerships, which provides concessional resources for African governments to use as their contribution to such partnerships. Our Concessional Climate Finance is another mechanism we use to develop the Bank's clean energy pipeline, especially with resources from the Scaling-up Renewable Energy Program and the Clean Technology Fund, two programmes under the Climate Investment Funds.

From our private sector window, we support energy projects by providing loans, equity investments, guarantees, lines of credit and loan syndications. We also support the provision of technical advice to governments on structuring and handling public-private partnerships and developing the legal and regulatory frameworks needed to promote effective energy provision and encourage investment.

Business efficiency

As part of our continuing effort to improve the quality of our operations, we strive to ensure that our project management staff manage a reasonable number of projects. The ● **number of projects per task manager**¹ for public sector projects has decreased since 2010 from 3.6 to 2.4, which enables staff to allocate adequate time to the supervision of each project and to address any problems in a timely way.

The cost-efficiency of our work is stable since 2010, with the ● **administrative costs per UA 1 million disbursed** amounting

¹ A grey bullet indicates data are not available to measure performance.

to UA 7800 in 2010 and UA 7700 in 2013². To speed up communications and improve our business efficiency, we are finalising a departmental online management tool that will provide a collaborative platform for the teams involved in complex projects to communicate on and address any problems in need of urgent attention. It will also provide a forum for learning and collaboration.

Client-oriented human resources

To ensure high-quality energy sector operations, we need a workforce that fully understands our strategies and the needs of our clients, and is skilled, productive and motivated. We have made significant progress in reducing our ● **net vacancy rate**³, on average from over 10% in 2010 to less than 1% in 2013. Moreover, the balance of our staffing is improving: the proportion of positions filled by ● **professional staff** has increased to 84%, giving us a broader pool of expertise to draw from.

One area of concern is the decrease in the ● **share of women in the professional staff**⁴ working on energy projects. This share has fallen on average from 35% in 2010 to 29%, and the proportion of women working on private sector operations has fallen by almost a third, from 40% in 2010 to 27.3%. The Bank is working to improve the recruitment, promotion and retention of women through gender-supportive policies.

The latest staff survey reveals that staff satisfaction with communication, learning and development, and overall job satisfaction, have improved for those working on energy projects; however, they remain below the Bank average, and more needs to be done in these areas.

Skills mix

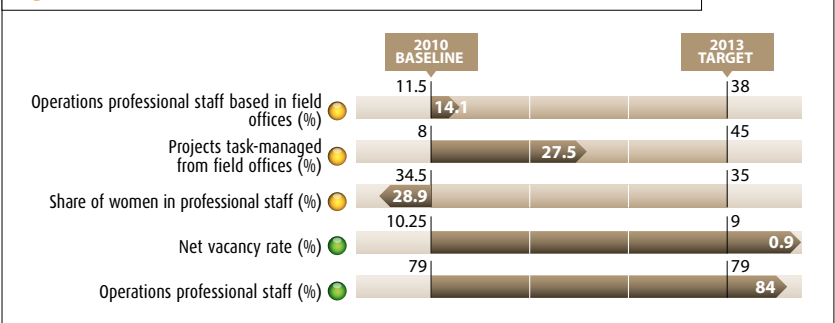
The number of skilled energy professionals has grown over the last few years. On the public sector side, we now have a team of 73 specialists with a wide range of relevant expertise in energy, environment and climate change. Of these, 37 are dedicated energy experts, of whom 5 specialise in renewable energy, 11 are environmental and social impact professionals, 11 are climate change experts and 14 are support staff and consultants. The private sector department has 11 professionals dedicated to infrastructure financing, including energy.

We plan to further strengthen our skills mix, especially in the areas of renewable and clean energy technologies, energy efficiency, energy trade and financing, to support the Bank’s strategy objective related to green growth. Learning and development for our energy specialists is a high priority so that they can identify and apply best practices and technologies from successful energy investments across Africa and beyond.

Decentralisation

The Bank is undergoing an ambitious programme of decentralising staff and functions to its 34 field offices, to deliver more effective and responsible service for our regional member countries. However, the energy sector remains fairly centralised, with just 14% of our ● **operational professional staff based in field offices**, compared to a target of 38%. The proportion of professionals working in field offices on public sector projects has reached 28%, but we currently do not have any energy private sector project staff based in the field. The ● **project tasks managed from the field office** for the public sector projects have increased from 16% to 55% over the period, which compares well with our target of 45%.

Figure 4.2 Client oriented human resources

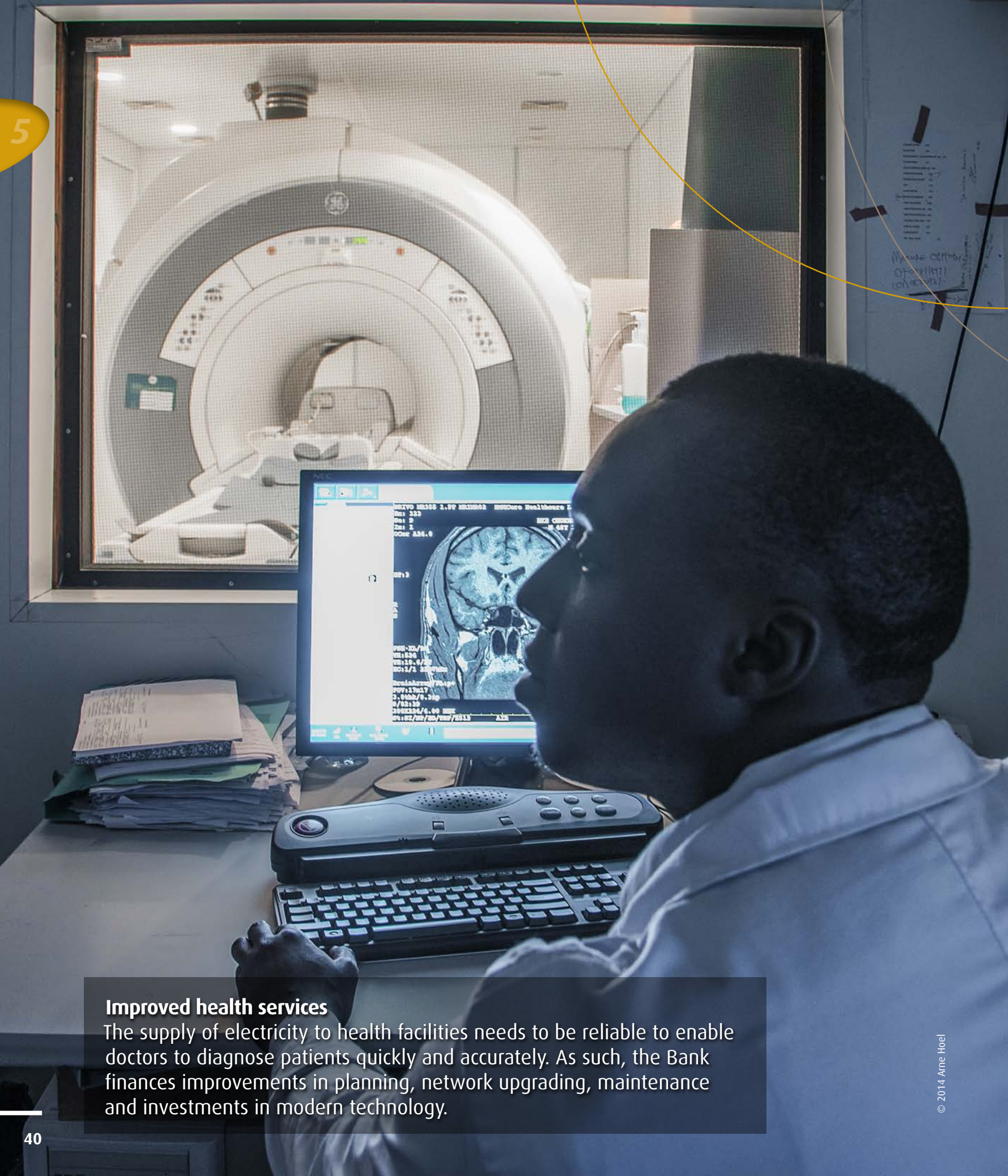


We plan to further strengthen our skills mix, especially in the areas of renewable and clean energy technologies to support the Bank’s strategy objective related to green growth

Conclusion

We restructured the organisation to better serve the energy sector and created a unit dedicated to energy investments in 2010. Although still relatively young, the unit is developing rapidly. We have achieved good collaboration between our public sector and private sector teams, enabling us to offer blended financial products in accordance with the One Bank principle. We are developing a new Energy Sector Network to promote the sharing of knowledge and good practice. We have invested in building the right skills mix, with our professional staff providing increasing coverage across key knowledge areas. We have decreased the workload for staff, enabling them to put more time into project supervision, and developed an online management tool to boost management efficiency. Perhaps the most dynamic aspect of our energy portfolio has been the development of innovative financial instruments, which enable us to share risks with private investors and leverage new sources of funding into the energy sector ■

2 UA refers to Units of Account – a value defined by AfDB in terms of a basket of currencies, equivalent to the International Monetary Fund’s Special Drawing Rights.
3 A green bullet indicates Good progress has been made, and we are on track to meet our target.
4 A yellow bullet indicates little progress has been made and we are at risk of not achieving our target.



Improved health services

The supply of electricity to health facilities needs to be reliable to enable doctors to diagnose patients quickly and accurately. As such, the Bank finances improvements in planning, network upgrading, maintenance and investments in modern technology.

Conclusion and outlook

Africa's energy needs are increasing rapidly. The latest Africa energy outlook to 2040¹ suggests growth of 4% per year in energy demand, driven by strong economic and population growth and rapid urbanisation. Per capita electricity consumption will increase at an unprecedented 3.7% per year. Electricity generation capacity is expected to grow at 6% – double the rate of recent years, but still well short of what is required. Power shortages are likely to be a problem for some time to come.

The mix of energy sources will continue to evolve. Thermal energy and dependence on fossil fuels will continue to grow over the 2014–2020 period. From 2020, large, low-cost hydropower and geothermal facilities now under development will come on stream, leading to large fuel cost savings in the 2020–2040 period. New clean energy technologies will play an increasingly important role, particularly in providing small-scale energy solutions in remote areas.

Against that background, the AfDB has launched a new Strategy for 2013–2022, which is firmly rooted in our understanding of Africa's progress over the past decade and its needs for the coming period. The Strategy recognises that Africa's infrastructure needs are vast. The continent invests just 4% of its GDP in infrastructure, compared with China's 14%. Bridging the infrastructure gap could increase GDP growth by as much as two percentage points a year. AfDB is therefore planning to accelerate the rate of investment in infrastructure, including energy – both using our own lending and leveraging additional financial resources.

Our new Energy Policy sets out two broad objectives for our energy portfolio: (i) to support African countries in providing modern, affordable and reliable energy services for their populations and productive sectors; and (ii) to help them develop their energy sectors in a socially, economically and environmentally sustainable manner. Several principles will guide our efforts. We will focus on providing access for all, irrespective of geographical location or social group, to promote inclusive growth. We will promote a cleaner energy path for Africa, helping to develop its abundant clean energy potential and to make the energy sector resilient in the face of a changing climate. We will use innovative approaches to attract more finance to the sector, while improving governance at the national level.

We will focus on the subsectors that we judge to be most important for addressing current and future energy demands and ensuring sustainability: renewable energy, fossil fuels, power transmission and distribution, regional cooperation and energy efficiency. Our mix of interventions will be tailored to the specific needs of African countries and population groups.

To implement this policy, we are finalising an energy strategy. To scale up efficiently, we need a healthy pipeline of high-quality investment projects. To this end, we have developed a three-layered approach

that includes a stock of project ideas, a reserve of projects and an indicative operational plan for projects that meet our readiness criteria. This will help to minimise disruption from any unexpected events. Our indicative operational plan for 2014–2016 comprises total investments of \$5 billion, all well aligned with the Bank's Ten-Year Strategy through their focus on private sector development, good governance and regional integration, as well as their contribution to promoting inclusive and green growth. During the same period, over 33 million people will benefit from improved electricity connections.

We will continue to develop our range of instruments and interventions, including public-private partnerships, partial risk guarantees, investment projects and advisory services. We will also continue to work on developing innovative financing instruments that catalyse additional finance and private investment.

The development of our energy portfolio will be supported by initiatives designed to increase our effectiveness as an organisation in this key area. Our new Results Measurement Framework 2013–2016 will provide a management tool to keep us focused on priority development results. It will generate evidence on our achievements and help us identify shortcomings that require management action.

We will continue to balance efficiency of investments with the necessary social and environmental safeguards. We will streamline our operational, institutional and budgetary processes, to ensure greater efficiency, flexibility and responsiveness to our member countries.

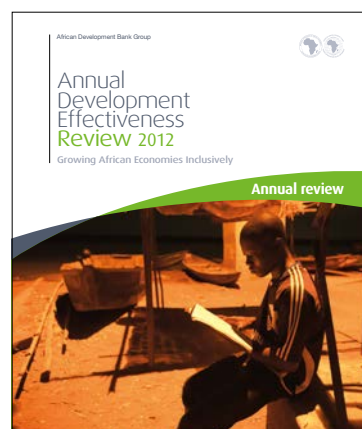
As Africa's future energy needs increase, our level of ambition in this critical area must be high. We are determined to make the best of our resources to provide energy access and energy security to Africans across the continent, to overcome a key constraint on Africa's development and set the continent on the path to green growth ■

1 IEA, 2014.

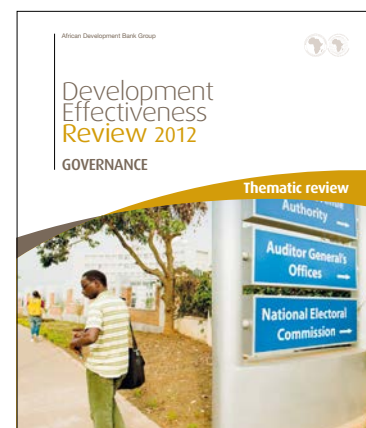
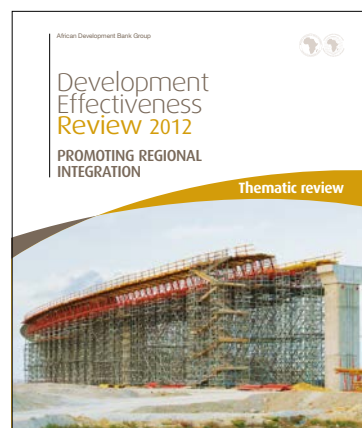
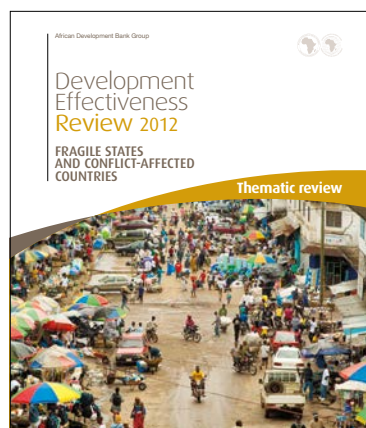
Notes

The Development Effectiveness Review series of the Bank

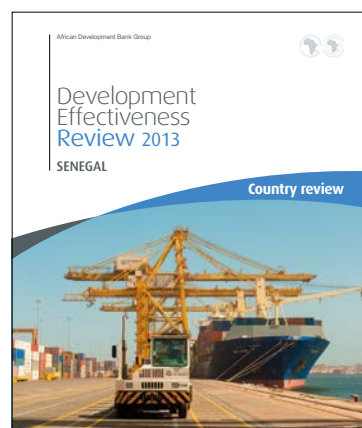
Annual reviews



Thematic reviews



Country reviews





www.afdb.org