Monitoring progress in the Africa-EU Energy Partnership

Africa-EU
Energy Partnership

AEEP 2020 Political Targets

Declaration of the First High Level Meeting of the Africa-EU Energy Partnership

Vienna, Austria, 14 September 2010

"**We**, African Ministers responsible for Energy, and European Union (EU) Ministers responsible for Africa-EU energy relations **resolve** to work within the AEEP to attain the **following targets**, in the timeframe up to 2020:

Energy Access

As a contribution to the African objective of achieving a continent wide rate of access to modern and sustainable energy of around 50 per cent, which means additional 250 million people, Africa and the EU will take joint action to:

- **bring access to modern and sustainable energy services to at least an additional 100 million Africans**, focusing on sustainable models: to provide energy for basic services (health, education, water, communication); to power productive activities; and to provide safe and sustainable energy services to households.

Energy Security

Africa and the EU will take joint action to improve energy security by:

- **doubling the capacity of cross border electricity interconnections**, both within Africa and between Africa and Europe, thus increasing trade in electricity while ensuring adequate levels of generation capacity;
- **doubling the use of natural gas in Africa, as well as doubling African gas exports to Europe**, by building natural gas infrastructure, notably to bring currently flared gas to market.

Renewable Energy and Energy Efficiency

Africa and the EU will take joint action to increase both energy efficiency and the use of renewable energy in Africa by:

- building **10,000MW of new hydropower facilities** taking into consideration social and environmental standards;
- building **at least 5,000MW of wind power capacity**;
- building **500MW of all forms of solar energy capacity**;
- **tripling the capacity of other renewables**, such as geothermal, and modern biomass; and
- **improving energy efficiency in Africa in all sectors**, starting with the electricity sector, in support of Africa's continental, regional and sectoral targets."

WORKING TOGETHER TO ACHIEVE OUR COMMON ENERGY FUTURE

African and European Heads of State launched the Africa-EU Energy Partnership (AEEP) in 2007 in the context of the Africa-EU Joint Strategy, in order to strengthen mutual efforts to achieve long-term sustainable supply of modern energy services to all of Africa and Europe's diverse populations. Ambitious targets – for energy access, for energy security, as well as for renewable energy and energy efficiency – were adopted at the first High Level Meeting of the AEEP, held in Vienna in September 2010. Mr José Manuel Durão Barroso, President of the European Commission, recently reiterated the European Union's commitment to achieving the AEEP targets. He further committed the EU to providing access to sustainable energy services to 500 million people by 2030.

Addressing the enormous demand for infrastructure, the African Union established the Programme for Infrastructure Development for Africa (PIDA),aiming at strengthening continental integration in Africa through improved regional infrastructure. The PIDA 2020 Priority Action Programme puts a high emphasis on the energy sector.

The pressing need to bring greater access is highlighted in the United Nations initiative to achieve Sustainable Energy For All by 2030. The UN Secretary General's initiative includes global political targets – for access, renewable energy and energy efficiency – that closely mirror the targets adopted by the AEEP for the two continents for 2020. In this context, we believe that our ideas and impetus have contributed to a broadening international consensus.

Ideas and results

Beyond the impact of ideas, the AEEP must bring concrete, measurable results. Monitoring the progress of the AEEP is essential to creating vibrant, sustainable energy industries that give access to millions more consumers, while ensuring energy security across continents. This is why the AEEP Road Map includes the creation of tools to allow us to monitor progress in achieving these concrete results.

The AEEP Baseline Document is a step in this direction, providing detailed data on the year 2010, starting point for the AEEP targets. This baseline document sets out the status of access to modern energy, of energy security, and of the use of renewable energy and energy efficient technologies. The document also summarizes a sampling of the many hundreds of activities, large and small, private and public, that are being implemented by African and European actors in the field of energy.

In the coming years, this document will be regularly updated, evolving from a baseline reference to a progress report. We expect to fully apply this information in our planning for new activities. In particular, it will allow us to better guide the Africa-EU Renewable Energy Cooperation Programme, launched at the AEEP High-Level meeting in 2010 to accelerate the uptake of renewable energy sources and to maximise their contribution to energy access and to energy security.

We, the Co-Chairs of the AEEP, hope that this document will be useful to African and European stakeholders, working together to achieve our common energy future.

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AFRICAN UNION COMMISION

Austrian Development Cooperation

BMZ Federal Ministry for Economic Cooperation and Development

Ministry of Energy and Public Utilities Republic of Mauritius

European Commission

Developing fit-for-purpose monitoring

The Africa-EU Energy Partnership (AEEP) is one of the eight partnerships constituting the Africa-EU Joint Strategy, adopted by African and European Heads of State and Government in Lisbon in December 2007. African and European Implementing teams have since been working to implement the three-year Action Plans of the AEEP.

A key milestone was the AEEP High Level Meeting (HLM) held in Vienna on 14-15 September 2010, where participants endorsed the HLM Declaration containing political targets to be achieved by 2020 on energy access, energy security, renewable energy and energy efficiency. Furthermore, the declaration called for increased dialogue at all levels, endorsed a roadmap for further implementation of the "Africa-EU Renewable Energy Cooperation Programme" (RECP) , and launched the RECP as a key instrument for reaching the political targets.

As an essential complement to concrete energy projects, the AEEP is creating an AEEP Monitoring Tool. This document outlines the work accomplished in establishing the baseline, or starting point, for Partnership actions, against which we will measure performance in achieving the AEEP political targets on a regular basis.

The Monitoring Tool aims to produce up-to-date, accurate metrics, as explained below. Future reports will allow us to better identify gaps in our approach to the energy sector.

Furthermore, work on the AEEP Monitoring tool will include **efforts to build data collection capacity** in African institutions.

Overcoming challenges

In order to complement existing national and continental data sources, the Monitoring Tool uses a 'ground up' approach. This allows projects to be followed from investment to commissioning, and allows metrics to be traced back to source. Details of this are provided in the pages that follow.

The Monitoring Tool aims to provide a continent-wide database of African generation, transmission and electrification projects, along with other data to track the AEEP political targets.

Ministers and Commissioners at the First High Level Meeting of the AEEP, 14 Setember 2010, Vienna

Africa's Energy Infrastructure

Selected major hydroelectric schemes Existing and future

	NAME	RIVER	CAPACITY
A	Afourer	Oued Day	463 MW
B	Abdelmoumen	Issen	400 MW
C	Aswan High	Nile	2,100 MW
D	Kajbar	Nile	300 MW
E	Merowe	Nile	1,250 MW
F	Tekeze	Tekeze	300 MW
G	Tana-Beles	Beles	460 MW
H	Tis Abay	Blue Nile	II: 80 MW
I	Grand Renaissance	Blue Nile	5,250 MW
J	Roseires	Blue Nile	300 MW
	Upper Atbara Dams	Atbara & Setit	135 MW
K	Koka, Awash II & III	Awash	107 MW
L	Gilgel Gibe	Omo	II: 420 MW III: 1,870 MW
	Halale-Werabesa	Omo	640 MW
M	Karuma	Victoria Nile	60 MW
N	Bujagali	Victoria Nile	250 MW
	Owen Falls	Victoria Nile	380 MW
O	Ruzizi I-IV	Ruzizi	500 MW
P	Stiegler's Gorge	Rufiji	2,100 MW
Q	Manantali	Senegal	200 MW
R	Garafiri	Konkouré	75 MW
S	Bumbuna	Rokel	400 MW
T	Kossou	Bandama	180 MW
U	Akosombo	Volta	1,200 MW
V	Kainji	Niger	800 MW
W	Mambilla	Donga	2,600 MW
X	Edea	Sanaga	224 MW
	Song Loulou	Sanaga	335 MW
Y	Grand Poubara	Ogooué	160 MW
Z	Inga	Congo	I: 350 MW II: 1,424 MW III: 3,500-4,250 MW Grand: 40,000-50,000 MW
	(Outputs: I & II are maximums; III & Grand [IV] are projections)		
1	Zongo	Inkisi	II: 160 MW
2	Nzilo	Lualaba	II: 120 MW
3	Ruacana	Cunene	240 MW
4	Kariba North & South	Zambezi	1,320 MW
5	Cahora Bassa	Zambezi	2,075 MW
	Cahora Bassa North	Zambezi	800-1,250 MW
	Mphanda Nkuwa	Zambezi	1,500 MW
6	Tubatse PS	Steelpoort	1,500 MW
7	Ingula PS (Braamhoek)	Wilge	1,333 MW
	Kilburn	Mnj. Tugela	1,000 MW
8	Lesotho Highlands Water Project		182 MW

Africa's energy infrastructure

The AEEP Monitoring Tool

The AEEP Monitoring Tool is based on data from international institutions, as well as from a database of African energy projects drawn up for the AEEP.

The database has been structured to incorporate all publicly available information on electricity generation and regional interconnections, supplemented by information from a network of contacts across Africa and Europe.

The AEEP Baseline

Baseline numbers have been generated to allow policy-makers to effectively monitor progress in achieving the AEEP political targets in the period up to 2020.

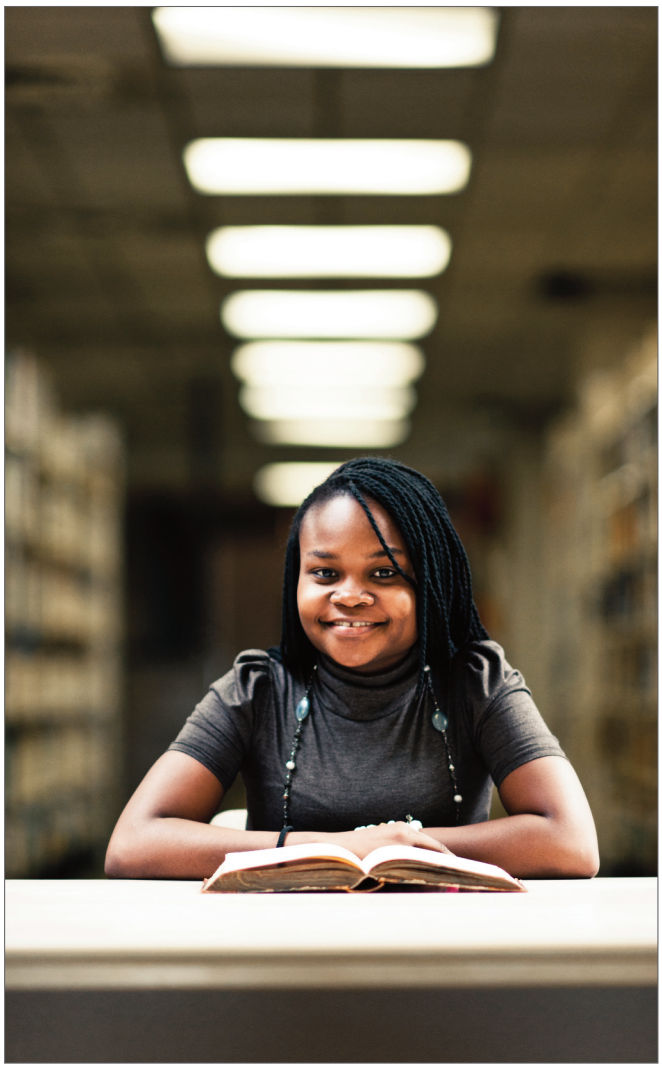
Information has been drawn from many complementary sources, taking into account the weakness of available data in some sectors and in some countries, so as to provide the most recent and comprehensive available figures.

The approach addresses some issues associated with the use and aggregation of national statistics, for example, by breaking down electricity generation figures to the unit level of the power plant. This enables fluctuations to be traced to their root causes more easily and could help better policy targeting. Inconsistencies in data-gathering between nations will thus be overcome.

Metrics and methodology

The metrics were selected to provide a measurable indication of progress towards the AEEP's political goals.

The centrepiece for the Monitoring Tool is a database of African electricity generation and transmission projects. This is a unique tool facilitating near real-time analysis of renewable energy and interconnection metrics.



The AEEP Monitoring Tool will help policy-makers effectively monitor the progress of the next generation of projects

An example of the type of data compiled for the AEEP Monitoring Tool

Project	Commissioned/Pipeline	Generation Capacity (MW)	Fuel Type	Renewable	Investment
Cambambe	Commissioned	180.0	Hydro	y	
Cambambe II	Pipeline - 2015	520.0	Hydro	y	
Caculo Cabaça	Pipeline - 2014	1,560.0	Hydro	y	
Cazenga	Commissioned	128.0	Gas	n	
Cazenga Expansion	Pipeline	50.0	Gas	n	
Angola LNG, Soyo IPP	Pipeline - Q1 2012	400.0	Thermal	n	
Biopio	Pipeline	35.0	Gas	n	
Kuito	Commissioned	10.0	Diesel	n	US$19.7m
Saurimo	Commissioned	7.5	Diesel	n	US$15.9m
Kwanza Sul	Commissioned	11.0	Diesel	n	
Malange	Commissioned	9.0	Diesel	n	
Namibe	Commissioned	16.0	Diesel	n	
Luena	Commissioned	7.5	Diesel	n	US$17.2m
Luanda OCGT	Commissioned	148.0	Gas	n	
Luanda Rental Power	Commissioned	120.0	Thermal	n	
Luanda Power Barge	Commissioned	42.0	Gas	n	
Luachimo	Commissioned	8.8	Hydro	y	
Nhangue	Pipeline - 2012-2015	450.0	Hydro	y	
Lauça	Pipeline - 2014	2,120.0	Hydro	y	

Source: Cross-border Information Ltd.

The database has been put together using information from public sources, but it also draws on a network of correspondents and other sources across the continent, through whose input it can be regularly updated as projects develop.

The Monitoring Tool includes all generation systems for which there is data available. This allows national and other statistics to be traced down to the unit level, enabling policy-makers to target the areas where action is most needed.

The database will complement national level information sources, in a user-friendly updatable format. While not perfect, estimates from the Monitoring Tool are among the most accurate possible and the metrics recorded in this document are current.

While data for large and medium size energy infrastructure is available and reasonably accurate, it is much more difficult to obtain reliable data on small systems, notably stand alone household systems such as Solar Home Systems. Similarly, more work needs to be done for the AEEP to document and report on losses in the electricity sector.

Critical elements

The AEEP is also monitoring other critical elements of the energy industry, including natural gas consumption and trade, energy efficiency and intensity. There are more details about these issues in the pages that follow.

Key baseline indicators

	Value	Unit
Energy Security		
Cross border electricity interconnections	12,547.0	MW
Consumption of natural gas in Africa	105.0	bcm
Natural gas exports from Africa to Europe	84.3	bcm
Renewable Energy		
Current hydropower installed	26,721.8	MW
Current wind power installed	1,137.3	MW
Current solar power installed	102.2	MW
Other renewables	1,153.2	MW
Energy efficiency		
Network losses	20.7	%
Energy intensity	0.37	toe/'000 US$ (2000)
Access to Energy		
People with access to electricity	425.1	million
People relying on solid fuels for cooking[1]	657.0	million

[1] Traditional biomass and coal.

Definitions

Hydropower includes micro-hydro and pumped storage projects unless otherwise stated.

Biomass is used to cover the burning of organic matter for electricity generation and includes waste-to-power projects.

Solar is utilised as a semantic covering any form of electricity generation which uses the sun as its sole energy source unless further specified.

Thermal covers fossil fuels such as petroleum products and coal.

Energy Access

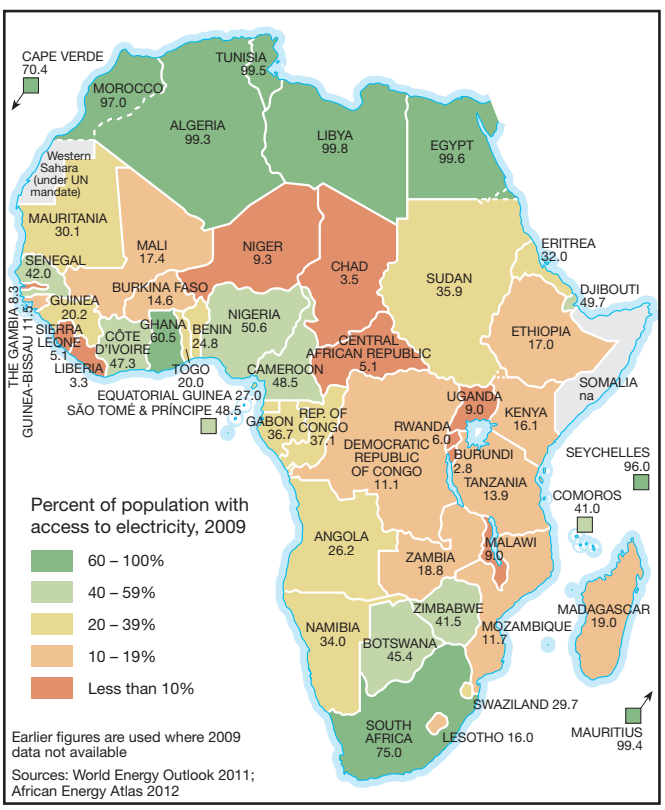
The AEEP 2020 Target on Energy Access

As a contribution to the African objective of achieving a continent-wide rate of access to modern and sustainable energy of around 50 per cent – which means an additional 250 million people – Africa and the EU will take joint action to bring access to modern and sustainable energy services to at least an additional 100 million Africans, focusing on sustainable models:

- **to provide energy for basic services (health, education, water, communication);**
- **to power productive activities; and to provide safe and sustainable energy services to households.**

Providing growing populations with access to electricity has become a priority for governments across Africa in the past decade; rural electrification programmes and agencies have proliferated throughout the continent, and there have been success stories. But there is a lot of ground to make up: across the continent 587 million people were without access to mains electricity in 2009, and less than 27% have access to electricity in Sub-Saharan Africa.

National energy access programmes under way in Africa are intended to provide modern and sustainable energy services, essential to achieving health, education, gender equality, economic development and other critical development goals.



Hydrological basins and 'water towers'

By increasing productivity, reducing the burden on women and children in the household, cutting indoor air pollution and providing light, energy access is a major facilitator of public health and economic growth. Promoting energy access programmes is thus a priority for the AEEP.

Improvements to data collection will help to achieve key development goals, by better targeting policies and finance to meet needs. The World Health Organisation in 2009 described data collection on energy access as "critical" for developing policies that address energy poverty and create the right environment to finance the expansion of access to modern energy services. The AEEP will use all available data to track progress in access to electricity across the continent.

In this context, the choice of indicators for access to energy is a critical element in the national decision-making processes that develop energy strategies.

Quality and affordability

Connection to the grid is a very desirable outcome, but other elements are needed to complement it to achieve positive outcomes. Quality and affordability of access to modern fuels and cooking equipment, as well as to electricity, is essential if real change is to be made.

Data collection has an essential role

A lively discussion on the definition of access to energy and on the appropriate indicators to measure progress is under way in the context of this year's global Sustainable Energy for All (SE4All) initiative.

This is far from an academic debate: how we define and measure access will influence how energy programmes are designed and carried out, as well as how energy programmes are linked to other development co-operation programmes.

International assistance is crucial, but access issues will continue to be defined within a national context, above all. And lack of national capacity to define appropriate, cost-effective, energy access strategies is a barrier to overcome in improving access. Progress on strategies will advance efforts to define national indicators and to collect data.

International support could have a very useful role in the energy strategy decision-making process, in a number of ways, by:

- identifying specific energy services that are the highest priority to achieve national development goals;
- helping to choose the most effective and efficient technological, financial and institutional solutions to provide these services;
- defining indicators to monitor progress in carrying out national strategies; and
- aiding national authorities in collecting data.

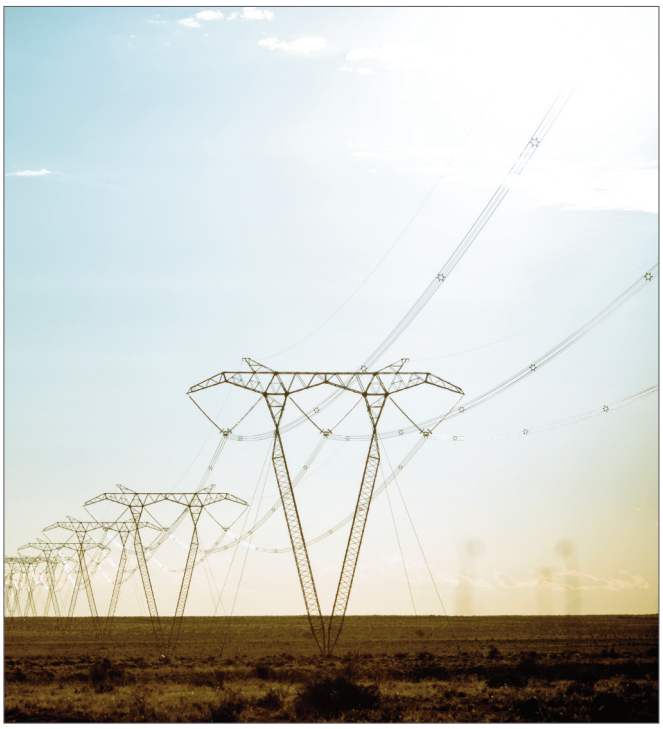
These indicators must be 'smart', providing useful information on progress and problems, based on feasible data collection processes. The AEEP is working towards making a contribution in this sense.

Other complexities

Infrastructure such as mini-grids and isolated thermal power plants has been installed across sub-Saharan Africa. While they may be less expensive to build in the short run than grid connections or renewable-based mini-grids, they often provide only limited amounts of electricity; consumer prices are often high and supply can be unreliable and polluting. Collection of data relating to the quality of supply is essential if these programmes are to be adequately assessed.

Connection to a national grid poses separate problems. The dispersed nature of populations in many countries makes the task of supplying rural communities extremely costly.

Affordable solutions are hard to come by for many countries, although electrification across borders has been employed on occasion. Few African countries with large rural populations have achieved electrification rates above 40%. Wood and other biomass fuels continue to dominate as the essential fuel source of many African populations.



South African pylons

SE4All seeks universal access to power by 2030

A clear international consensus emerged, at the Johannesburg World Summit on Sustainable Development, on the crucial role of access to energy in achieving national and international development targets, including the Millennium Development Goals. A decade later, the international community is considering establishing a common goal of achieving universal access to energy by 2030. The Sustainable Energy for All (SE4All) initiative has been launched by UN Secretary General Ban Ki-Moon to bring access to modern energy services to 1.3 billion people by 2030, with a doubled share of renewable energy in the global energy mix and a doubled global rate of improvement in energy efficiency.

As well as some 1.3 billion people currently having no access to electricity, SE4All recognises that around 2.7 billion cook and heat using wood, charcoal or vegetable matter that they burn in traditional cookstoves – and that everyone should have access to modern and reliable sources of energy by 2030. This is a huge undertaking: to reach the SE4All goals, some US$48 billion annual investment will be needed, according to the International Energy Agency. Multilateral, national and other public sources of funding will play an important role – with the European Union making a significant commitment of reaching an additional 500 million people by 2030 to support the SE4All targets – but even more crucial will be the mobilisation of private sector financing.

Energy Security

The AEEP 2020 Targets on Energy Security

Africa and the EU will take joint action to improve energy security by:

- **doubling the capacity of cross border electricity interconnections, both within Africa and between Africa and Europe, thus increasing trade in electricity while ensuring adequate levels of generation capacity; and**
- **doubling the use of natural gas in Africa, as well as doubling African gas exports to Europe, by building natural gas infrastructure, notably to bring currently flared gas to market.**

Energy security means different things to different people in a wide variety of contexts. For many Africans it refers to the goal of providing an adequate supply of reliable and affordable energy. Today, inadequate energy infrastructure must meet the demand from growing populations and rapidly expanding economies. Governments and energy companies must play 'catch up', to build adequate regulatory structures and to finance the needed capital investments.

The AEEP Monitoring Tool can make a contribution to the AEEP's focus on increasing electricity links, increasing African gas exports and gas consumption, by measuring the progress made in developing interconnections and trade.

Africa faces specific challenges to its energy security at the present time: these include rising hydrocarbons prices, political and social difficulties associated with introducing cost-reflective tariffs, insufficient investment in ailing infrastructure, weak regulation and sector organisation.

Natural events, such as droughts, also have a major impact, for example by increasing reliance on costly rented diesel generators.

Oil and gas prices have risen beyond expectations in recent years, and look unlikely to decrease significantly over the medium term. This has had a severe effect on Africa's largely fossil fuel-dependent energy sector – squeezing revenues, putting irresistible upward pressure on prices and draining foreign exchange reserves. Although most countries have planned diversification away from fossil fuels, investment in renewables has been slow to take off. Natural gas is under-utilised in many countries, that rely instead on costly and polluting oil-derivatives.

Current high hydrocarbon prices provide an opportunity for oil and gas exporting nations to increase sales abroad, both to Europe and to Africa. These prices can also make the export of green power from the Sahara a reality, as the cost of large-scale solar projects becomes more viable when benchmarked against spiralling conventional fuel costs.

Energy economics impact on project delivery

Success in building energy infrastructure requires the strengthening of institutions and governance procedures.

Fixing cost-reflective tariffs will foster private investment in many countries, improving the return on investment for potential developers of new power generation plants and other privately-financed infrastructure.

Inappropriate tariffs have also adversely impacted the investment decisions and financial viability of national energy companies, who face hard choices when supplying energy at a loss to poor customers.

Strengthened regulatory structures will aid in ensuring that projects are completed on time, and on budget, so as to deliver promised benefits.

Both appropriate tariffs and improved regulation will foster investment. A stronger financial and regulatory framework will aid African countries in meeting demand, overcoming the difficulties of achieving economies of scale when supplying energy to populations dispersed over very large areas. It will support the renovation of ailing infrastructure and the expansion of capacity.

Cross-border cooperation

Building physical infrastructure – notably interconnections between countries, discussed below – will facilitate reaching economies of scale and full utilisation of renewable energy hotspots.

New export facilities to carry natural gas to Europe and to Africa will increase the diversity of gas sources in Europe, provide benefits to exporting nations, and aid in doubling the use of natural gas in Africa.

These are stated goals of the AEEP's energy security targets.

Trans-Mediterranean Interconnections

North Africa – Europe connections

Europe and Africa are already connected by a significant number of gas pipelines and electricity interconnections, with more planned in the period to 2020 – helping to ensure energy security and economic co-operation on both sides of the Mediterranean

Gas and the Monitoring Tool

The AEEP Monitoring Tool seeks to track natural gas consumption and trade.

Th *BP Statistical Review* provides data on the consumption of natural gas in Africa and natural gas exports from Africa to Europe, which is updated annually, although a year in lieu. Details of projects are recorded by *African Energy*, whose data are shown in the map above.

In its initial phase the Monitoring Tool has used metrics derived from the BP review to establish baseline numbers; they have not undergone any data manipulation or extrapolation.

Connecting Africa with Europe, Algiers

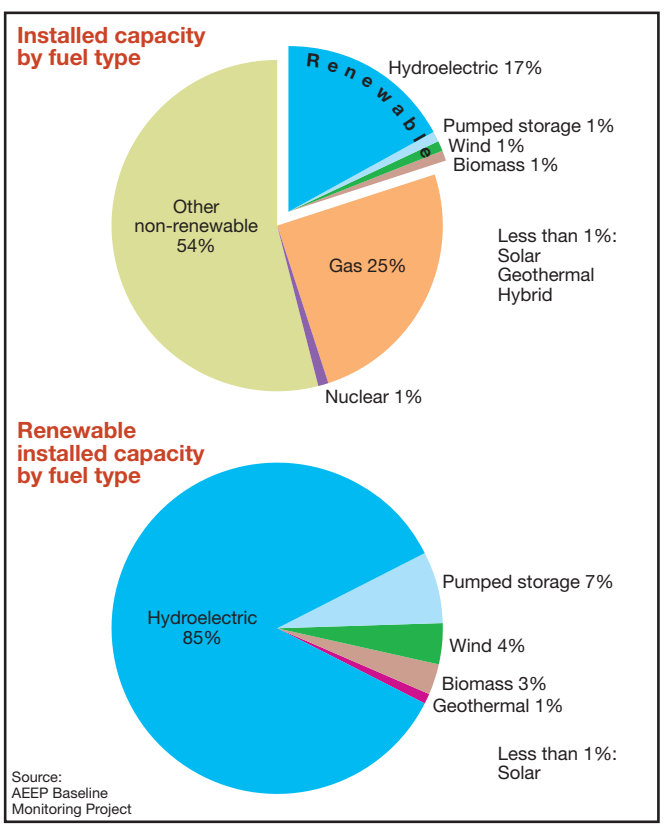
Greater diversification of fuel types is a desirable outcome

The AEEP database of African electricity generation projects provides an overview of the African generation sector – whose growth is essential to ensure energy security

2,400 projects monitored

The AEEP Monitoring Tool database was constructed using a range of publicly available information from sources such as national electricity companies, energy ministries, private electricity companies and reliable press sources. This compilation of local project information has been injected into a database for the purposes of developing an effective and flexible tool to monitor the African electricity supply industry's size and composition.

To date, the database has recorded some 2,400 generation plants across the continent – providing a baseline of installed capacity from which future expansion can be measured. It is possible to produce accurate measurements of the total current installed capacity, installed capacity of particular fuel types, total renewable capacity, fuel type composition and annual changes in the above at the continental, regional and national level.



Installed capacity in Africa

Figures from this database confirm the dominance of hydrocarbons in North African generation capacity; the importance of hydropower, especially in the centre of the continent; and the importance of huge coal deposits in the southern region. At present less than 20 per cent of electricity generated on the continent comes from renewable sources, but more renewable energy projects are now emerging, as shown on pages 16-17 below.

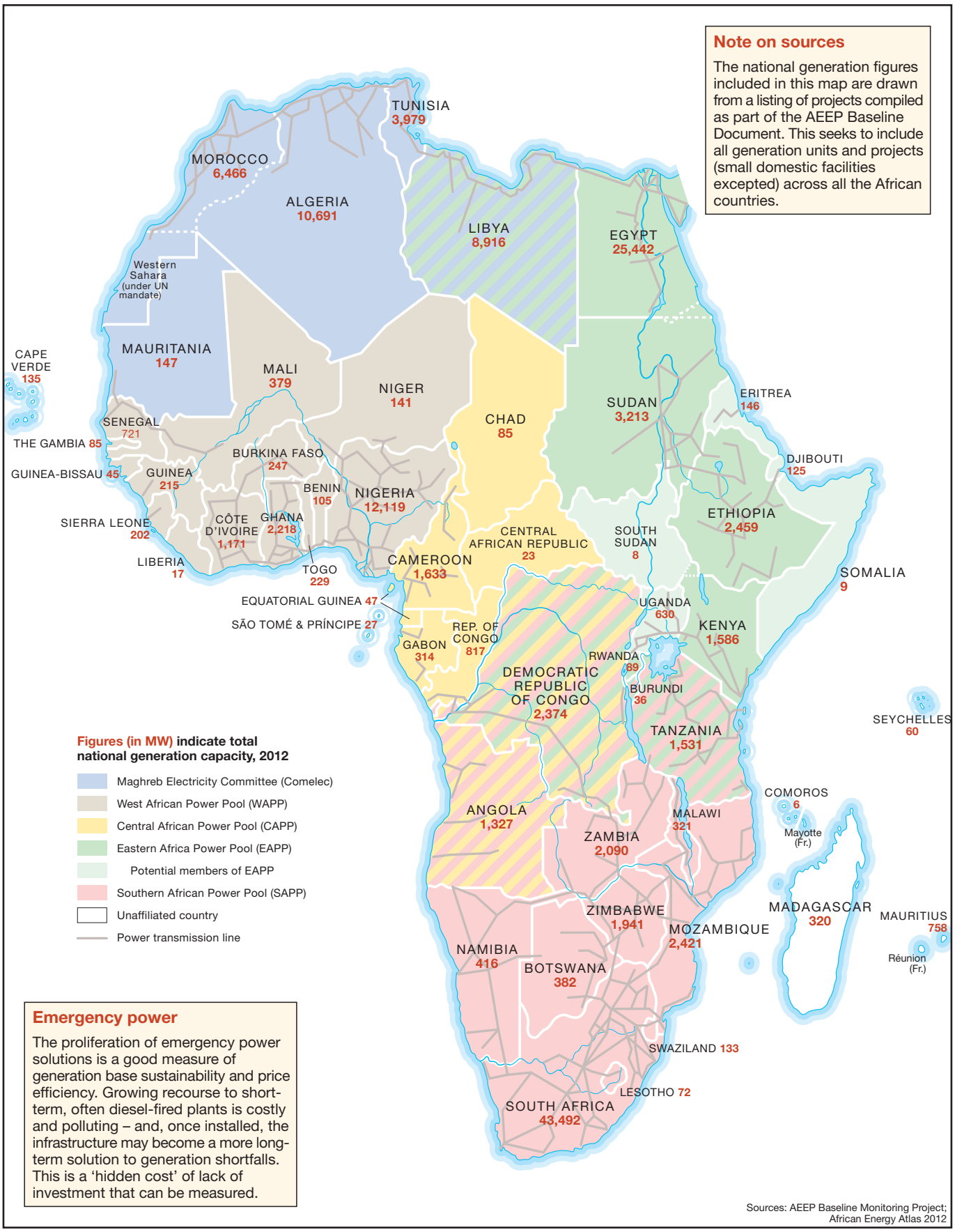
The vast majority of renewable capacity comes from hydroelectric sources (more than 92 per cent if pumped storage facilities are included). Huge river basins and other water resources give some African countries actual or potential 'water tower' status. Their mighty hydropower potential can supply the continent (and potentially even Europe, if some of the biggest projects are realised) for decades to come; some of the most important are shown in the map on page 13.

Hydropower is, however, vulnerable to climatic variables and the exploitation of large-scale hydropower sources may, due to a lack of grid infrastructure, not always contribute to increased energy access. These factors, as well as increasing and volatile oil prices point to the pressing need of a diversification of electricity generation in Africa in order to increase reliability.

Diversification will involve wind and solar, as well as natural gas, the so-called "transition fuel". The percentage of generation capacity using gas is, at 25 per cent, higher than in Europe, although the gas supply in Africa can be erratic and is sometimes replaced by costlier and more polluting diesel, when supplies fail.

Fuel types

The pie chart opposite shows the composition of installed capacity in Africa by fuel type, as well as the breakdown of renewable capacity by fuel type. Both figures refer to the generation sector as of Q1 2012. Metrics charting the total installed capacity of the renewable sector in the key baseline indicators were also generated using this tool.



Installed capacity and power pools

Electricity Interconnections

Cross-border co-operation to provide cheaper, more reliable power

The rewards of cheaper and more reliable power justify the cost and challenges of connecting national and regional electricity grids. But with only 52 transmission lines crossing national borders in Africa, these benefits have yet to be fully enjoyed by the continent.

Interconnection allows power companies to take advantage of economies of scale, building infrastructure in locations where electricity generation and transmission will be cheapest. Producers are then able to generate to their plant's maximum profitable potential and consumers benefit from lower cost electricity. The inter-connected system also allows countries to import electricity during emergencies and peak usage, or to facilitate essential maintenance, thus contributing to energy security.

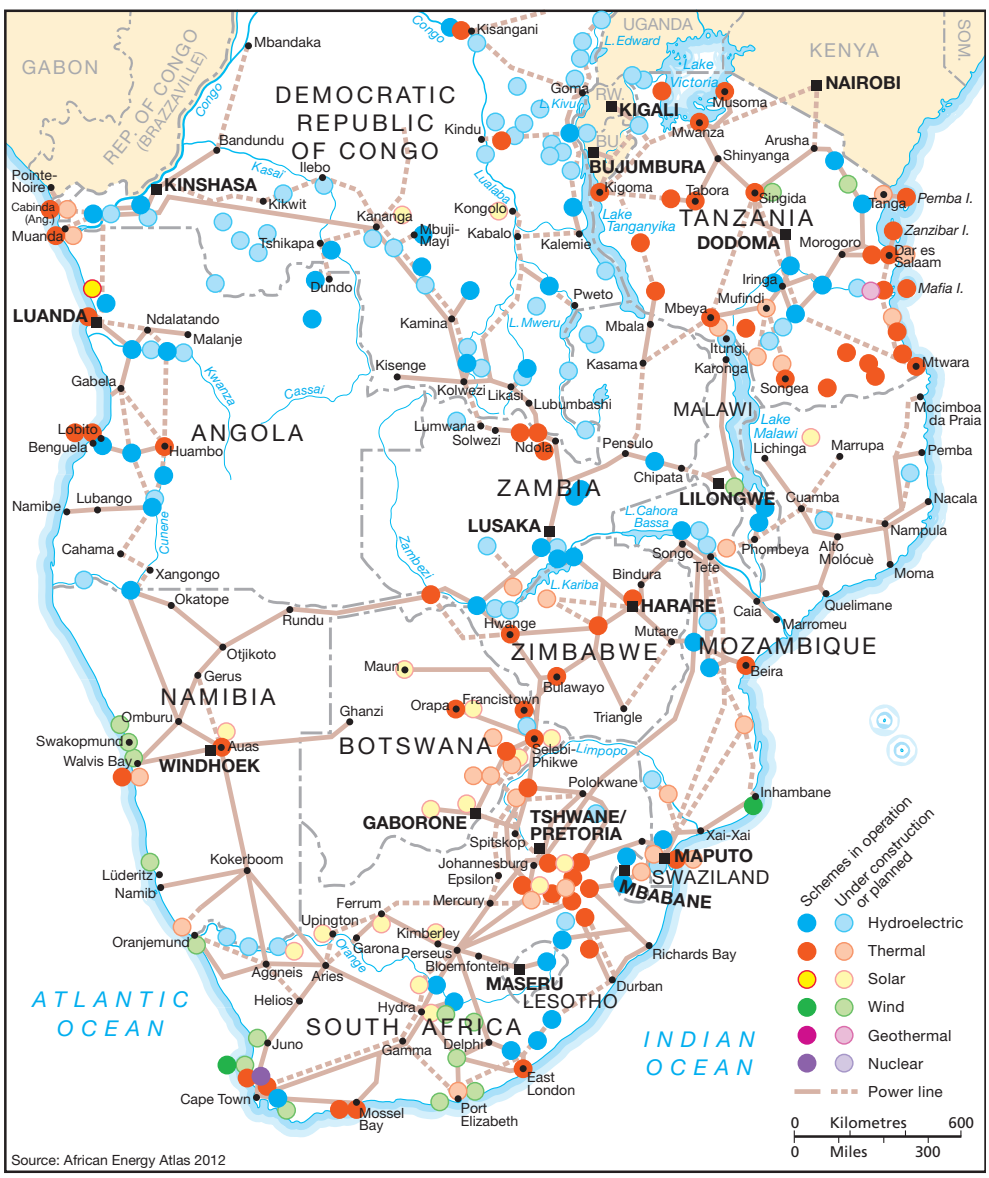
Africa already has a number of power pools: the Southern African Power Pool is shown in the map on this page. These are developing their potential to deliver more electricity across borders. These examples of international co-operation are at the heart of the AEEP.

Renewable energy stands to benefit from increased interconnection. While wind power can be unpredictable, several wind farms spread over a large distance can be more reliable, and reduce the need for costly backup capacity. Solar and hydropower sites are geographically limited, making interconnection an essential component of ensuring their financial viability. Interconnections can help realise the potential of renewable energy hotspots such as the Sahara Desert and Congo River, and increase African cross-border trade in energy.

The AEEP is committed to assisting with efforts to overcome the challenges of interconnections: realising the extensive studies required to ensure that systems are compatible and stable; helping grid operators adapt their operations; and fostering the necessary administrative co-operation.

The political dimensions of regional interconnection – notably energy security – must be addressed to assure progress. Contributing to dialogue on rigorous implementation of policy, so that cross-border transmission projects become a reality, the AEEP will continue to monitor progress in this sector, as part of its drive to improve energy efficiency and increase access to affordable and reliable energy.

The Southern African Power Pool (SAPP): building up interconnections



Source: African Energy Atlas 2012

The AEEP 2020 Targets on Renewable Energy and Energy Efficiency

Africa and the EU will take joint action to increase both energy efficiency and the use of renewable energy in Africa by:

- building **10,000MW of new hydropower facilities** taking into consideration social and environmental standards;
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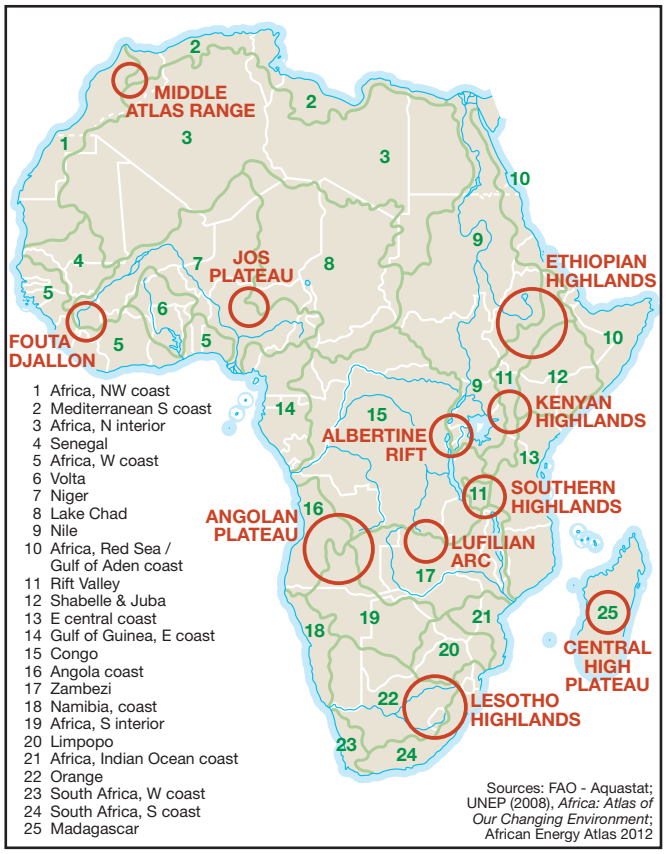


Hydrological basins and 'water towers'

Vast potential can be unlocked through cooperation

The promotion of renewable energy (RE) sources, including hydropower, solar and wind power, is an essential part of the Africa-EU Energy Partnership, tapping the continent's vast potential for RE to meet future energy needs in Africa and Europe.

Hydropower is a major resource across the continent, as shown in the map opposite, which shows some of the continent's huge river basins and its main 'water towers'.

But while Africa's mighty hydropower potential can supply the continent – and potentially even Europe – for decades to come, this resource remains vulnerable to climatic variables. Investing in other sources of sustainable generation is essential, and integrating larger scale solar, wind power, biomass and other technologies into the fuel mix is now a priority for many African governments.

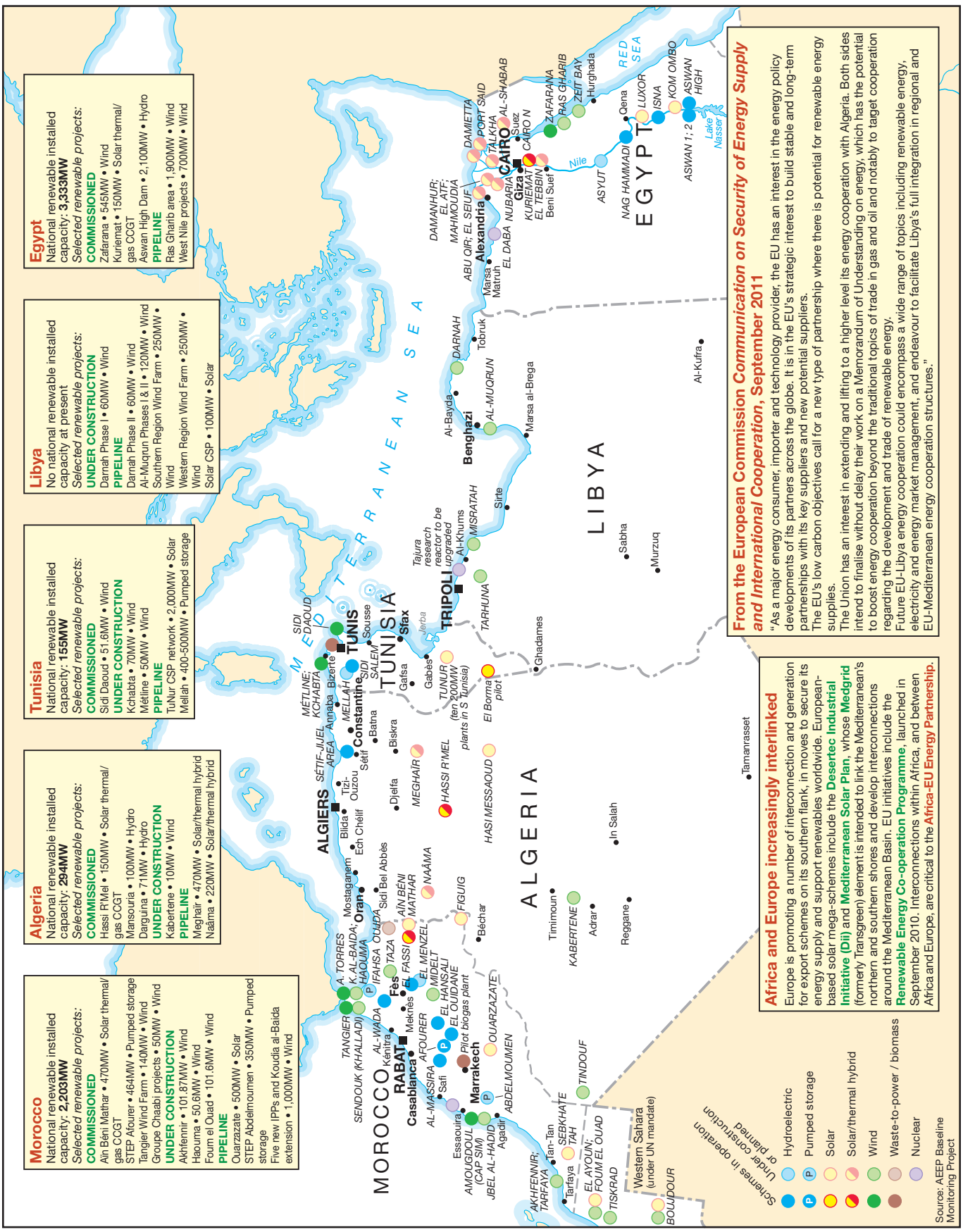
Maps on pages 16 and 17 show the spread of new RE schemes, which are emerging in North and Sub- Saharan Africa, as recorded in the AEEP Monitoring Tool.

RECP framework for investment

The expansion of renewables in the energy mix will reduce dependency on fossil fuels, improve energy security and form the backbone of a future low-carbon energy system. The development of RE capabilities can help Africa to meet its rapidly growing need to expand access, promote social progress and drive economic growth. The European Union is ideally placed to partner Africa in this, given its strong scientific and industrial base that has made it a world leader in developing RE technologies.

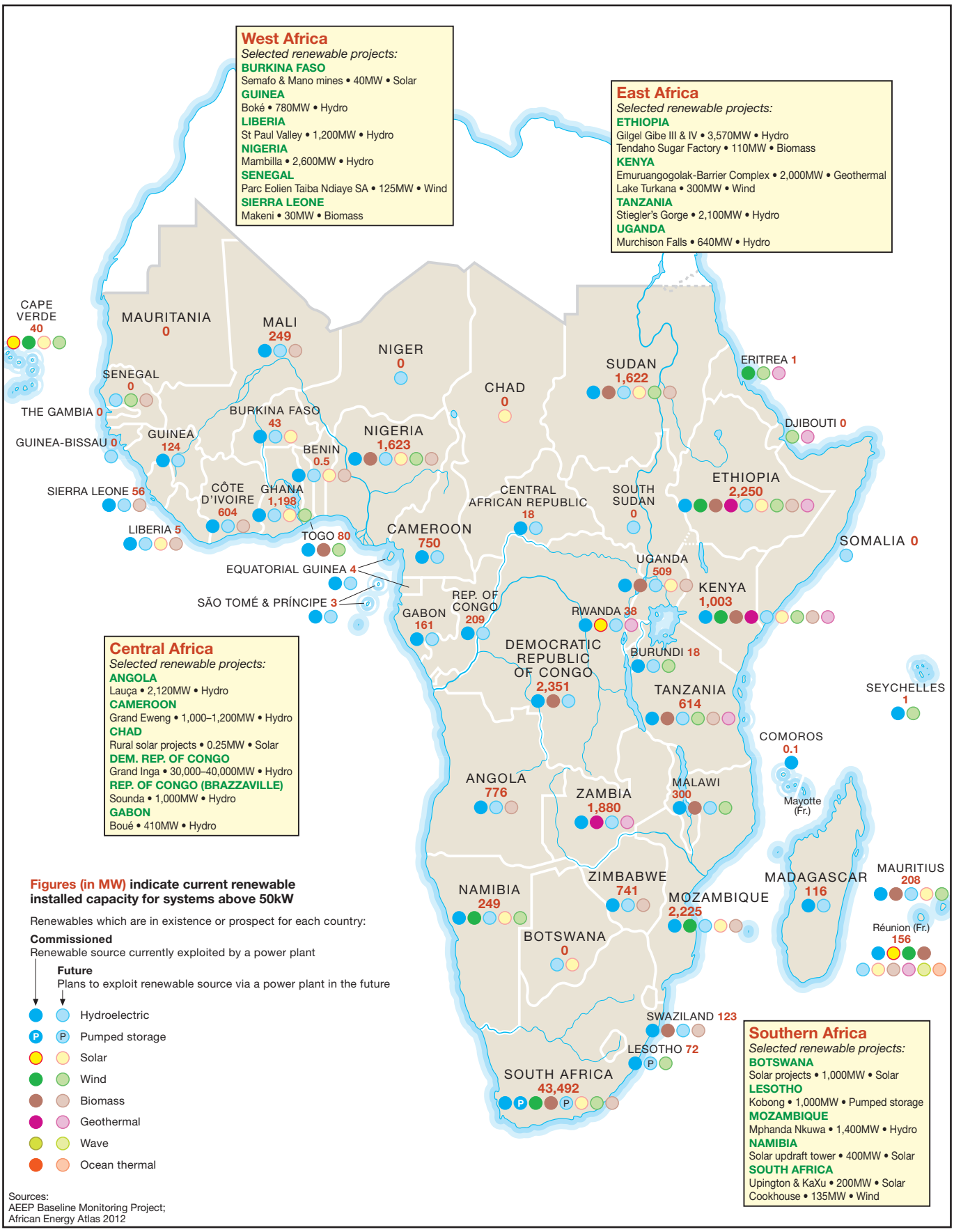
It was in this context that African and European leaders launched the Africa-EU Renewable Energy Cooperation Programme (RECP) at the AEEP's First High-Level Meeting, held in Vienna in September 2010. Under the RECP, Africa and Europe will take joint action to help make Africa a prime destination for renewable energy investments, complementing existing Africa-EU cooperation by mobilising European technology expertise and innovation capacity to build knowledge and capacity in Africa and support the growth of a new industrial sector on the continent.

North African Renewables Projects



North African renewable energy and nuclear projects

Sub-Saharan Renewables Capacity and Projects



Renewable energy in Sub-Saharan Africa

Measuring the benefits of more efficient energy use

Energy efficiency is a fundamental attribute of an effective energy sector, but it has been calculated that Africa uses more energy per unit of economic output than any other region. Inefficiency causes higher costs and dramatically reduces the social and economic benefits of energy access. But rapid savings can be obtained at low cost, by such means as using modern high performance light bulbs and refrigerators.

By getting more and better services out of less energy Africa can make huge savings – estimated at up to 40% – which would make a rapid contribution to easing power crises across the continent. For this reason Africa and the EU are committed, within the AEEP framework, to taking joint action to increase energy efficiency. And in this context the AEEP Monitoring Tool is working on ways of indicating progress towards a more efficient African energy sector by measuring electricity network losses and energy intensity.

Tackling network losses

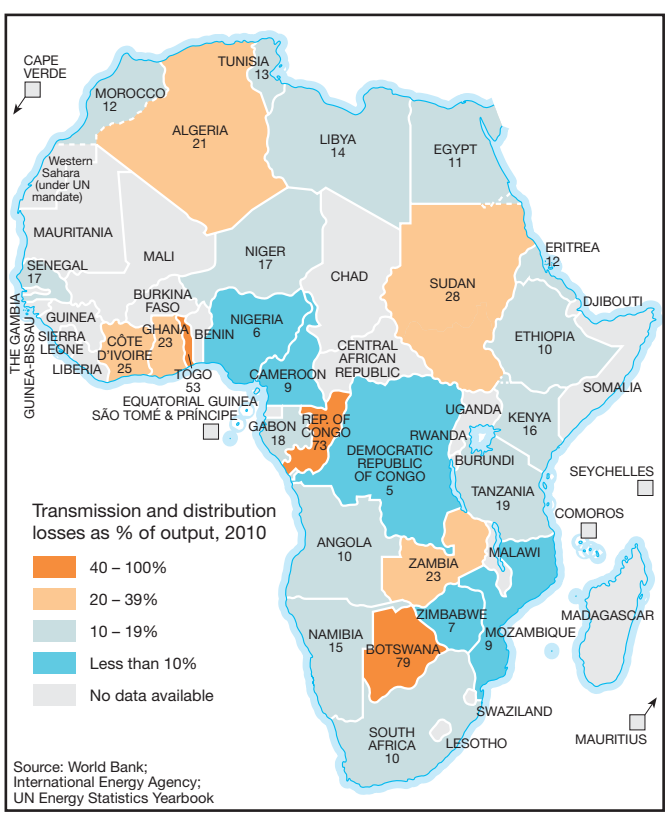
Network losses are a strong indicator of inefficient energy delivery and ailing infrastructure. High losses mean that much of the electricity supplied is wasted, resulting in higher generation requirements and lower revenue for electricity companies.

Energy intensity demonstrates the extent to which energy is used efficiently to stimulate economic activity. More effective energy use is likely when effective regulations and tariff structures are in place, where there is access to appropriate and affordable energy resources and energy saving measures are working. These figures – shown below – therefore allude to a range of positive characteristics.

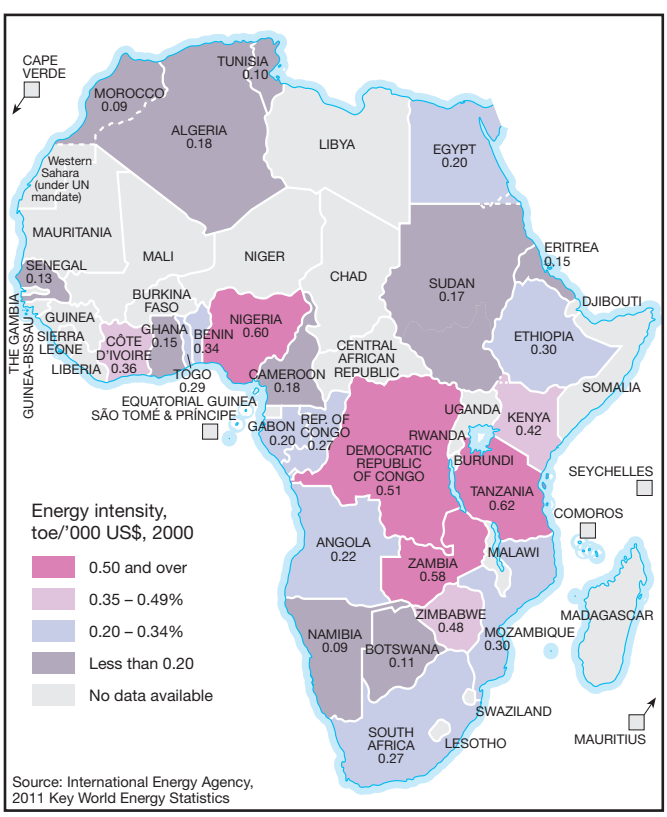
Efficiency baseline

In the first instance, to help understand and measure energy efficiency issues, a baseline network loss figure is being used based on data which is compiled and presented by the World Bank and updated annually; this data comes from the International Energy Agency (IEA) and the UN's Energy Statistics Yearbook.

The baseline figure refers to a simple average of national transmission and distribution losses (in 2009, the latest data



Network losses



Energy intensity

available). These data include losses due to theft and between generation source and distribution point. The baseline figure is therefore indicative of the characteristic national losses, rather than continental. As network losses are operated at the national level, this method makes sense – the indicator suggests that the average country will lose 20.7% of output between generation and consumption. Unfortunately the dataset is not complete, with 27 of the poorest countries not included. This means that the network loss metric is likely to be understated.

National documenting and reporting on losses is an area in need of improvement if a more accurate approximation is to be arrived at. This represents an important area for future work for the AEEP.

Intensity challenge

Measuring energy intensity poses similar challenges. Information can be unreliable or just not available – as is the case for 27 African countries – posing another challenge the AEEP Monitoring Tool is committed to tackling.

The baseline energy intensity figure was generated by extrapolating national energy intensity data from 2009 – total primary energy consumption over gross domestic product (GDP) at purchasing power parity (PPP) – from the IEA's 2011 Key World Energy Statistics dataset. This was done by subdividing the continent into three regions – North Africa, South Africa and Sub-Saharan Africa minus South Africa – and extrapolating values for energy intensity on the basis of population within each region. A weighted mean value for the African continent could then be calculated, also based on population. This has produced a reasonable but at best approximative figure, ahead of more extensive work being carried out to measure energy intensity.

Energy intensity is most relevant to the firm and the household, which means that this method has the advantage of providing a stronger indication of energy intensity across the entire continent, irrespective of national boundaries. A simple average of available country data would have given a value of 0.28 toe per thousand US dollars (2000). Again, as the countries not included tended to be less-developed economies, there is likely to be some small downward bias in the figure. This will be less in the weighted average.

Dr Elham M.A. Ibrahim, Commissioner for Infrastructure and Energy, African Union Commission, and Günther Oettinger, EU Commissioner for Energy, at the First High Level Meeting of the AEEP in 2010

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