Africa-EU Energy Partnership

Status Report Update: 2016

A mid-term report on progress, achievements and future perspectives

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About the Africa-EU Energy Partnership

The Africa-EU Energy Partnership (AEEP) is one of the eight partnerships created following the December 2007 Lisbon summit, under the Joint Africa-EU Strategy (JAES) – a long-term framework for co-operation that allows Africa and Europe to work together to develop a shared vision, common policy approaches and actions. This is central to achieving the AEEP's overall objective – of improving access to reliable, secure, affordable and sustainable energy services on both continents.

The AEEP's efforts focus on meeting a series of concrete, realistic and visible targets by 2020, as agreed at the Partnership's First High Level Meeting, held in Vienna in September 2010, and at subsequent meetings, of which the Second Stakeholder Forum, to be held on 16-17 May 2016 at the Politecnico di Milano in Italy, is the latest.

The AEEP receives political guidance from a Steering Group which is currently made up of representatives of the African Union Commission, the Common Market for Eastern and Southern Africa (COMESA) Secretariat, Egypt, the European Commission, Germany and Italy. The AEEP Secretariat is hosted by the EU Energy Initiative's Partnership Dialogue Facility (EUEI PDF).

The AEEP's data-monitoring and targets for renewables, energy access, efficiency and security are the subject of this report, which updates the AEEP's 2014 *Status Report* (which may be downloaded at http://euei-pdf.org/aeep-status-report). The 2014 *Status Report* described efforts to set benchmarks and monitor progress to meet the AEEP's goals, and pointed to directions for continued action. These included discussion of whether the AEEP's 2020 targets should be revised – a discussion expanded in this *Status Report: 2016 Update*, ahead of the Second Stakeholder Forum in Milan.

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%, 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."

Steering Group

European Commission

COMESA

Ministry of Electricity and Renewable Energy

Federal Ministry for Economic Cooperation and Development

Ministero degli Affari Esteri della Cooperazione Internazionale

Contents

Abbreviations

bcm	billion cubic metres	**km**	kilometre
bn	billion	**kV**	kilovolt
C02e	C02 equivalent	**kW**	kilowatt
CSP	concentrated solar power	**m**	million
		MJ/$	million joules/dollar
GJ	gigajoule	**MW**	megawatt
GW	gigawatt (MW1,000)	**PV**	photovoltaic
h	hour (as in GWh)	**tcf**	trillion cubic feet
HEP	hydroelectric power	**t/yr**	tonnes a year

Definitions

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

Biomass for electricity generation (rather than, cooking) covers the burning of organic matter . This category of 'Other Renewables' 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 when used for electricity.

Status Report: 2016 Update

The First AEEP *Status Report* was published to coincide with the Second High Level Meeting of the Africa-EU Energy Partnership, held in Addis Ababa in February 2014. It was the result of more than two years of work conducted by the AEEP Secretariat, its consultants and stakeholders, to help the Partnership to meet its objective of tracking progress against the AEEP 2020 Political Targets and inform decision-making in Africa-EU energy cooperation. In this, it conformed with the mandate established for the AEEP at the 2007 Africa-EU Summit held in Lisbon: to establish benchmarks by which the Partnership's Political Targets could be measured.

The report's origins were in a comprehensive baseline study, *Monitoring Progress under the AEEP*, which was launched at the AEEP's First Stakeholder Forum in Cape Town, South Africa in May 2012. The 2014 *Status Report* was notable for operationalising the AEEP Monitoring Tool – a Power Project Database containing more than 3,250 individual generation projects, along with details of transmission lines, cross-border connections and export markets, and other data. The 2014 *Status Report* was an ambitious project; it is a reflection of the lack of data about many African energy sectors that there had been little like it to date. Indeed, judging from feedback received by the AEEP, the project is still seen as authoritative in 2016, when the need to collect and collate more accurate data has risen up the global agenda, following an upsurge in international attention paid to African energy issues from initiatives such as the United Nations-led Sustainable Energy for All (SE4All), US President Barack Obama's Power Africa and the African Renewable Energy Initiative (AREI).

The Monitoring Tool's principal aim was to track progress towards achieving the AEEP 2020 Political Targets. The report set the stage for ground-breaking monitoring of electricity generation capacity and cross-border electricity and gas interconnections on the continent. This was work carried out directly by the AEEP and has been updated for this report, which benefits from a database with more than 3,000 generation projects.

Constraints on resources mean that external sources were used to benchmark other key targets – for energy access and energy efficiency – following rigorous analysis of the data by the AEEP Secretariat. This remains the case for this *Status Report Update*. Analysis of published data suggest that, in Africa, the goals of universal energy access and accelerated rates of improvement in energy efficiency remain elusive goals. As the 2014 *Status Report* observed, the situation is not helped by the poor quality of much of the existing data. While far from perfect, the Global Tracking Framework (GTF)– established within the SE4All framework and driven by a Steering Group led jointly by the World Bank Group's Energy Sector Management Assistance Programme (ESMAP) and the International Energy Agency (IEA) – has started to produce more authoritative data sets, which are expected to improve further in the next few years. This data is used for access and efficiency indicators in this report.

This *Status Report Update* is to be launched at the AEEP's Second Stakeholder Forum, to be held in Milan, Italy on 16-17 May 2016. It is hoped that its data and analysis will help the AEEP's diverse community of stakeholders – who include governments, public institutions, civil society, academia and business – to take stock of progress to date and develop policy for Africa and Europe to move ahead.

A critical issue to be informed by this report is whether, following nearly a decade of growth in the African energy industries, the AEEP's political targets are still relevant in developing sustainable energy systems. The AEEP Power Project Database shows that solar power capacity installed since the 2010 baseline already far exceeds the AEEP 2020 Political Target of adding 500MW.

Discussions held in preparation for the Second Stakeholder Forum in Milan suggest it may be appropriate to ask if the Political Targets' timeframe should be extended. A number of major initiatives – including SE4All, AREI and Power Africa – have a shared target date: 2030. In September 2015, the United Nations unveiled 17 Sustainable Development Goals (SDGs), which are intended as a baseline for harmonising global action to tackle poverty. SDG Goal 7 provides a commitment to "ensure access to affordable, reliable, sustainable and modern energy" by 2030. Goal 7 aims closely align with other AEEP targets, with commitments to substantially increase renewables' share of the global energy mix and doubling the global rate of improvement in energy efficiency.

Research into the multiplicity of global initiatives conducted for the AEEP and published in a new report, *Mapping of Energy Initiatives and Programmes in Africa*, concluded that given the large variety of multi-country, multi-stakeholder initiatives and aid programmes, a more systematic exchange of information and increased co-ordination are needed. Aligning the AEEP's Political Targets might be one contribution in this direction.

Progress despite frustrations

The world in which the Africa-EU Energy Partnership (AEEP) functions is changing, with many more actors becoming involved in the electricity sector. The AEEP has contributed to pushing energy to the top of the Africa-EU agenda and has helped to shape global initiatives such as Sustainable Energy for All (SE4All). Its remit remains to provide a framework in which policies and projects – the African Renewable Energy Initiative (AREI), among others – can be implemented with high levels of delivery and stakeholder buy-in. It will push ahead on this agenda with the AEEP's Second Stakeholder Forum, to be held in Milan.

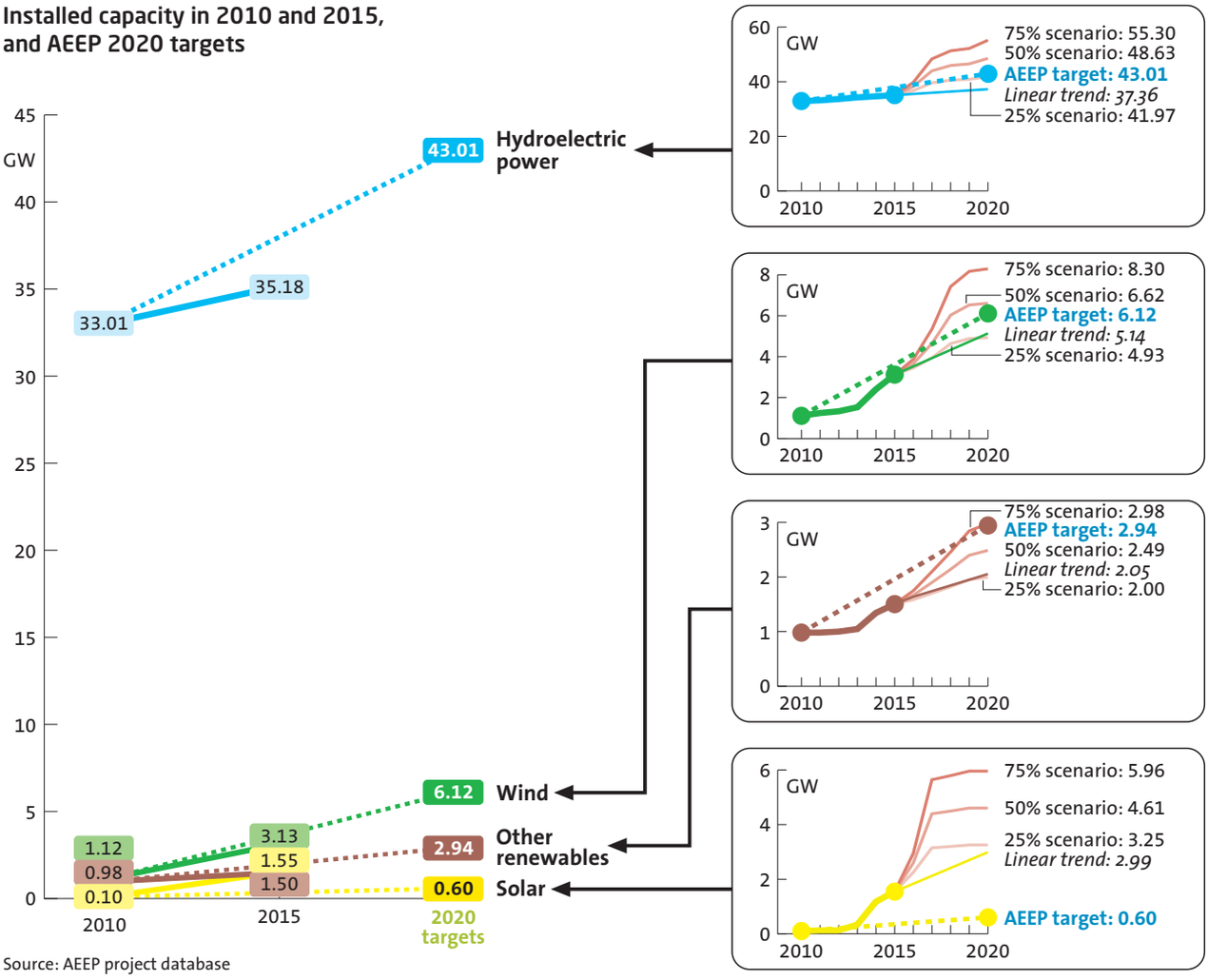
This *Status Report Update* builds on previous work to give an overview of progress towards meeting the AEEP's 2020 Political Targets – using the AEEP Monitoring Tool and its ground-breaking Africa Power Projects Database. The report should also provide a platform for discussion of how cooperation can be further intensified and project implementation and coordination enhanced to help improve the lives of many millions in Africa and Europe. The report recognises that much remains to be done in compiling the data necessary to inform these decisions. In a transitional period for data-gathering on African energy sectors, AEEP stakeholders – many of them now also involved in complementary initiatives, such as SE4All and its Global Tracking Framework (GTF) – are committed to making up the information gap to obtain accurate data on African access, energy efficiency and other indicators.

Renewable generation is growing

Renewable energy (RE) generation capacity has been increasing, as shown in the graphic below, which is based on analysis and estimates drawn from the AEEP Power Project Database. The data for generation plants in

AEEP renewable generation targets

Installed capacity in 2010 and 2015, and AEEP 2020 targets



Source: AEEP project database

operation and planned for completion in the period to 2020 suggest that in some sectors – such as the installation of solar capacity – developments have largely surpassed the AEEP's 2020 Political Targets, which were agreed in 2007, when the global renewables industry was at a very different stage of development.

Hydroelectric power

Hydroelectric power (HEP) remains the dominant RE technology supplying African grids. Between 2010 and 2015, 2,174MW of HEP capacity was added. Further, rehabilitation work has been undertaken at a large number of dilapidated facilities, improving performance and reliability. While large HEP projects dominate the AEEP Power Project Database, smaller projects can have a very big impact in providing energy for isolated communities.

Solar capacity exceeds projections

Solar capacity started at a very low level, but has enjoyed exponential success. The AEEP's Political Target of adding 500MW more generation capacity by 2020 was met only four years after the 2010 baseline was set – and is expected to have been met four times over by the end of 2016. Installed capacity at end-2015 was 1,546MW, compared with 103MW in 2010.

Wind power

Since 2010, 2,132MW of wind power has been added, more than doubling the 2010 capacity of 1,120MW. Analysis of the project pipeline suggests the AEEP Political Target of adding 5,000MW by 2020 can be met, if 43% of the planned projects are completed on time.

Other renewable technologies

The AEEP database shows that some 1,410MW must still be added to triple the amount of generation from biomass and geothermal resources from their 2010 levels. Because timelines for some Kenyan geothermal projects have slipped, 73% would have to be completed on time for the AEEP target to be reached. While biomass in 2015 had more capacity – 950MW compared with 554MW for geothermal – geothermal capacity is anticipated to overtake biomass in 2017-18.

Indicators for access

Indicators for access to electricity and clean, sustainable cooking fuels remain inexact, and GTF statistics published to date are a work in progress, but they show an overall improvement in electricity access: in 2012, 516m Africans had access to electricity – leaving 570m without. The average compound annual growth rate rose from 3.9% in 2000-10 to 6.1% in 2010-12. In terms of new connections, this represents an increase from an average of 14.4m people gaining access to electricity each year between 2000 and 2010, to 28.9m in 2010-12. If this annual increase can be sustained, Africa is likely to achieve the AEEP's target of 50% access by 2020. Meanwhile, only 32.5% of Africans had access to non-solid cooking fuel in 2012, the same proportion as in 2010 and barely up from 31.8% in 2000 and 27.7% in 1990.

Energy efficiency

Energy intensity – calculated as units of energy per unit of GDP – is a measurable (if imperfect) indicator of energy efficiency. World Bank/SE4All data suggests that Africa experienced a decrease in average final energy intensity of 20% (or an average 2.9% per year) in 2000-12. Network losses remain a problem across Africa, but are exhibiting a stable trend, with only a 0.4% decrease between 2000 and 2012 (from 13.1% to 12.7%) and no change in 2010-12.

Energy security reinforces connections

The slow pace of Programme for Infrastructure Development in Africa (PIDA) projects and other cross-border schemes have slowed increases to electricity transfer capacity; the database shows no new operating lines completed since 2011. But recent progress on regional transmission projects suggests that, with improved project delivery, the AEEP target of doubling capacity by 2020 could be met. Among other energy security targets, gas consumption in Africa plateaued in 2012-14, due to political and economic challenges that have also had an impact on gas exports to Europe, which fell to 46bcm in 2014, having peaked at 84.9bcm in 2006.

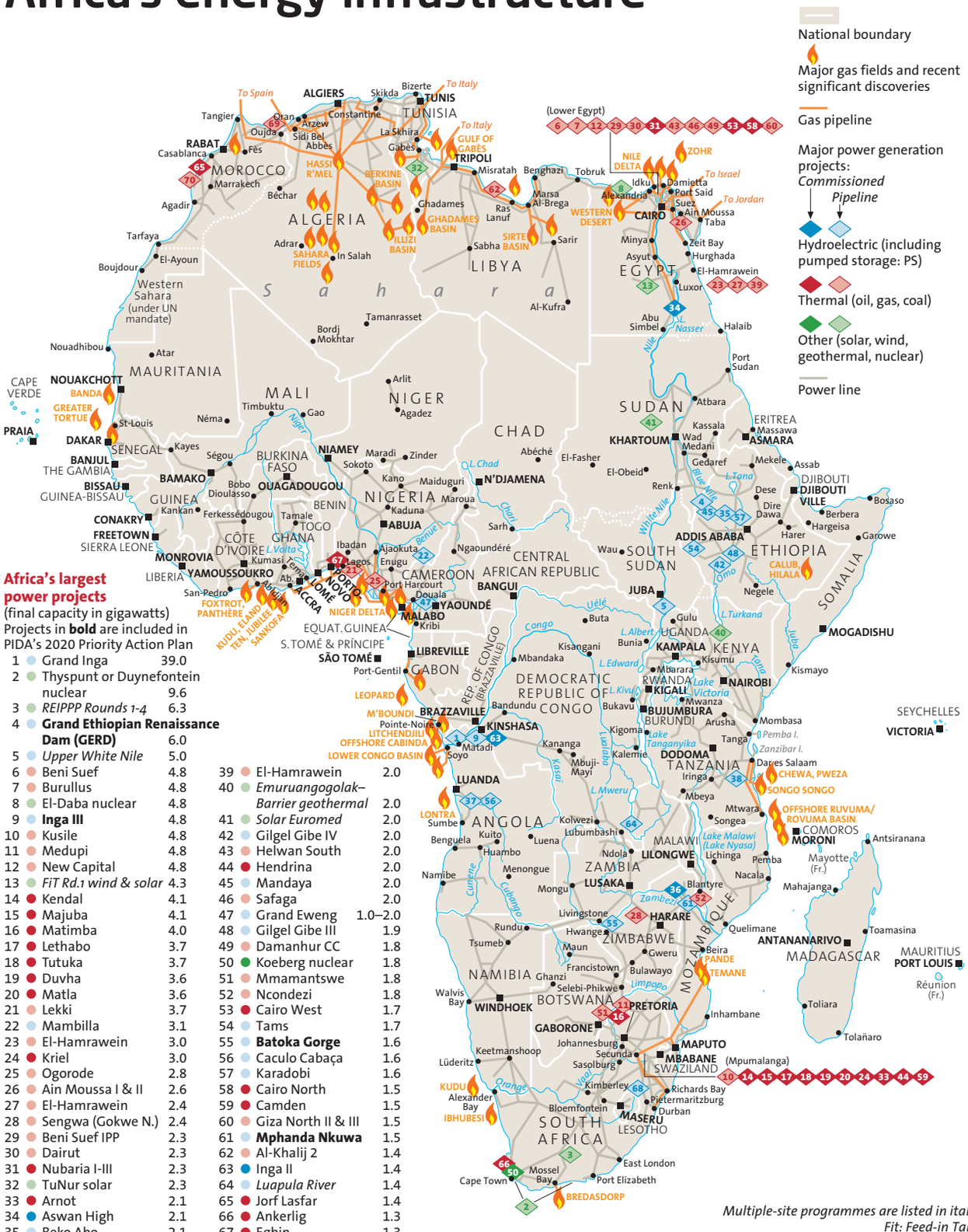
Financial support continues to grow

Increasing levels of financial support are shown in data for African and European contributions – which, although still incomplete, point to positive trends. These include an increase in allocations to energy in African government's annual capital spending budgets, for which initiatives such as PIDA are adding to, and volumes of multilateral loans.

AEEP should consider revising targets

Efforts to harmonise the growing number of African energy-focused initiatives – the subject of a separate AEEP study to be presented in Milan – together with increased focus on private sector investments and the contribution of global initiatives like GTF towards better understanding energy access and efficiency, suggest the AEEP should consider revisions to its 2020 Political Targets, both in terms of what is expected and the appropriate timeframe. 2030 is the chosen date for SE4All and AREI, the Sustainable Development Goals and other benchmarks.

Africa's energy infrastructure



Africa's largest power projects

(final capacity in gigawatts)
Projects in **bold** are included in PIDA's 2020 Priority Action Plan

1		Grand Inga	39.0
2		Thyspunt or Duynefontein nuclear	9.6
3		*REIPPP Rounds 1-4*	6.3
4		**Grand Ethiopian Renaissance Dam (GERD)**	6.0
5		*Upper White Nile*	5.0
6		Beni Suef	4.8
7		Burullus	4.8
8		El-Daba nuclear	4.8
9		**Inga III**	4.8
10		Kusile	4.8
11		Medupi	4.8
12		New Capital	4.8
13		*FiT Rd.1 wind & solar*	4.3
14		Kendal	4.1
15		Majuba	4.1
16		Matimba	4.0
17		Lethabo	3.7
18		Tutuka	3.7
19		Duvha	3.6
20		Matla	3.6
21		Lekki	3.7
22		Mambilla	3.1
23		El-Hamrawein	3.0
24		Kriel	3.0
25		Ogorode	2.8
26		Ain Moussa I & II	2.6
27		El-Hamrawein	2.4
28		Sengwa (Gokwe N.)	2.4
29		Beni Suef IPP	2.3
30		Dairut	2.3
31		Nubaria I-III	2.3
32		TuNur solar	2.3
33		Arnot	2.1
34		Aswan High	2.1
35		Beko Abo	2.1
36		Cahora Bassa	2.1
37		Lauça	2.1
38		Stiegler's Gorge	2.1
39		El-Hamrawein	2.0
40		*Emuruangogolak–Barrier geothermal*	2.0
41		*Solar Euromed*	2.0
42		Gilgel Gibe IV	2.0
43		Helwan South	2.0
44		Hendrina	2.0
45		Mandaya	2.0
46		Safaga	2.0
47		Grand Eweng	1.0–2.0
48		Gilgel Gibe III	1.9
49		Damanhur CC	1.8
50		Koeberg nuclear	1.8
51		Mmamantswe	1.8
52		Ncondezi	1.8
53		Cairo West	1.7
54		Tams	1.7
55		**Batoka Gorge**	1.6
56		Caculo Cabaça	1.6
57		Karadobi	1.6
58		Cairo North	1.5
59		Camden	1.5
60		Giza North II & III	1.5
61		**Mphanda Nkuwa**	1.5
62		Al-Khalij 2	1.4
63		Inga II	1.4
64		*Luapula River*	1.4
65		Jorf Lasfar	1.4
66		Ankerlig	1.3
67		Egbin	1.3
68		Ingula PS	1.3
69		Nador	1.3
70		Safi	1.3

Multiple-site programmes are listed in italics
Fit: Feed-in Tariff
REIPPP: Renewable Energy Independent Power Producer Procurement

Sources: AEEP Power Project Database; Programme for Infrastructure Development in Africa

Tracking developments in the African energy sector

The First AEEP *Status Report* introduced the AEEP Monitoring Tool – the African Power Project Database containing more than 3,259 individual generation projects, along with details of transmission lines, cross-border connections and export markets, and other data. The principal aim of the database was to track progress towards achieving the AEEP 2020 Political Targets. The report set the stage for ground-breaking monitoring of electricity generation capacity and cross-border electricity and gas interconnections on the continent. The Database has been updated for this *Status Report Update*.

The approach allows continent-wide statistics to be traced back to their origin in the power plants that generate the electricity. This makes the statistics more transparent – in a sector that is often reputed for its opacity – while facilitating the analysis of developments in a way not possible in other systems.

In this way, the AEEP Monitoring Tool allows policy-makers to understand how progress towards the Political Targets agreed at its First High Level Meeting in Vienna, Austria in September 2010 – which were confirmed in February 2014 at the AEEP's Second High Level Meeting – are being achieved. It is intended to help the AEEP's varied community of stakeholders to better understand trends, and identify opportunities and problems.

There has been a greater focus on improving the quality of monitoring of the African energy sector since the original AEEP Baseline Monitoring Report in 2012. At the forefront of these efforts has been the Sustainable Energy for All (SE4All) initiative, now established as a permanent secretariat in Vienna and sponsor of Global Tracking Framework (GTF), whose Steering Group is led jointly by the WBG's Energy Sector Management Assistance Programme (Esmap) and the International Energy Agency (IEA).

The latest SE4All *Global Tracking Framework Report*, published in 2015, showed significant progress towards better quality of data relating to energy access in particular. While the AEEP has been able to mobilise resources to monitor generation, it has not been positioned to carry out similar levels of data collection on issues of access and efficiency – although the Partnership has active work streams which are heavily focused on other facets of these issues. For this reason – and reflecting the strong support offered by African and European governments to SE4All and the GTF process – this report depends on GTF data.

There has been recognition of the need to provide comprehensive coverage of the continent at the same time as improving the depth of coverage. However, shortcomings remain. Improved data on energy access along the tiered system model is only available for a minority of countries. Datasets for the continent as a whole remain, in large part, a modelling exercise dependent on old data points. Furthermore, even with the acceleration of work by SE4All/GTF, the latest available data is for 2012. Using existing data alone makes understanding the effects of energy access and efficiency programmes initiated early in the decade impossible to determine.

Since its creation in 2007, the AEEP has taken a lead in statistical analysis and benchmarking key sectors of African energy. This pioneering approach has been reflected in subsequent initiatives such as SE4All and many more. It is given substance by the AEEP Monitoring Tool, which is able to provide reliable and up-to-date electricity generation and interconnection statistics up until 2015 and beyond.

Gaining an understanding of the weaknesses apparent in datasets that might support more accurate benchmarking of AEEP and other monitoring of African energy indicators has been a substantial element in the Partnership's work. Helping to strengthen methodological approaches and data-gathering will continue to be an important area of work as the AEEP strives to meet its goals.

Tracking from the ground up

The data underpinning the Monitoring Tool comes from three key sources: the AEEP Power Project Database, the GTF and BP. The database contains information on operating and planned power plants and electricity interconnections in Africa, allowing the installed capacity of renewable and other energy technologies to be tracked accurately through time.

The dataset – while a work in progress – is continually updated, allowing real-time analysis of events and trends in the sector.

The AEEP Power Project Database, which also provides the basis of the interconnection and renewable energy power generation statistics in this report, attempts to remove the opacity and improve on the reliability of existing datasets. It records detail including each of the recorded project's name, location, size and fuel type for over 3,250 actual and planned generation plants across the continent.

The approach of individually researching, verifying and recording power projects in 50 countries cannot claim to be comprehensive or guarantee the accuracy of all of the data. The approach is limited in its ability to record certain types of data, which may be increasingly important as more off-grid solutions are implemented to overcome generation shortfalls; one example would be statistics on solar water heaters and household energy solutions (such as solar home systems and diesel generators).

The AEEP's current approach may also lack the authority of aggregations based on data received from efficient, well-resourced national statistical offices. However, despite shortcomings, the AEEP is confident that this work is an improvement on comparable datasets – and provides a platform for further African-European cooperation to develop monitoring.

Aligning with SE4All

Given the realities of developing comprehensive efficiency and access statistics and the global efforts already under way, the AEEP has opted for a strategy of aligning its monitoring with SE4All, which is establishing benchmarks for access data.

Supported by a wide range of major public and private stakeholders, SE4All published its Global Tracking Framework in May 2013. The report marked a break with previous African energy statistics, endeavouring to provide data for every country on the continent, as well as putting in place financial and technical support to produce better quality statistics in countries that signed up to the SE4All programme. The second GTF report in 2015 built on this model, and showed the process was starting to make progress in some areas.

The SE4All database contains estimates of access to electricity and non-solid fuel for cooking, energy intensity and electricity transmission and distribution losses for all but a handful of African countries. Using modelling techniques, the GTF takes data from surveys carried out to international standards to produce estimates of data points for years and countries where no data currently exists. The underlying data set is aggregated from the WBG's Global Electrification Database,the IEA and the World Health Organisation's Household Energy Database.

Baseline Data

Tracking energy security indicators

Within the AEEP's energy security remit, information on pipeline and LNG natural gas exports from Africa to Europe and the consumption of natural gas is contained in the annual *Statistical Review of World Energy*, published by BP plc. This report is well respected internationally and has been published since 1951, providing an unrivalled dataset.

These data sources together form the AEEP Monitoring Tool, which tracks progress towards the AEEP 2020 political targets.

Overcoming information gaps...

In many areas, progress will understandably take time, given the need to develop the capacity and independence of national statistical offices and to undertake large-scale, very detailed surveys. In many countries, household surveys to gain a much deeper picture of energy use are only just beginning. Data gaps thus remain.

The absence of up-to-date energy access statistics means that analysts are reliant on estimates for data, which can have only limited responsiveness to policy reforms and new initiatives. In energy efficiency, SE4All data on network losses is implausibly volatile. In the case of the statistics for Botswana, the dataset estimates a low of 11.1% in 2001 but a high of 158% in 2012. Similarly, for Togo the figures fluctuate between 40.1% and 129%. Clearly there are serious questions to be asked about the dataset.

Constrained resources at national statistical offices, coupled with very widely dispersed populations, communications and transport infrastructure restrictions, limited state presence in some locations, large informal economies and the ubiquitous use of diesel generators, the poor condition of much existing infrastructure, all contribute to a high degree of uncertainty and complication in data production and analysis.

...needs a lot of resources

Reporting by national utilities and governments has often left much to be desired when it comes to providing up-to-date, comprehensive and publicly available statistics. But there has been some improvement as energy regulators

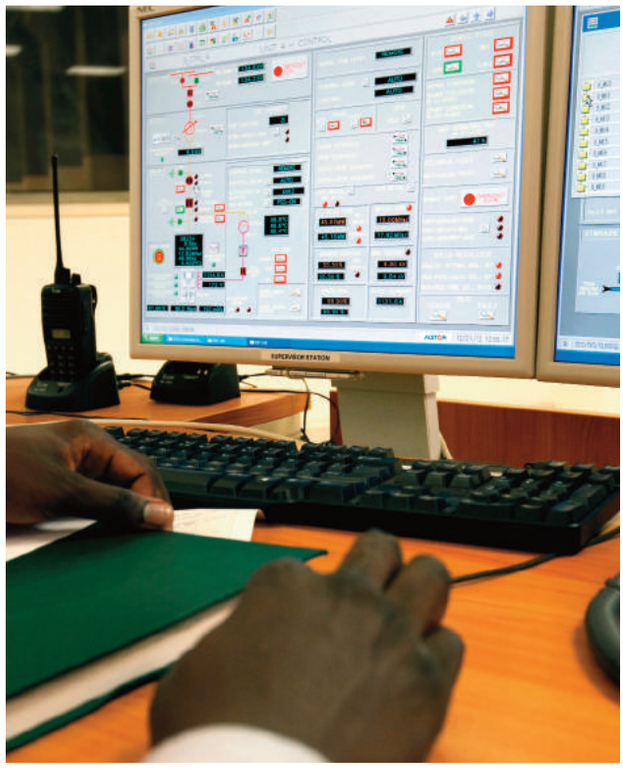
AEEP 2020 Political Target	Baseline 2010	Numeric 2020 Target	AEEP 2020 Will the target be met or missed by 2020?
Energy Security			
Double capacity of cross-border interconnections	9,230MW	18,460MW	Missed on current trend
Double the use of natural gas in Africa	108bcm	216bcm	Missed on current trend
Double African gas exports to Europe	79bcm	158bcm	Current trend is negative
Renewable Energy			
10,000MW Hydro	33,010MW	43,010MW	Missed on trend since 2010. Achieved on optimistic and balanced pipeline scenario
5,000MW Wind	1,120MW	6,120MW	Missed on trend since 2010. Achieved on optimistic and balanced pipeline scenario
500MW Solar	103MW	603MW	Already achieved
Tripling of other renewables (geothermal, biomass)	981MW	2,943MW	Missed on trend since 2010 Achieved in optimistic pipeline scenario only
Energy Efficiency			
Network losses (%)	12.7	na	No target defined
Energy intensity (MJ/US$2011 PPP)	6.7	na	No target defined
Energy Access			
Electricity Access (for an additional 100 million)	458m	558m	Comfortably achieved if trend since 2010 is maintained
Cooking (for an additional 100 million)	336m	436m	Missed by 10m on trend since 2010

and new management practices have had time to embed somewhat more open reporting cultures.

The situation is especially acute when it comes to assessing levels of access to modern, sustainable energy. For example, in some cases an electricity connection to one or a cluster of houses may be registered as a whole settlement or even town having access, which would clearly skew the data. This report – like other work in the sector – remains subject to these .

Given limited options, this report uses the best of the data available to produce estimates of trends and quantities, in the case of several key indicators following unique research work carried out for the AEEP.

The data set out in the following pages is of sufficient quality to illustrate trends and provide an indication of current values and rates. It does not claim to be either definitive or infallible, but it aspires to making a contribution towards better understanding the trends by which African populations can be supplied with the clean, sustainable energy, to which it is everyone's right to have access.



	Historical trends for 2020 target (based on annual average increases)			Scenarios (based % on current project pipeline)		
	Long-term (2000-15)	Medium-term (2007-15)	Short-term (2010-15)	Pessimistic (25% online)	Halfway (50% online)	Optimistic (75% online)
Energy Security						
Double capacity of cross-border interconnections	11,842MW	11,619MW	11,076MW	na	na	na
Double the use of natural gas in Africa (bcm)*	164	146	143	na	na	na
Double African gas exports to Europe (bcm)*	42	30	21	na	na	na
Renewable Energy						
10,000MW Hydro	37,378MW	38,319MW	37,358MW	41,969MW	48,633MW	55.297MW
5,000MW Wind	4,118MW	4,669MW	5,144MW	4,934MW	6,616MW	8,299MW
500MW Solar	n/a	n/a	2,989MW	3,254MW	4,606MW	5,958MW
Tripling of other renewables (geothermal, biomass)	n/a	n/a	2,054MW	1,995MW	2,487MW	2,978MW
Energy Efficiency						
Network losses %	2000-2012 – 12.6, 2010-2012 – 12.3			na	na	na
Energy intensity (MJ/US$2005 PPP)	2000-2012 – 5.2, 2010-2012 – 4.8			na	na	na
Energy Access						
Electricity Access (for an additional 100 million)	2000-2012 – 649m, 2010-2012 – 743m			na	na	na
Cooking (for an additional 100 million)	2000-2012 – 420m, 2010-2012 – 426m			na	na	na

* Trend figures are to 2014

PIDA will progress with strong support

The Programme for Infrastructure Development in Africa (PIDA) and its Priority Action Programme (PAP) are central to efforts to upgrade energy and other services across the continent by developing major projects at a regional level. PIDA has an impressive roster of schemes, which are shown in the map on page 20. It is supported by the African Union Commission (AUC), African Development Bank (AfDB) and the New Partnership for Africa's Development (NEPAD), whose NEPAD Planning and Coordinating Agency is PIDA's implementing agency.

The European Union has promoted support for PIDA as an important element in its cooperation policy, and with new urgency since the April 2014 Africa-EU Summit in Brussels. This is reflected in financial and technical support for projects, and coordinated through bodies like the Africa-EU Reference Group on Infrastructure. European institutions are participating in initiatives such as the PIDA Project Technical Assistance Facility, which is supporting early stage project preparation for these complex schemes.

PIDA has identified a group of energy sector projects which could have the greatest transformative potential in the period to 2040: the PAP. A subset of priority programmes will expand existing capacity to meet forecasts of growing trade through to 2020. The programme's primary objective is to reduce energy costs and increase access.

PIDA gives project development a strongly regional focus. This point was emphasised by NEPAD executive secretary Ibrahim Assane Mayaki at the First PIDA Week, organised by (NEPAD) in November 2015. "We must recognise that policy-making is increasingly moving from a national to a regional level," Mayaki said.

The scale and complexity of PIDA's 'transformational' projects – led by the biggest project of all, to develop the potential 50GW Inga Falls hydropower resource in Democratic Republic of Congo for the benefit of all Africa – means progress has been slow in many cases. No PIDA project has come online in the period covered by this update report. All four energy projects included in the recent PIDA Financial Structuring Plan have been discussed for years: the Zambia-Tanzania-Kenya power transmission line, the Trans-Saharan gas pipeline, Batoka Gorge and Inga III hydropower. But progress on projects like Ruzizi III and the CLSG transmission line (see Energy Security) suggests several more PIDA schemes will help to light up Africa in the period through to 2020.

Coordinating multiple African Energy initiatives

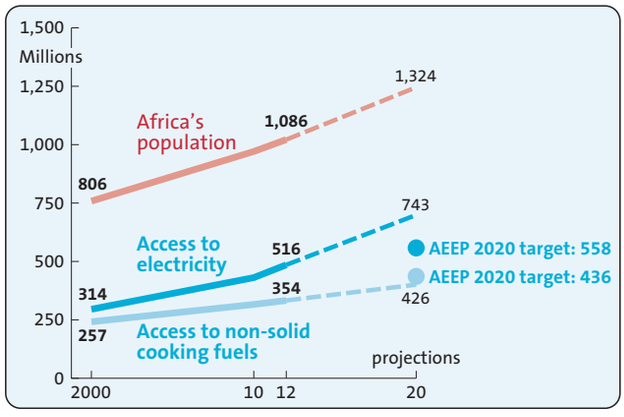
As energy has risen ever higher up the global agenda, there has been a proliferation of institutions, programmes and initiatives entering the African arena. Collaboration between organisations is now common, but even more often actors operate in isolation, duplicating effort and confusing issues. Harnessing momentum behind a focused set of global strategies and priorities seems essential to maximise impact and avoid contradictory goals;this requires a clear picture of the range of institutions, funds, programmes and initiatives jostling for space in the sector.

The AEEP has been involved in compiling the report *Mapping of Energy Initiatives and Programmes in Africa*, since May 2015. The report surveyed 58 initiatives and programmes. Information on 51 of these was either validated or supplied by the institutions behind them.

Renewable energy was seen as a priority, with 98% of initiatives covering it. Some 52% covered energy efficiency, 41% non-renewable generation and 36% heating and cooling, while only 34% were involved in clean cooking. Some 74% of electricity sector initiatives included grid generation, 57% mini-grids and 50% stand-alone off-grid. The AEEP mapping exercise found Central Africa received less attention than other regions, and relatively few focused on African sub-regions. A high level of private sector participation was identified, but limited interaction with civil society. It sees scope for stronger engagement with African non-governmental organisations.

As this *Status Report Update* also concludes, *Mapping of Energy Initiatives* identifies significant potential for increased support for clean cooking, and noted that while off-grid and mini-grid projects are receiving more attention, this interest comes from a low base. Further analysis is needed to develop tailored offerings, which include support for entrepreneurs and start-ups. The report concluded that skill development tended to be under-represented in technical assistance programmes. Knowledge transfer is a priority for many African governments and an essential component of building capacity at institutions and utilities; more skill development programmes might work.

Energy Access



African governments and the European Union recognise that access to sustainable energy is the basis of every modern economy, without which it is impossible to raise living standards or drive inclusive economic growth. As well as increasing productivity and the possibilities for entrepreneurship, access to electricity creates safer, well-lit streets, saves time in the home and allows food to be stored for longer. Electricity provides the foundation for modern healthcare, the media and digital world. In Africa, as in so many emerging economies, access to clean cooking fuels is integral to improving living standards. Reliance on solid fuel for cooking, such as charcoal, has well-documented adverse effects on health, together with often unsustainable and damaging production methods.

Securing access to secure, affordable, clean and sustainable energy services is one of three main areas for action under the Agenda for Change driving the EU's energy development policy. The African Union and EU see that providing support for the United Nations' Sustainable Energy for All (SE4All) initiative – which aims to pull 1bn out of energy poverty by 2030, some 500m of them in Sub-Saharan Africa (SSA) – is an important means of coordinating activity in this critical area.

African governments, the EU and other international actors are firmly focused on achieving a radical overhaul of this situation. Goal 7 of the Sustainable Development Goals (SDGs), unveiled by the UN in September 2015 as a baseline for harmonising global action to overcome poverty, provides a commitment to "ensure access to affordable, reliable, sustainable and modern energy" – underpinning SE4All's promise of universal access by 2030.

However, data compiled for SE4All and research by the AEEP and other agencies suggest that universal energy access remains an elusive goal. While many countries have made a concerted effort to improve levels of rural electrification and other forms of access, the impacts of insufficient resources and growing populations are still reflected in disappointing access indicators.

Further, while statistics – and basic observation – show that much of SSA is confronted with major shortfalls of access to electricity and clean cooking fuels, there is much to do before sufficiently accurate data is available to help improve the situation. Within the SE4All framework, the Global Tracking Framework (GTF) has been established to counter this shortfall, with a Steering Group led jointly by the WBG's Energy Sector Management Assistance Programme (ESMAP) and the International Energy Agency (IEA).

much remains to be done to compile accurate statistics until the GTF datasets are ready to provide a definitive picture of access in SSA. With some reason, critics argue that the statistics as currently available may even serve to obscure the challenges, rather than enlighten strategies to overcome them. Indeed, as the AEEP's 2014 *Status Report* observed, debate continues over the definition of access.

These issues are discussed by the AEEP's Energy Access Work Stream. NGO Practical Action (whose Senior Policy Advisor Lucy Stevens is AEEP Focal Point for Civil Society in Europe), has argued that new ways of defining and measuring energy access are crucial if the SDG target is to result in poverty reduction and development benefits. To achieve this means going beyond the conventional binary definitions of energy access such as household electricity connections and cooking with non-solid or solid fuels.

The GTF is adopting an innovative, 'multi-tier' approach to defining access, able to measure progress in achieving good-quality, affordable, safe and reliable energy services. While the statistics presented below may sometimes only represent a 'best guess' as to the current situation, it makes sense to work with the GTF data accumulated so far during the interim period covered by this *Status Report Update*. Given the paucity of other available data – and the GTF's potential for providing a more rigorous baseline in the period to 2030 – the SE4All data set seems the most appropriate for use in this report, in the understanding that this source will produce a more refined appreciation of SSA's multiple problems of access in coming years.

Improving market economics to create more consumers

Providing access to modern and sustainable energy services requires building new markets and overhauling old ones. At its most basic, the electricity sector has only two main sources of revenue: income from consumers and subsidies, which are usually provided by the state. For decades, a majority of African governments have held tariffs well below costs, seeing this as the only way to keep the cost of electricity affordable for very poor consumers. Such calculations are often driven by political expediency, rather than by economic logic – resulting in under-investment and a lack of incentives to invest. In recognition of this stark reality, policy-makers have made the introduction of cost-reflective tariffs (CRTs) a focus for reforms.

Across the continent there have been concerted efforts to move tariffs towards the system cost of providing electricity by establishing economic and quasi-economic regulators that have a degree of independence from governments. The EU has created several instruments, to assist in fine-tuning partner countries' energy policies and regulatory frameworks to stimulate investment, including EUEI PDF and the Technical Assistance Facility (TAF).

Real progress has been made, despite political pressures, but there is more to do. Southern African Development Community (SADC) member countries in 2004 committed to achieving CRTs by 2013, but are not yet there. Electricity supply markets have yet to show they can achieve the commercial take-off that mobile telecommunications have achieved with such great impact across the continent.

Progress in electrification since 2010

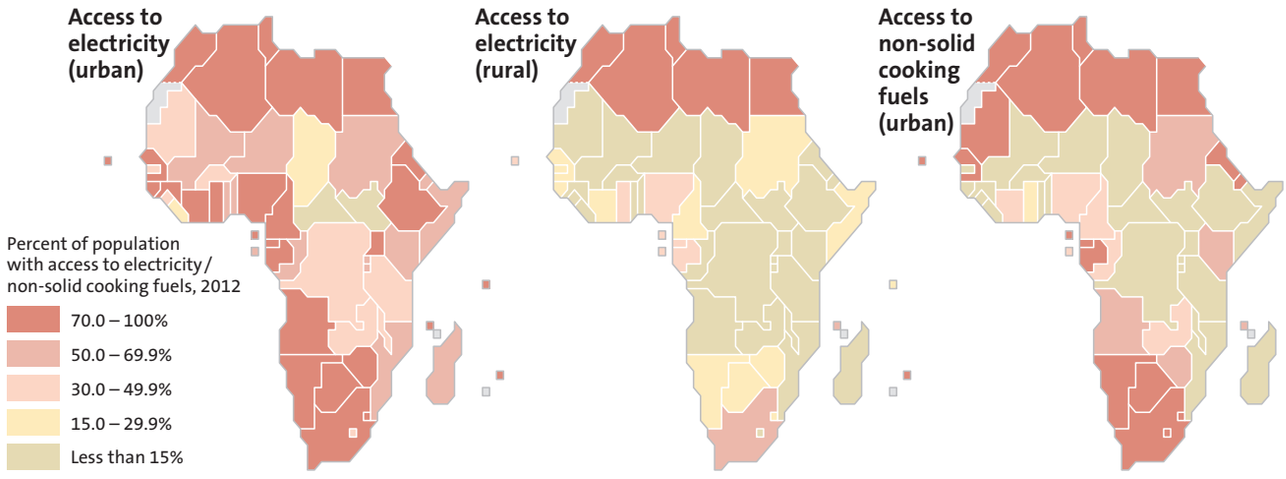
Data on access to modern and sustainable energy remain weak on a number of levels. In the interim, statistics produced by the Global Tracking Framework are predominantly estimates based on a limited set of data points, and the impact of changes in policy and the implementation of large projects will not show up on a statistical model until new data points are gathered – the aim of intense national-level work that is now under way.

Efforts to improve the capacity of national statistical authorities are supported by the AEEP and other stakeholders. Without these authorities, reliably tracking the situation on the ground will not be possible.

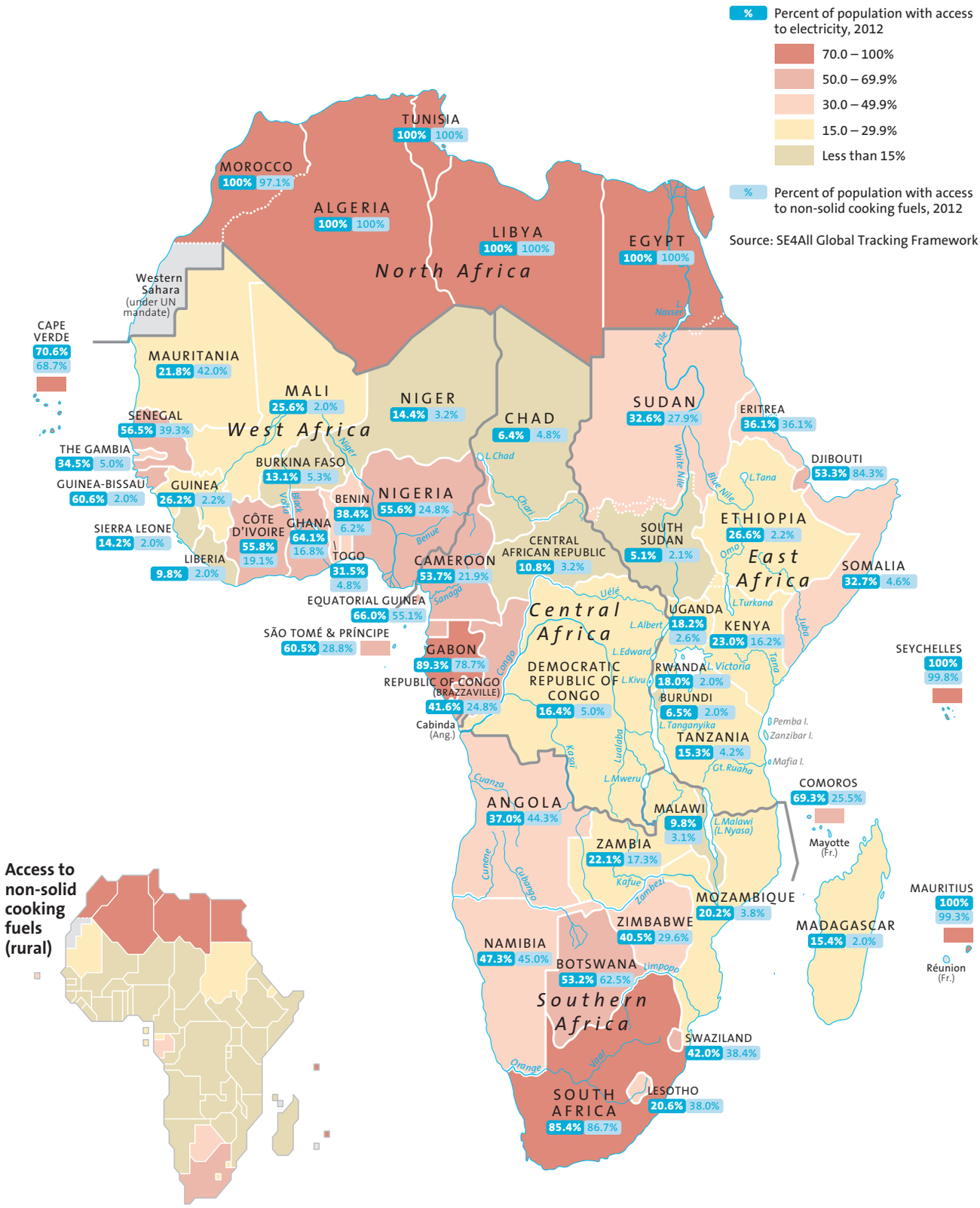
The SE4All statistics published to date show an improvement in electricity access. This as investment in sustainable energy has been increasing, and improved governance and management of the electricity sector has facilitated project development. The data show that, in 2012 (the most recent year for which data is available), 516m Africans had access to electricity – leaving 570m without.

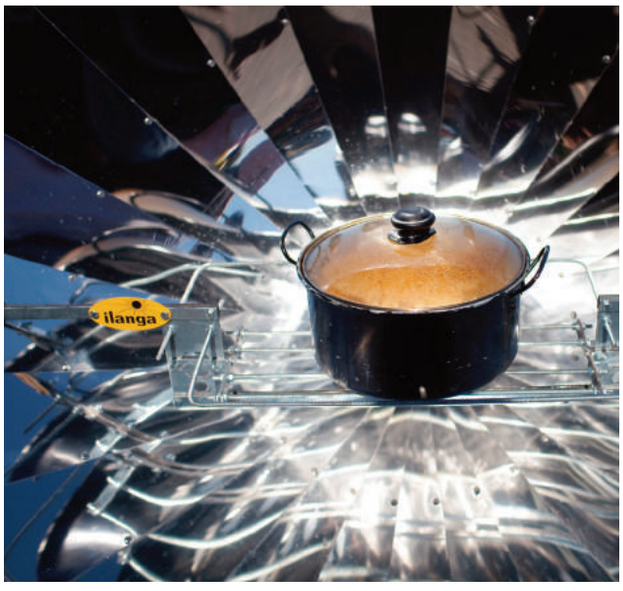
The average compound annual growth rate for electricity access has risen from 3.9% in the 2000-10 period to 6.1% between 2010 and 2012. In terms of new connections, this represents an increase from an average of 14.4m people gaining access to electricity each year between 2000 and 2010, to an average of 28.9m per year in 2010-12.

If this annual increase can be sustained , then Africa is likely to achieve the AEEP's target of 50% access by 2020.



Access to electricity and non-solid fuels





Questions about clean cooking

The GTF data for access to non-solid cooking fuels point to an apparent slowing of momentum behind the clean cooking fuel movement. These statistics have barely improved since the 2010 baseline was established, with increases in access struggling to keep pace with population growth. Indeed, the data show declines in some cases.

Only 32.5% of Africans had access to non-solid cooking fuel in 2012, the same proportion as in 2010 and barely up from 31.8% in 2000 and 27.7% in 1990. The compound annual growth rate has actually declined since 2010, when it averaged 2.6% compared with an average of 2.7% in the 2000-10 period.

However, this represented an increase in terms of absolute numbers: on average 18m Africans gained access to non-solid fuel for cooking between 2010 and 2012, compared to an annual average of 8m in 2000-10. Were the same number of people to gain access to non-solid cooking fuels every year to 2020 – as the data show happened between 2010 and 2012 – then only 32.1% of Africans would have access by the end of the current AEEP target period, leaving nearly 900m people without.

The implications go beyond the negative effects of solid cooking fuel use. There appears to be a substantial gap between the use of clean cooking fuels and access to electricity, implying that many households with access to power continue to use 'dirty fuels' for cooking. This suggests that issues around the reliability and affordability of electricity, the cost of household appliances, and education about the risks of using solid cooking fuel continue to be problematic.

Rural-urban divide

Stark differences persist between levels of rural and urban access. In 2012, 26.3% of people in rural areas had access to electricity in the average African country, according to SE4All/GTF. This had risen from 23.8% in 2010, 18.6% in 2000 and 14.6% in 1990. Excluding North Africa and South Africa, the 2012 figure is just 17.8%. In contrast, 69.9% of the urban population in the average African country had access to electricity in 2012, up from 63.7% in 2010, 59.5% in 2000 and 58% in 1990.

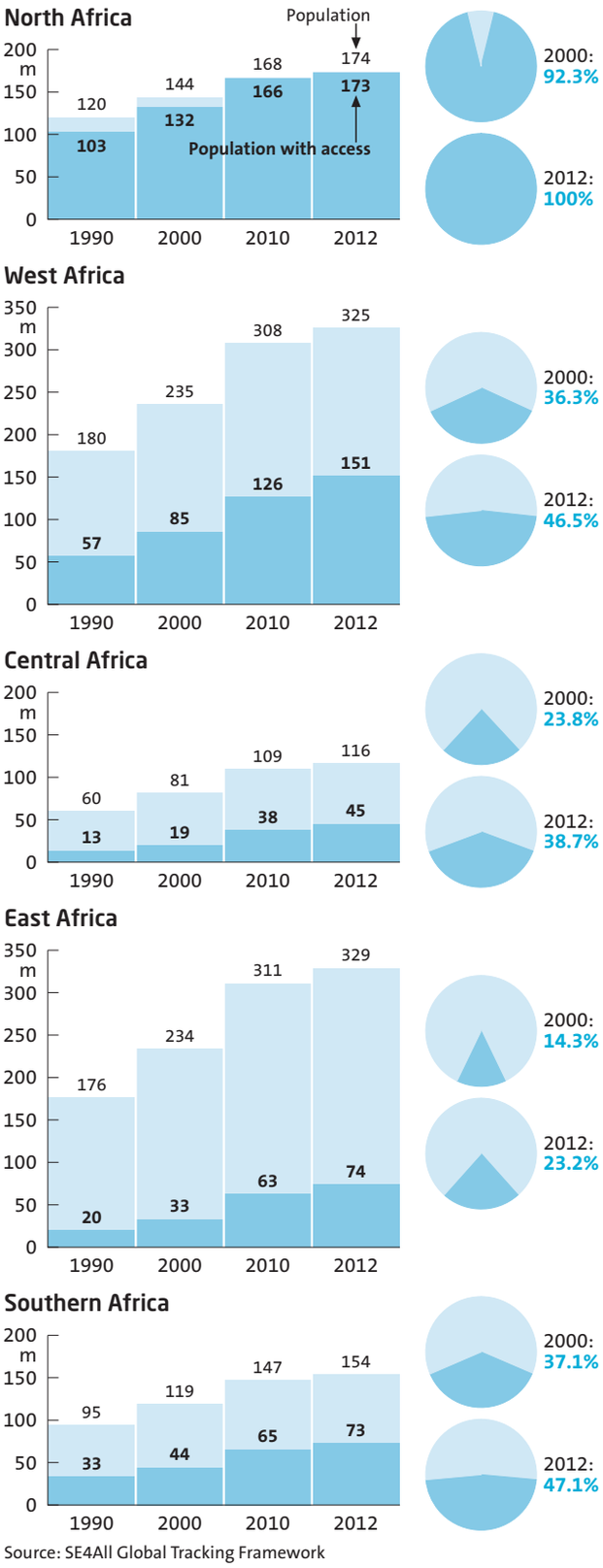
Median figures show an even more substantial differential. While the median for the urban population is very similar to the near 70% mean shown above, the median for the rural population shows that more than half of the countries in Africa had access rates of less than 13.7% in 2012 and 9.8% in 2010. The standard deviation shows that while the gap between countries has been decreasing for urban electrification (going from 30% in 2000 to 25% in 2012), the reverse is true for rural electrification (28% to 30%). This suggests that the rural population is being left behind in some countries.

Although SE4All data is only available for 2010 and 2012, the trends are similar for access to non-solid fuel for cooking. Access among the urban population of the average African country was 45.9% in 2012, with a median of 37.2%. In 2010, the mean was 45.8%, with a median of 36.9%. In rural areas the 2012 average was 21%, but the median was only 4%, compared with 20.6% and 3.7% in 2010.

The figures show that rural populations are being bypassed by efforts to improve access to sustainable energy. They suggest that the dynamics of improving energy access to 2020 and beyond will be complicated by demographic and cost trends. These estimates suggest that energy access initiatives have mostly targeted the 'low-hanging fruit' in urban areas. As electrification in these areas moves towards 100%, the rate of increase could begin to fall off as focus shifts towards more costly periurban and rural energy access.

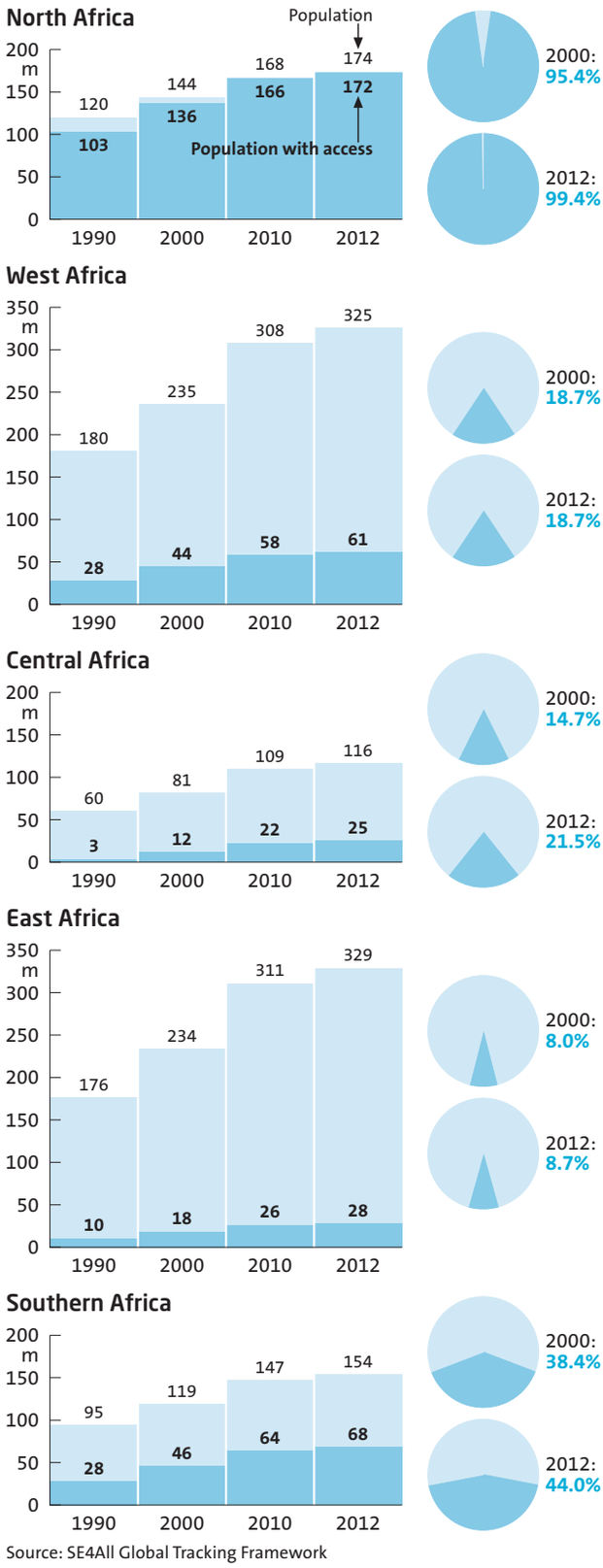
This could potentially slow progress towards meeting continental targets. However, this trend will be mitigated, to some extent, by the expected large relative increase in the size of the urban population to 2020, compared with the rural population. Further analysis of these dynamics would be beneficial for identifying initiatives which will make the maximum impact towards meeting continental targets while also revealing constituencies that could be left behind.

Access to electricity by region, 2012



Source: SE4All Global Tracking Framework

Access to non-solid cooking fuel by region, 2012



Source: SE4All Global Tracking Framework

A new generation of entrepreneurs goes off-grid

Momentum is building quickly behind efforts to give access to clean, sustainable energy to the hundreds of millions of Africans who live beyond established grids – and who are unlikely to be integrated into national transmission infrastructure for the foreseeable future.

European and other governments are providing ever larger amounts of financing and technical assistance to support off-grid schemes in Sub-Saharan Africa (SSA). An increasing number of African governments are integrating off-grid solutions into their development plans. As SE4All Chief Executive Rachel Kyte has observed: "Decentralised renewable energy will be essential if we are to close the energy access gap". Kyte argues that "with advances in technology and competitive prices, we now need to support leaders to introduce policy reforms and unlock the finance to bring power to the people".

Off-grid projects are usually small-scale, when compared to 'conventional' projects that feed national grids. Where possible, they are included in the AEEP Power Projects Database, but their cumulative impact, to date, is very limited when it comes to the overall figures. However, more projects are appearing to excite businesses along the whole value chain – as reflected in the growing membership of the Alliance for Rural Electrification (ARE), the decentralised clean energy industry association, which is an AEEP Focal Point.

Start-up businesses such as Jumeme Rural Power Supply Ltd, which is running an independent solar PV hybrid mini-grid project in rural Tanzania, are attracting considerable interest. Business models may have to evolve to attract the larger sums of private capital that will make decentralized power projects a significantly bigger contributor to overcoming energy poverty in SSA.

Many of the best-known projects, such as Renewable Energy Solutions for the Lake Victoria Ecosystem (Resolve) in Kenya and Jumeme, have business models underpinned by grant finance from foundations and other NGO sources. But an increasing number of commercial operators are showing interest in developing decentralised projects for isolated communities, as well as to serve wealthier clients such as industrial farms or resources industries. Private equity and other investors are asking whether small-scale projects can be 'bundled up' to draw institutional investors into decentralised clean energy.

Decentralised, off-grid solutions are receiving strong support from European governments and institutions. Facilities include Energising Development (EnDev), a multi-donor partnership that promotes sustainable access to modern energy services, and the EU's Electrification Finance Initiative (ElectriFI). Aimed largely at SSA, ElectriFi opened for business with initial funding of €270m from the European Commission, in the expectation that European development finance institutions will leverage significantly more money as the programme rolls out.

Energy Security

The AEEP's targets are based on the assumption that a united Europe is well-placed to facilitate the promotion of cross-border energy in and with Africa. This reinforces the energy security of both Africa and Europe. International co-operation is essential to safeguard energy supplies. Vast distances between sources of generation and their feedstocks and areas of electricity demand have led to an increase in the number of regional interconnections in development; these projects promise improved economies of scale, cheaper electricity and energy supply to those countries with limited natural resources.

Integration is strongly encouraged by the Programme for Infrastructure Development in Africa (PIDA). However, the slow pace of implementation for PIDA projects and other cross-border schemes have slowed the trend of increases to electricity transfer , which was notable in the AEEP's 2014 *Status Report*. The database shows no new operating lines completed since 2011, but recent progress on regional transmission projects suggests that, with improved project delivery, the AEEP target of doubling capacity by 2020 could be met.

Among other energy security targets, data collected by the AEEP Monitoring Tool shows that gas consumption in Africa plateaued in 2012-14, following an almost two-fold increase in the decade before. This was due to political and economic challenges that have also had an impact on natural gas exports to Europe, which fell to 46bcm in 2014, having peaked at 84.9bcm in 2006.

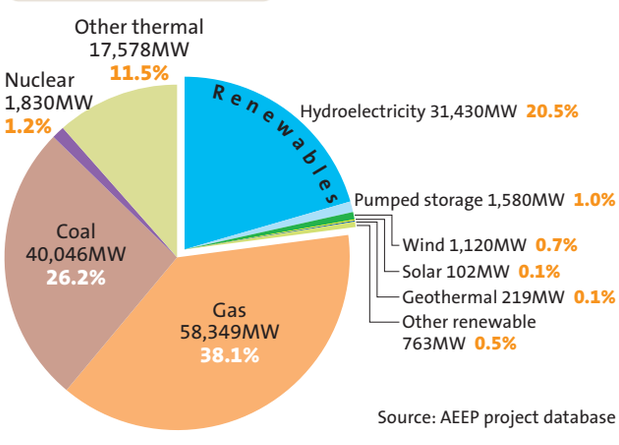
The AEEP's focus on gas and renewables – which has gathered pace since the 2010 baseline was established – allows a practical option for the diversification of energy sectors This reduces exposure to fluctuating oil prices and dependence on high carbon-content fossil fuels, such as coal, diesel and heavy fuel oil; in some cases it can lower the cost of generation. Diversification helps to combat an over-reliance on a single energy source. Many African countries with an over-dependence on hydroelectricity suffer severe power shortages during times of drought, which are becoming ever more severe as regions of East and West Africa struggle with desertification. These pressures may lead hard-pressed governments to procure costly – and often polluting – liquid fuel-fed rental power.

As the charts below show, based on data from the AEEP Power Project Database, changes can be observed since 2010, as both hydroelectricity and coal account for lower percentages of the energy mix in 2015, while gas-fired capacity has increased to over 40% of the total, and wind and solar have increased almost three-fold. However, natural gas remains vastly under-utilised as a source of fuel in most African economies.

Greater regional integration is under way – with notable progress in the West Africa Power Pool, Southern Africa Power Pool and East African regions – which will help countries to access a wider range of sources of generation. This will help them to diversify their energy mix and trade electricity to balance system costs, which is crucial to reinforcing the supply of sustainable, affordable power.

Installed capacity by technology, 2010

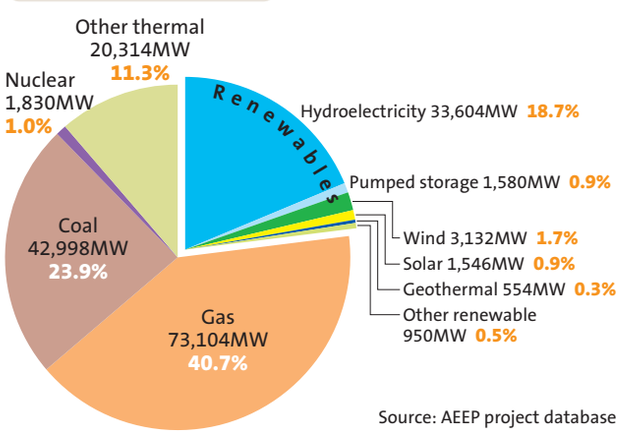
Total capacity: **153,017MW**



Source: AEEP project database

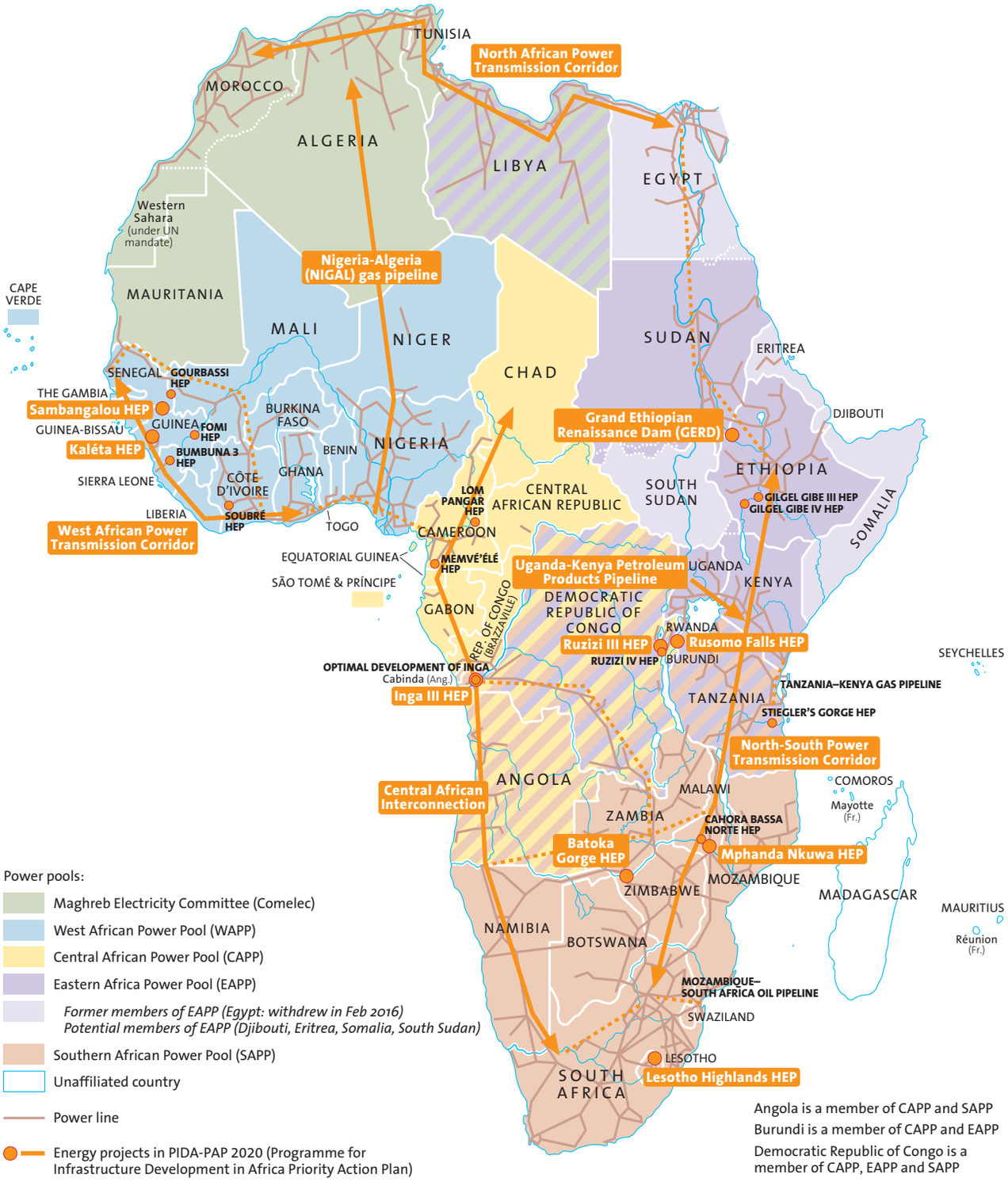
Installed capacity by technology, 2015

Total capacity: **179,611MW**



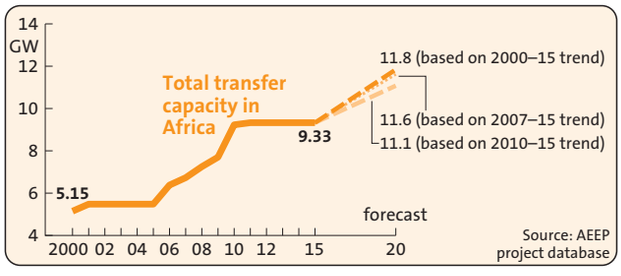
Source: AEEP project database

Power pools, power lines and PIDA projects



Sources: AEEP project database; African Energy Atlas; Programme for Infrastructure Development in Africa

Doubling cross-border interconnections



The electrification of sprawling urban and isolated rural communities is a major challenge for a continent of such diverse countries, large expanses of territory and limited resources. The high costs of building and operating an electricity grid is reflected in low electrification rates and the poor condition of much existing infrastructure. The technical challenges of delivering electricity from sources of generation to consumer areas, often across large distances, has proved a barrier to investment in large conventional forms of energy production. The heavy investment required to build modern electricity grids may result in over-dependence on the cheapest forms of production – such as polluting diesel power – which further increases energy insecurity.

The interconnection of national grids across the continent is a major component in the Programme for Infrastructure Development in Africa (PIDA) and other international initiatives because it promotes economies of scale and comprises an important step towards energy security. The construction of cross-border transmission lines allows the import and export of electricity generated by various sources, providing a means of balancing system costs while also allowing African countries to take advantage of cheap generation in neighbouring countries.

The development of large-scale projects such as the Ruzizi III hydropower project shared by Burundi, Democratic Republic of Congo (DRC) and Rwanda, or Ethiopia's Grand Renaissance Dam, which will generate 6GW – not to mention the Grand Inga dam in DRC which could eventually produce 50GW – make more sense when they can supply multiple markets.

However, achieving such interconnections is a complex process in regions which lack harmonised legislation, compatible grids and integrated currencies or economies. This is not helped by the instability of many national grids and shortages of installed generation capacity. These bottleneck have stalled several of the continent's many planned projects. However, the future looks brighter as plans are under way to reinforce existing grids and build a number of high-voltage transmission backbones across the continent.

Significant progress expected

In 2014 the AEEP *Status Report* observed that estimating the transfer capacities of interconnections was an imprecise science, and this remains the case. However, given that word of caution, the AEEP Power Project Database shows that approximate maximum transfer capacity in Africa almost doubled between 2005 and 2011 from 5.48GW to 9.33GW. The updated database shows that no new operating lines have been built since 2011. But statistics alone do not tell the whole story; while projects could have moved more quickly, there has been progress on a number of major regional schemes. A number of significant transmission projects are in development or under construction across the continent – and these are expected to create a spike in interconnection capacity over the short- to medium-term.

Interconnections with a combined capacity of over 4.5GW are expected to be completed in East Africa in the coming years, including a 220kV Rwanda-Uganda HV line. The transmission lines between Kagitumba, Mirama and Shango were completed in October 2015, but delays in building the Birembo and Shando substations means the interconnection is not expected to be operational until October 2016.

A 2GW capacity 500kV transmission line connecting Ethiopia to Kenya, first conceived in 2006, is moving closer to reality with construction expect to start during 2016. Meanwhile, a 400kV transmission corridor linking Kenya, Uganda and Rwanda – expanding existing interconnections – is also in development; it is intended to allow 500MW of electricity trade between the three countries.

A number of projects in development will eventually see the West Africa region fully interconnected. The 225kV CLSG line, which will connect the grids of Côte d'Ivoire, Liberia, Sierra Leone and Gambia, has been revived as a West African Power Pool (WAPP) priority project. The 1,400km high-voltage line will cost an estimated €365m, and will connect to the existing Côte d'Ivoire-Benin-Togo-Nigeria interconnection. CLSG is expected to be completed in 2017. Meanwhile finance is being raised to connect the Senegal River Basin Development Organisation (OMVS) network to the CLSG. The 225kV interconnection will

initially connect the electricity network of Guinea to the southern backbone, after which it will be extended to Gambia, Guinea-Bissau and Senegal. This €700m project is expected to have a maximum transfer capacity of 800MW and be completed by 2019.

Other projects under way in West Africa seek to connect Ghana's grid to Burkina Faso and Côte d'Ivoire, which is expected in 2018 and 2019 respectively.

In North Africa, 400kV interconnections with a total capacity of 4GW are planned to link the grids of Algeria and Tunisia with those of Italy and Spain.

The North Africa Power Transmission Corridor – a PIDA-Priority Action Project – aims to add 4.5GW of HV transmission lines connecting Egypt, Libya, Tunisia, Algeria and Morocco.

Selected interconnections in development in East and West Africa

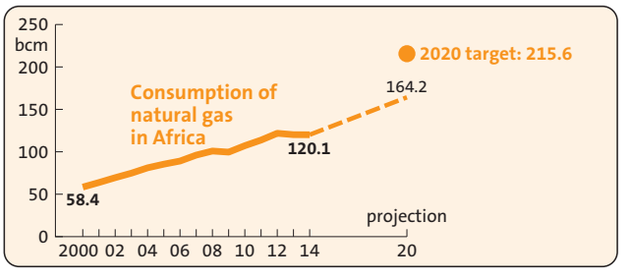
Project	Voltage	Est. commissioning date
WAPP		
Côte d'Ivoire-Ghana	330kV	2019
Ghana-Togo-Benin	330kV	2019
Nigeria-Benin	330kV	2020
Ghana-Burkina Faso	225kV	2018
Ghana-Burkina Faso-Mali	225kV	2020
Guinea-Mali	225kV	2019
Nigeria-Niger-Burkina Faso-Togo/Benin	330kV	2020
OMVG (Senegal-Gambia-Guinea-Guinea Bissau	225kV	2019
CLSG (Côte d'Ivoire-Liberia-Sierra Leone-Guinea)	225kV	2018
EAPP		
Ethiopia-Kenya	500kV	2017
Kenya-Uganda-Rwanda	400kV	2016
Kenya-Tanzania	400kV	2018
Ethiopia-Rwanda	500kV	2017
Rwanda-Burundi	220kV	2022
Rwanda-Uganda	220kV	2016
Kenya-Tanzania	400kV	2016

African Power Interconnections

Line Voltage (kV)	Number of interconnections
<50	4
51-100	3
101-150	9
151-200	2
201-300	16
301-400*	16
>400	2

Source: AEEP Power Projects Database

Doubling the use of natural gas



Increasing domestic use of natural gas in Africa remains an important target for the AEEP as a means of improving energy security, raising living standards and helping to mitigate the effects of climate change.

Data from the *BP Statistical Review of World Energy 2015* show that, despite a number of challenges, the historical trend has been positive, with an almost two-fold increase in consumption during the last decade. However, consumption plateaued between 2012 and 2014, holding at around 120bcm as a variety of political and macroeconomic challenges had an impact on output.

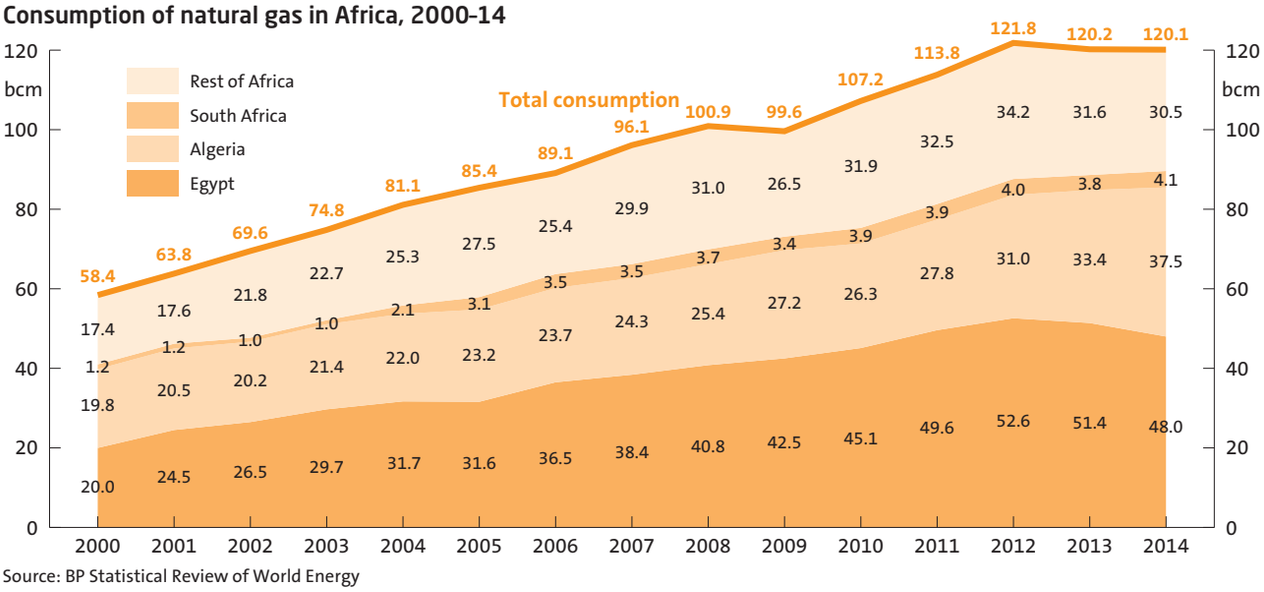
A key factor in this has been falling production levels in Africa's largest consumer, Egypt, where consumption declined by almost 9% in 2012-14. The fallout from the 2011 'Arab Spring' had a substantial impact on the gas sector, as investments dried up and existing fields began to decline; Egypt turned from being an exporter to a net importer of natural gas during this period. However, a period of political stability, a resumption of international oil company (IOC) development plans and the discovery in 2015 of the giant Zohr offshore gas field – where first production is expected in 2017 – should result in Egypt returning to significant growth in both production and consumption in the period to 2020.

Elsewhere in North Africa, Algerian consumption has risen sharply, from 26.4bcm in 2010 to 37.5bcm in 2014. Morocco is also looking to increased demand for gas for power generation and industrial use, which it intends to meet with a project to import around 5bcm/yr of liquefied natural gas (LNG) to the port at Jorf Lasfar, from where it will be piped to five new combined cycle gas turbine (CCGT) power stations and other infrastructure.

South African demand, which has stagnated at around 4bcm, is also expected to grow significantly. Pending a major discovery offshore or the exploitation of non-conventional reserves, South Africa has limited reserves, but a push for new gas-fired generation is planned, in a policy led by the government but based on private sector investment. This could be supplied from LNG or, potentially, from gas imported from neighbours notably from Mozambique, which has also made a major offshore natural gas find in the Rovuma Basin.

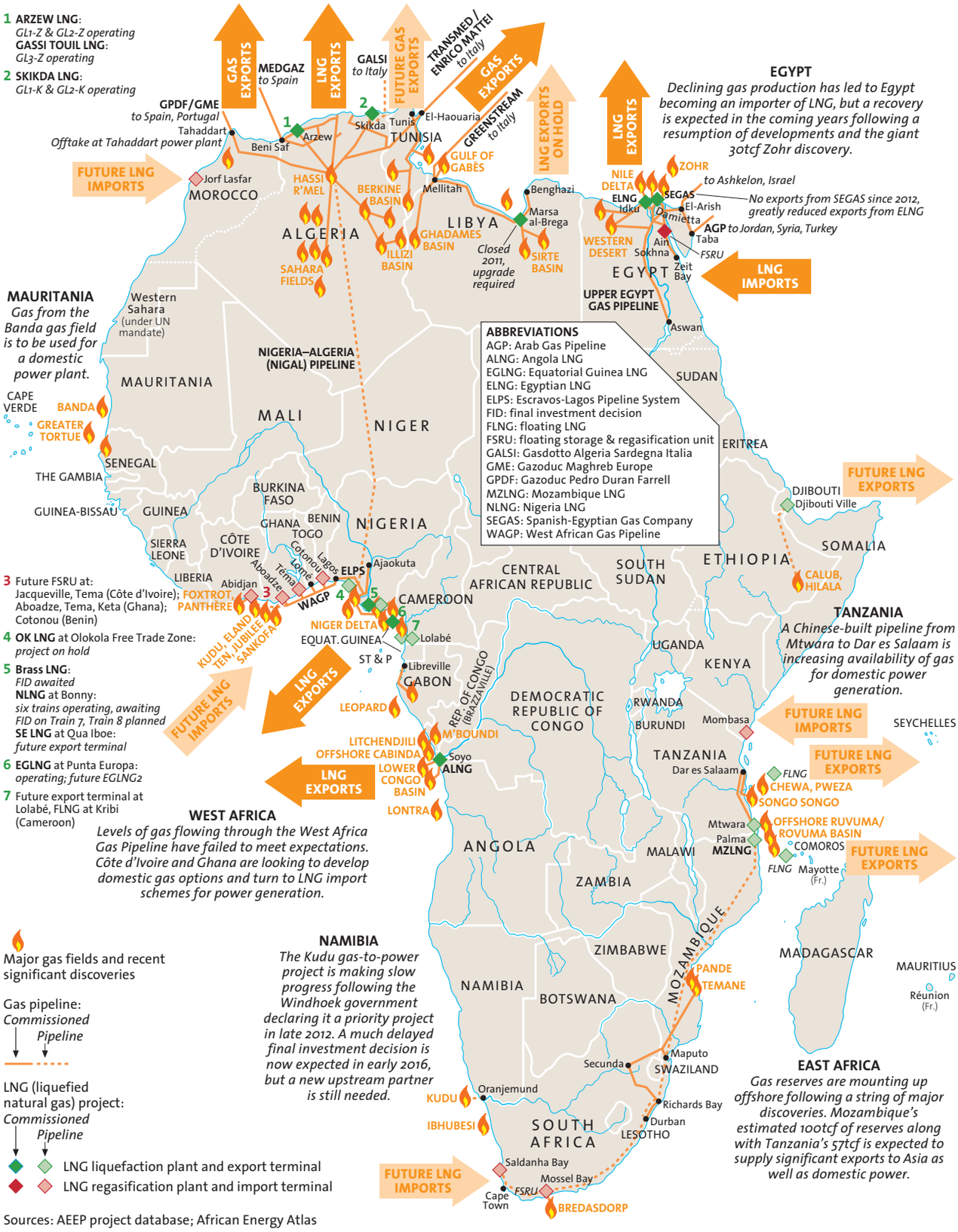
The likelihood that some of the major discoveries made in recent years – in Mozambique, Tanzania and other countries – coming on stream suggests an increase in output that will allow the ambitious AEEP target of 215.6bcm of domestic consumption by 2020 to be met.

Consumption of natural gas in Africa, 2000-14



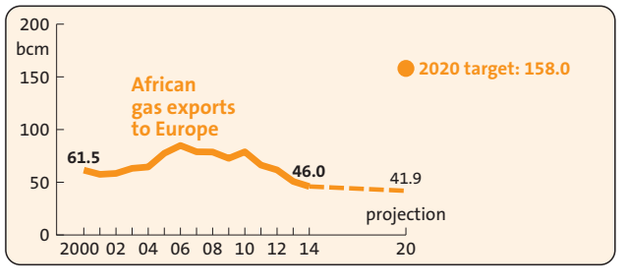
Source: BP Statistical Review of World Energy

Natural gas infrastructure and trade routes



Sources: AEEP project database; African Energy Atlas

Exporting gas from Africa to Europe



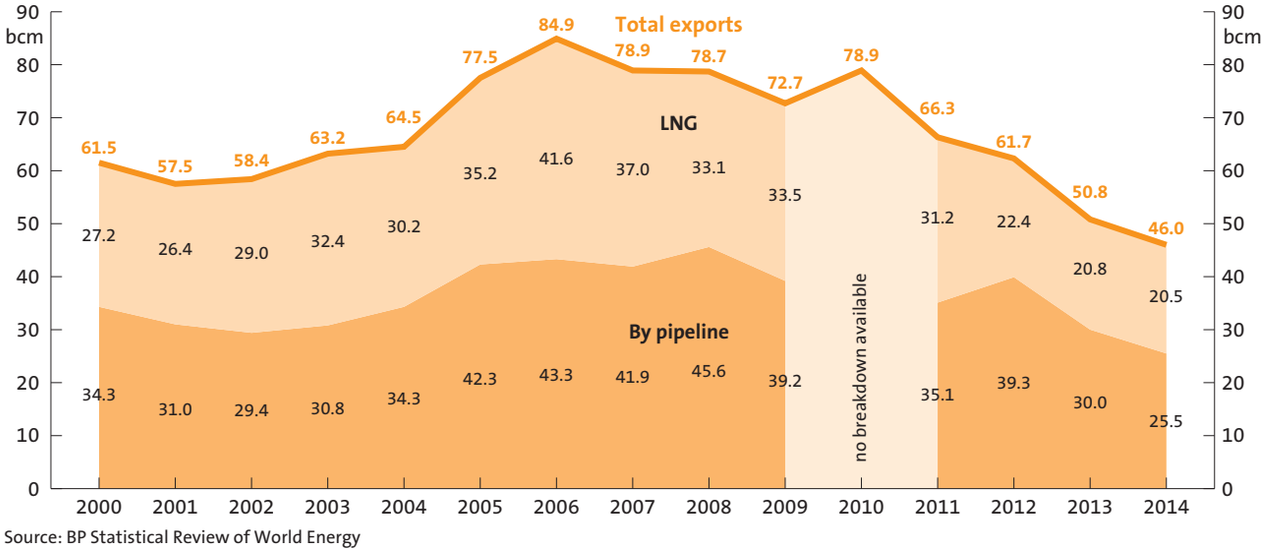
Supported by world-scale natural gas reserves, North Africa has established itself as a major exporter of gas to Europe, through liquefied natural gas (LNG) cargoes and four gas pipelines connecting Libya and Tunisia to Italy via Greenstream and Transmed respectively, and Algeria and Morocco to Spain and Portugal through Medgaz and GPDF/GME (as shown in the map on page 26). Nigeria has also emerged as a significant exporter through the six-train Nigeria Liquefied Natural Gas (NLNG) company.

African exports to Europe reached a peak in 2006 at 84.9bcm, but have since been on the decline. According to the *BP Statistical Review of World Energy 2015*, total exports fell to just 46bcm in 2014. LNG exports to Europe have been in gradual decline since 2006, reaching a low of 20.5bcm in 2014, aggravated by the collapse in Egyptian LNG exports from 2011. Pipeline exports also slumped during the period, to just 25.5bcm in 2014, with conflict in Libya halting exports through Greenstream.

Exports from Sub-Saharan Africa to other continents are making slow progress. Angola's new LNG export terminal has never reached its expected production levels; it shut down due to technical failure in 2014, only a year after its first exports to Brazil, but was expected to reopen as this Status Report Update went to press. Angola, Nigeria and other exporters into the Atlantic Basin and other gas markets have been affected by price volatility and intense competition, notably from the production of gas from shales in North America.

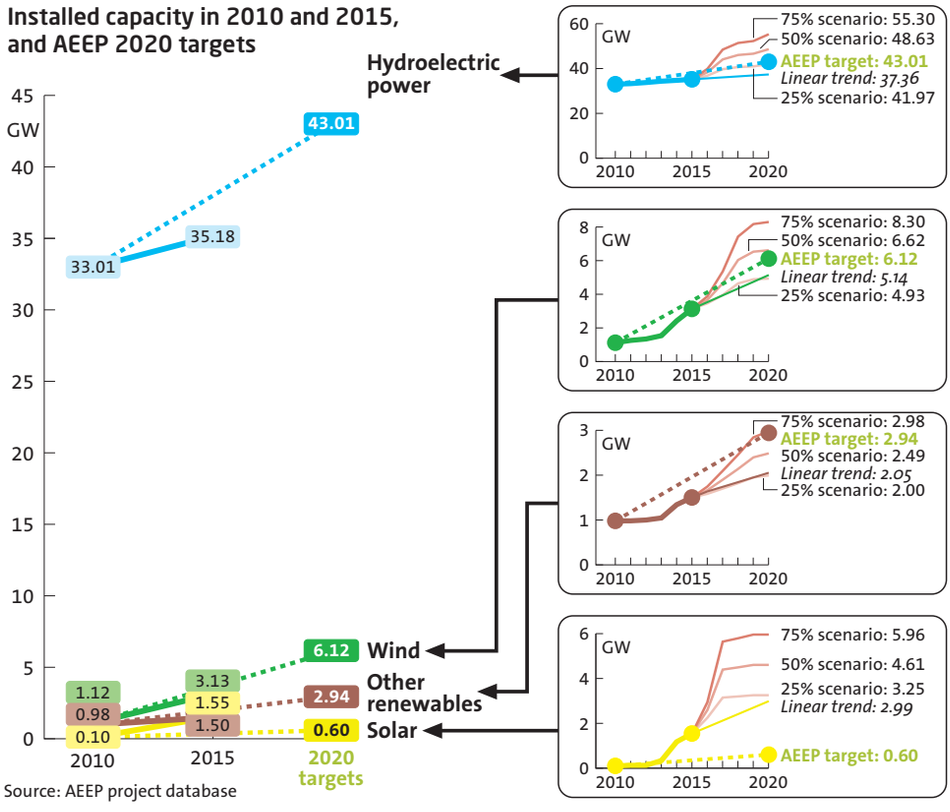
International companies are looking hard at major discoveries and export potential in Tanzania and Mozambique. It is calculated that Mozambique has sufficient reserves to become the world's largest supplier of LNG after Australia and Qatar, with a start to production expected in the early 2020s. The negative implications of prevailing low oil prices, which still feed into gas pricing, may slow projects, but the growth in spot sales of LNG suggests new markets will emerge.

African gas exports to Europe, 2000-14



Source: BP Statistical Review of World Energy

Renewable Energy



Source: AEEP project database

Renewable energy technologies are critical to the development of modern, clean and sustainable electricity supply industries. Their technical development and geographical spread is central to efforts to reduce global greenhouse gas emissions, as enshrined in the UN Conference on Climate Change (COP21) Paris Agreement. This commitment is being followed up within a framework of high level meetings, including the COP22 talks, to be held in Marrakech, Morocco on 7-18 November 2016.

With a stronger focus on renewables – drawn from the continent's hydropower resources to solar, wind and biomass, and a range of cutting-edge new technologies – many African countries are better positioned than ever before to exploit the new deal COP21 offers to help them supercede old, often polluting technologies.

The European Union is strongly committed to supporting this trend, with a commitment to allocate at least 20% of its development assistance portfolio for climate change-related projects. This will, of course, provide substantial finance for renewable generation and transmission projects – some of it off-grid, as well as strengthening existing utilities and national transmission and distribution systems. EU support will also seek to promote more holistic programmes across a 'nexus' of sectors – for example, linking energy projects to urban development, and access to water and sanitation.

Renewable technology has become increasingly cost-competitive in recent years. The biggest developments to date, in the Republic of South Africa (RSA) and Morocco, have demonstrated that large programmes can be delivered on time and on budget. This is now being replicated elsewhere, including Egypt, which has major wind and solar programmes.

For go-ahead governments and ambitious entrepreneurs,

emerging renewables industries provide a means of building a manufacturing base, delivering jobs and diversifying ownership. The technologies offer particular advantages: for example, they are well-suited for use in remote rural areas – with technology such as solar photovoltaic (PV) comparatively simple to operate and construct – and currency risks are reduced, when compared to many conventional thermal schemes.

The AEEP Power Project Database, created to provide the main data flows in the AEEP's 2014 *Status Report*, has been updated for this *Status Report Update*. The data for generation plants in operation and planned for completion in the period to 2020 suggest that in some sectors – such as the installation of solar capacity – developments have largely surpassed the AEEP's 2020 Political Targets, which were agreed in 2007, when the global renewables industry was at a very different stage of development.

However, this impressive performance is skewed by the progress made in a handfull of countries; the experience of many countries across Africa is that successfully implementing renewables projects remains problematic for many developers, while transmission and distribution (T&D) systems have yet to catch up with developments.

Hydropower dominates at present

Hydropower remains the dominant renewable technology supplying African grids. Away from North Africa and RSA, there is only limited solar and wind power capacity feeding the grid. The largest solar scheme operational in East Africa remains the 8.5MW Agahozo-Shalom Youth Village solar PV plant, developed by Gigawatt Global and commissioned by Scatec Solar in September 2014.

Encouraging partnership: the RECP

The AEEP's Africa-EU Renewable Energy Cooperation Programme (RECP) is a multi-donor programme that has fostered technical expertise and encouraged business cooperation since 2010. RECP seeks to facilitate an enabling environment for renewable developments by supporting improved regulatory frameworks and strengthening institutions through its policy advisory services, meetings and other instruments. This includes support for European and African entrepreneurs through the provision of dedicated market information. RECP is also rolling out Finance Facilitator, an advisory platform to support meso-scale renewable energy project preparation in Sub-Saharan Africa.

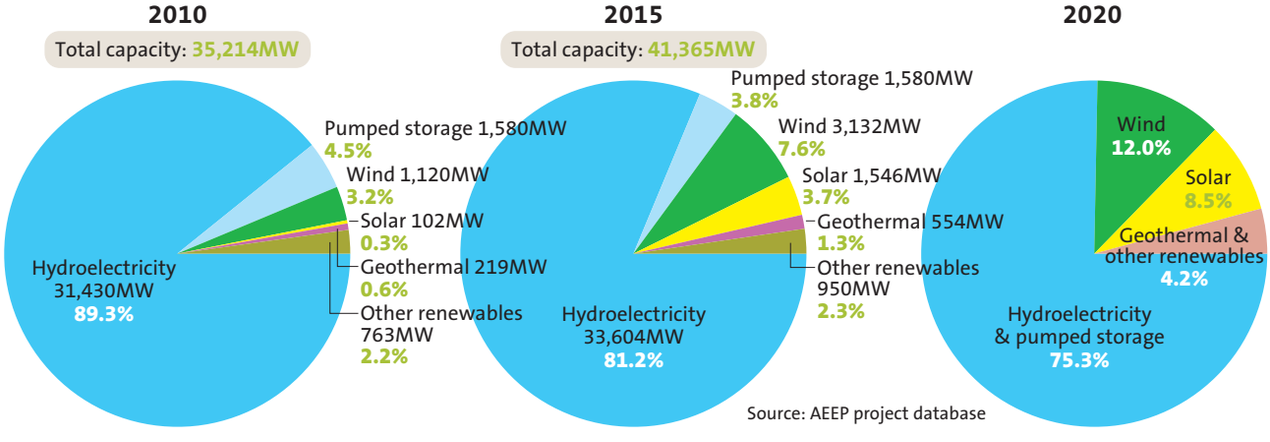
Visit: http://www.africa-eu-renewables.org

In West Africa there are few projects of note operating, other than Masdar's 15MW solar PV project in Mauritania, BXC Ghana's 20MW solar PV plant (which began commissioning tests late in 2015) and the 25.5MW Cabeólica wind farm in Cape Verde. The 13.6MW Ngong II wind farm remains the only solar or wind power project larger than 10MW operating in East Africa. There is virtually no wind or solar power in Central Africa and very little in Southern Africa outside of South Africa.

...solar and wind pipeline is growing

However, a growing pipeline of projects, backed by an increasingly formidable array of financial instruments and technical expertise, is pushing governments to resolve longstanding problems. Across the continent the market for renewable energy is deepening as legal and regulatory reforms are required to keep pace with increasingly well-

Installed renewable capacity by technology in 2010 and 2015, and 2020 projections



developed projects – and nascent markets are emerging.

Analysis of the project pipeline suggests Nigeria could bring between two and four renewable energy projects to close in 2016, with capacity of around 100MW. Also in Nigeria, a procurement programme is being designed with support from Germany's GiZ, which is likely to start up during the year. More projects are expected to follow the BXC Ghana project, although issues remain to be resolved. Zambia, Senegal, and Madagascar have all joined the International Finance Corporation's fast-moving Scaling Solar initiative.

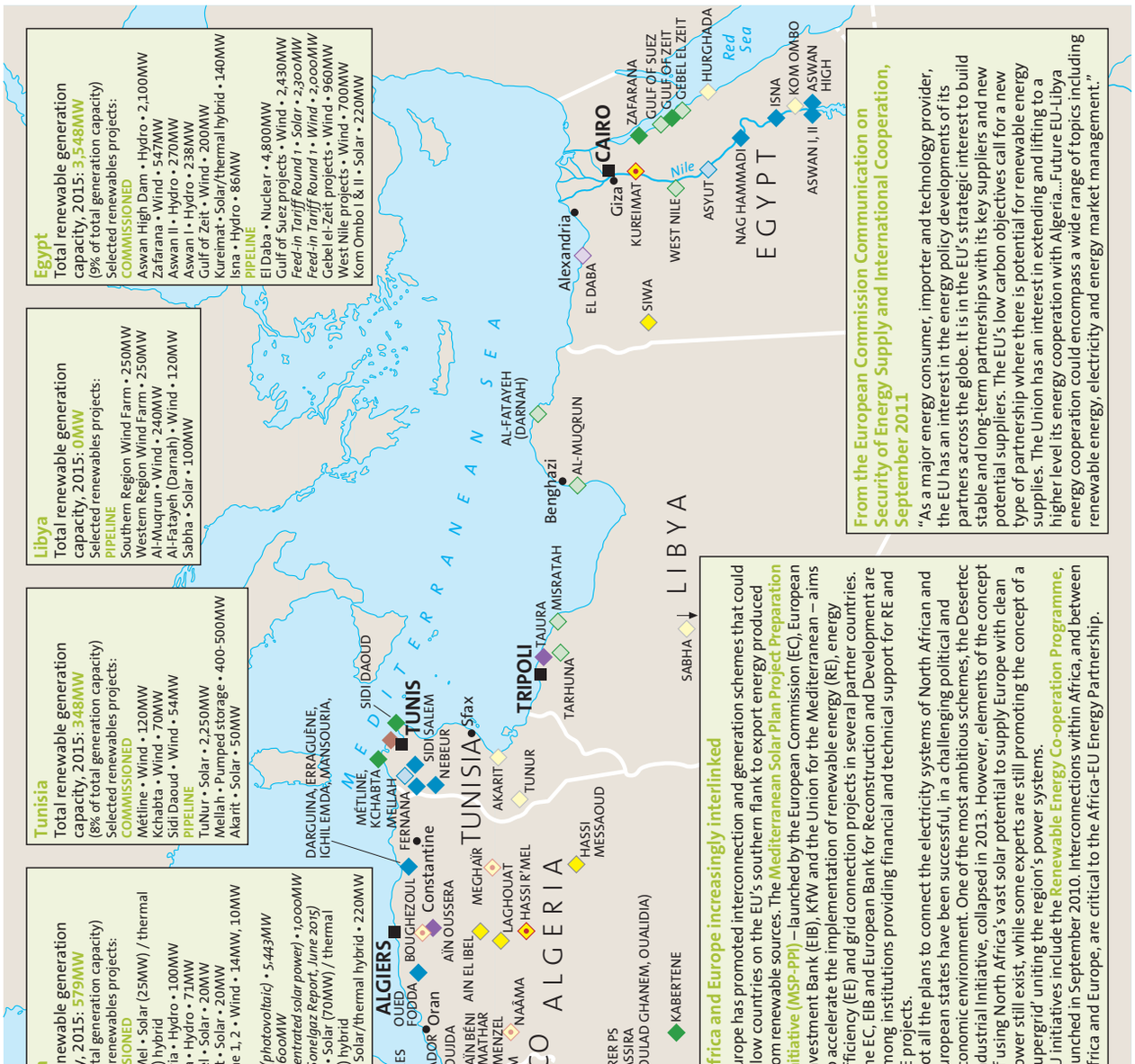
Questions of transmission

For solar and wind power in particular, the fragility of antiquated transmission systems has been a longstanding impediment, despite work to reinforce grids. Offtake agreements have, in most cases, been underwritten by state and development finance institutions – suggesting the system of guarantees and insurance will be tested as an increasing number of renewable generation projects demand significantly more T&D infrastructure. Even RSA, with its sophisticated grid infrastructure, has struggled to keep up with the geographical spread of renewables projects and pressures on its transmission system.

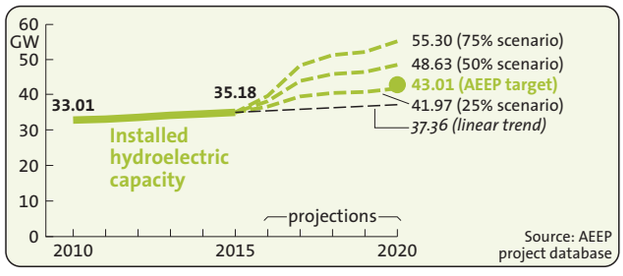
Other countries are likely to experience wind and solar transmission difficulties. Concerns have been raised over the effect on grid stability of the landmark 310MW Lake Turkana wind project, under construction in Kenya, which requires completion of a 428km transmission line. Zambia Electricity Supply Company has issues taking power from two new 50MW Scaling Solar photovoltaic plants, while in Uganda, hydroelectric power plants recently sat completed but without access to the grid pending coordination between local authorities. The good news is that these perennial problems have now been widely recognised – and long overdue investments and reforms are starting to be made in response.

Among renewables growth markets, Egypt may need to consider strengthening its transmission backbone to take electricity generated at solar PV projects in the south; these are being developed under the first round of Cairo's innovative renewable energy feed-in tariff scheme. Negotiations were under way as this report went to press to put in place a standardised power purchase agreement (PPA) for solar and wind power; the resulting document is seen by experts to be a critical factor in attracting investors to the market as Egypt rolls out its ambitious development plans.

North African renewables projects



Hydroelectric power



Hydropower can be a victim of climate change – as disastrous water shortages in some regions leave dams barely able to generate electricity – but it also holds a key to providing clean, sustainable baseload energy, which can be produced from the continent's abundant hydrological basins, in Democratic Republic of Congo (DRC), Ethiopia and several other 'water towers'.

The AEEP Power Project Database shows that, with its capacity to generate large volumes of energy, hydroelectric power (HEP) remains the dominant renewable technology operating on the continent – and will remain so in the pipeline of projects being developed in the period to 2020 and beyond. Having turned away from large HEP projects in the previous decade due to concerns about environmental and social impacts, many donors are looking to become involved in the sector again, but with a new system of safeguards in place.

Judged by the data, progress towards the AEEP's target of adding 10GW capacity increases has not been substantial in the period since the last *Status Report*. However, the target should be comfortably met as a number of large projects are due to come online over the 2016-20 period.

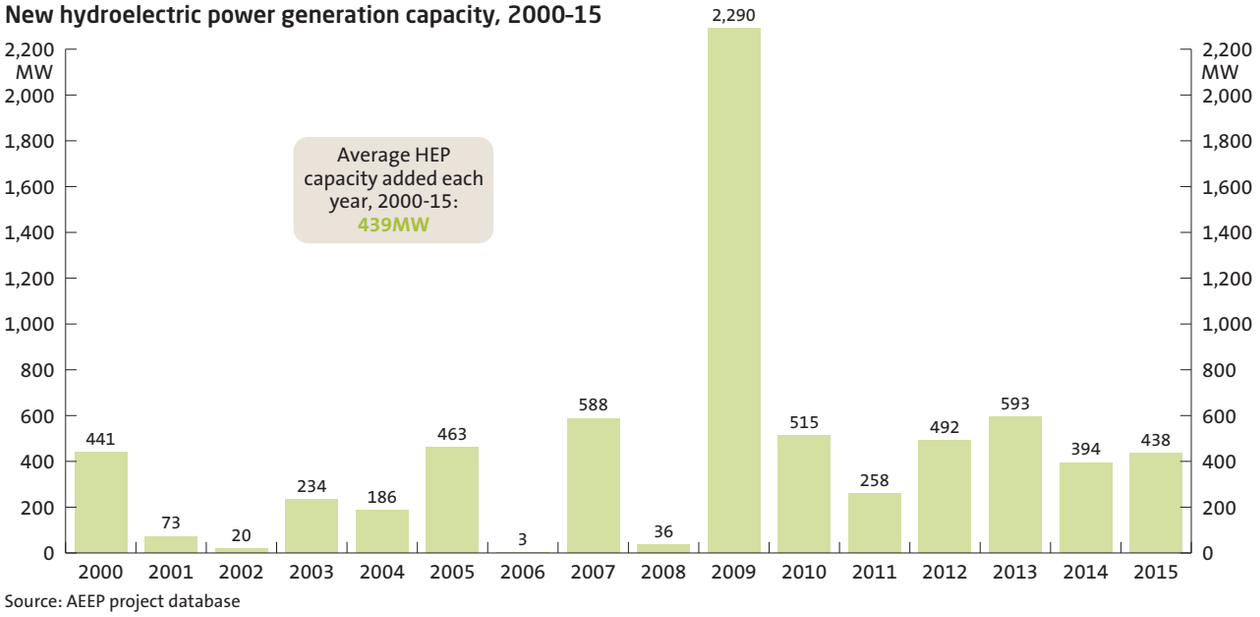
Between 2010 and 2015, 2,174MW of hydropower capacity was added. Additions were fairly evenly spread between the regions of Sub-Saharan Africa (SSA), with 689MW added in West Africa, 560MW in Central Africa, 515MW in Southern Africa, and 411MW in East Africa. This does not tell the whole story, however. Rehabilitation work has been undertaken at a large number of dilapidated facilities since the 2000s, improving performance and reliability. With much of the continent's 35,304MW hydropower capacity very old and operating well below its potential output, rehabilitation has the potential to add large amounts of power to the grid.

Run-of-river potential

Large HEP projects dominate the AEEP Power Project Database, but the AEEP is well aware that smaller projects can have a very big impact in providing energy for a large portion of the rural population in Africa. Work is under way to improve the commercial prospects of small run-of-river systems for rural electrification. In several countries, such as Rwanda and Uganda, considerable progress has been made, supported by European instruments such as KfW's GET-FIT scheme.

With the advantage of being able to provide cheap power 24 hours a day, small-scale HEP has considerable potential. The cost of identifying new sites on a scale which makes

New hydroelectric power generation capacity, 2000-15



Source: AEEP project database

the mass production of turbines viable, has been an issue. However, improvements to satellite imaging and accompanying software could help to identify thousands of prospective sites (as it can optimise solar-powered mini-grids), suggesting substantial progress to come.

'Huge pipeline of projects'

African HEP will benefit from a huge pipeline of projects which are under construction and expected to come into operation over the next few years.

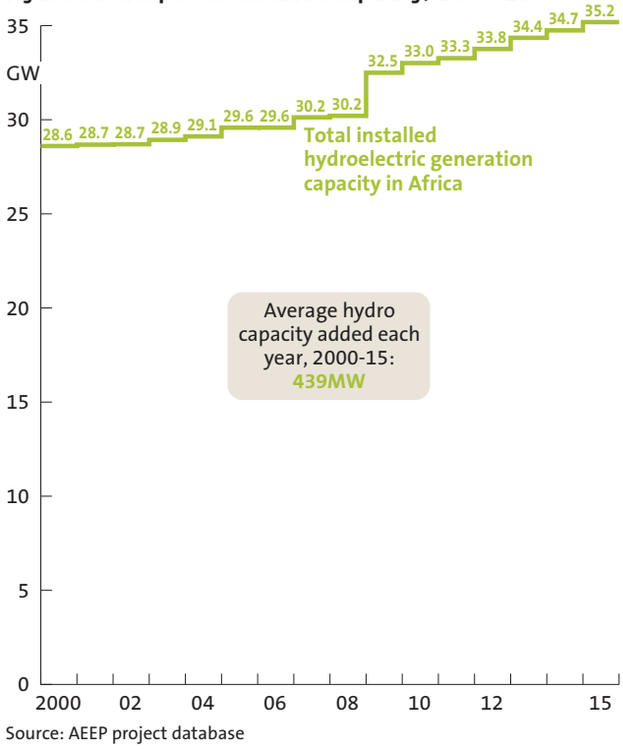
Most eye-catching are developments in Ethiopia, where construction of the huge 6GW Grand Ethiopian Renaissance Dam (GERD) is well under way. Despite serious concerns about water flows expressed by downstream countries, GERD's first two units are expected to begin generating by the end of 2016. Ethiopian Electric Power Company (EEPCo) reported that the first four 187MW turbines at the 1,870MW Gilgel Gibe III dam began operating early in 2016, with the rest expected to follow later in 2016. EEPCo is considering other large HEP projects, including Gilgel Gibe IV (2GW), Tams (1.7GW) and Karadobi (1.6GW). These developments will be welcomed, providing their environmental and social impacts are well understood and safeguards put in place.

European companies have long been active in the HEP sector, as reflected in Italian firm Salini Costruttori's project pipeline in Ethiopia, and studies carried out by Coyne et Bellier (Tractebel Group), Fichtner and Lahmeyer International. But China has built up the largest presence in building – and financing – HEP schemes. On the Victoria Nile in Uganda, Sinohydro has been building the 600MW Karuma dam since 2013; its next phase of development is due to be finished in 2018, supported by a $1.4bn loan from the Export-Import Bank of China. China International Water and Electric Corporation (CIWEC) is building the 183MW Isimba dam, which has raised concerns from local communities and the World Bank because of its potential impact on tourism, the environment and cultural heritage.

In Cameroon, Sinohydro is building the 200MW Memve'ele HEP, for operation in mid-2017. Construction is expected to start in mid-2016 at the 420MW Nachtigal HEP, which is being developed by EDF Energy, the International Finance Corporation and the Cameroon government. In Côte d'Ivoire, Sinohydro has been building the 274MW Soubré dam since 2013, and on the border between Benin and Togo it has begun work on the 147MW Adjarala HEP.

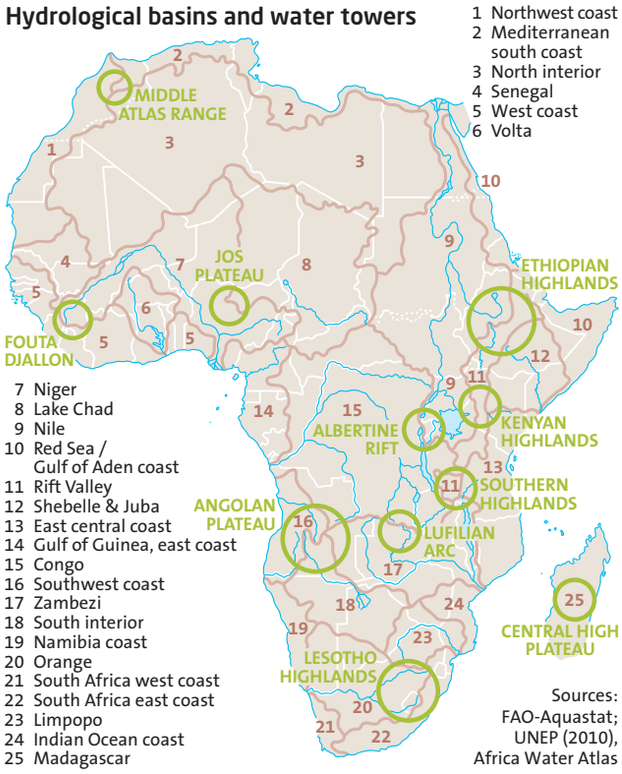
HEP projects that came online in 2015 include the 160MW Lom Pangar dam in Cameroon and 28MW Nyabarongo I in Rwanda. The 120MW Itezhi Tezhi plant in Zambia began operating in January 2016, although drought has cut output to a fraction of installed capacity. In Guinea, the 240MW Kaleta dam was commissioned in mid-2015 by CIWEC – also contractor for the 450MW Souapiti dam.

Hydroelectric power installed capacity, 2000-15



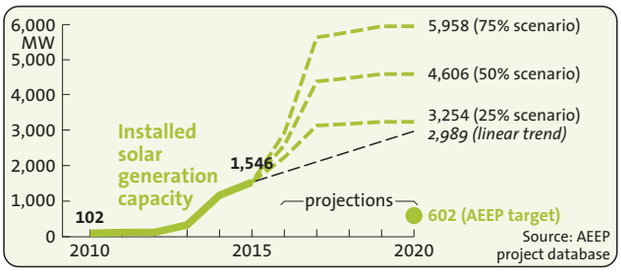
Source: AEEP project database

Hydrological basins and water towers



Sources: FAO-Aquastat; UNEP (2010), Africa Water Atlas

Solar power



With some of the world's strongest irradiation levels, solar has long been expected to have a big role to play in Africa's energy future. That potential is now being confirmed, from the implementation of world-scale projects in Morocco and Republic of South Africa (RSA), to impressive growth in the rooftop solar market, which is helping to mitigate the impact of intermittent power supply and provide at least some access to power for households not yet connected to the grid.

Utility-scale solar parks have proven to be an effective way of expanding generation in a short timeframe. Large solar projects to date have not suffered the delays and cost overruns characteristic of some other technologies. Concentrated solar power (CSP) can now, in some cases, deliver 12 hours of storage, enabling generators to help meet morning peak demand.

Mini-grid technology continues to improve. Many countries are working to put in place regulatory and financial structures to develop a commercial model for solar powered mini- and micro-grids. Solar lamps, USB chargers and other products are having a transformative impact on households previously reliant on kerosene lamps and long walks to mobile phone charging stations.

For now, the AEEP Africa Power Project Database relates overwhelmingly to utility and commercial solar power plants. But as rooftop and mini-grid markets expand there will be a need to monitor these technologies more closely to reflect the new African reality.

Exponential success

The solar sector's exponential success is revealed by data that show the AEEP Political Target of adding 500MW more generation capacity by 2020 was met only four years after the 2010 baseline was set – and is expected to have been met four times over by the end of 2016. Installed capacity at end-2015 was 1,546MW, compared with 103MW in 2010.

However, there is good reason to be cautious about the of the solar industry's success. While progress is undoubtedly being made, away from the major markets of North Africa and South Africa there is much to do before solar and wind power plants make an significant input into feeding national grids. The largest solar power plant in East Africa remains the 8.5MW Agahozo-Shalom Youth Village solar PV developed by Gigawatt Global and commissioned by Scatec Solar in September 2014. In West Africa there are few projects of note operating other than Masdar's 15MW photovoltaic project in Mauritania and BXC Ghana's 20MW PV project.

Solar products appear to be having the most impact, notably rooftop solar programmes, in a majority of African economies. Utility-scale solar is being held back by low tariffs, inadequate regulation and weak transmission systems. Efforts are under way to improve the situation, such as the International Finance Corporation (IFC)'s Scaling Solar initiative, which is offering a holistic package of support to prospective developers in three countries. In Zambia, the first country to sign up to Scaling Solar, eleven companies have prequalified to bid to build two 50MW plants. The initiative is forcing the government to confront problems around governance and transmission which, if addressed, will make solar more appealing to investors.

The KfW-sponsored Global Energy Transfer Feed-in Tariffs (GET-FIT) programme in Uganda has underpinned the 10MW Soroti PV plant and a 10MW plant at Tororo is expected to follow later in 2016. Development finance institutions (DFIs) are playing a key facilitating role in assisting governments in the design of appropriate procurement programmes. Thus Germany's GIZ is working in Nigeria to design a new solar initiative. IFC hopes to include Nigeria in its Scaling Solar programme.

Models for utility-scale projects

Morocco and RSA demonstrate what can be achieved when a solar procurement programme is structured effectively. Morocco's solar programme has benefitted from strong political support and robust enabling structures, including Moroccan Agency for Solar Energy (Masen). This has been complemented by financial backing from the WBG, AfDB and other multilaterals, KfW and other DFIs. In the few months from end-2015 to early 2016 Masen began commercial operations at the 160MW Noor I CSP project's first phase. This is part of the planned 510MW Ouarzazate solar complex, which should be completed in the period to 2020 – a record of achievement which is encouraging greater participation by independent power producers (IPPs).

Other countries are investing heavily, and attracting funds, to utility-scale solar, including Egypt, which is promoting IPPs. Across the continent, larger scale solar schemes are being promoted. Notable developments are expected in energy poor regions such as the Sahel, where Chad, Senegal and other governments are promoting utility-scale schemes.

A flexible technology for off-grid

DFIs and private developers are increasingly focusing on off-grid and mini-grid solutions. By creating the right environment for private sector operators and investors, an exponential increase in activity could follow in areas unlikely to be connected to the main grid systems for many years. Offgrid advocates argue that this would circumvent the challenge of piecing together weak transmission and distribution systems while expanding access to energy poor communities.

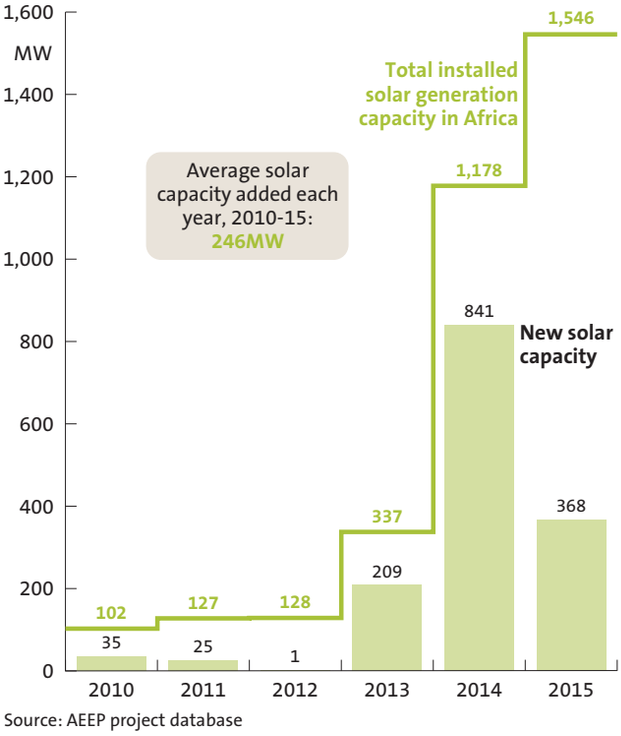
An increasing number of African countries are putting in place legislation and regulations to support nascent off-grid and mini-grid industries. DFI initiatives and funds have proliferated to support this. However, work remains to be done to establish model commercial and regulatory systems and significant questions remain to be answered about the ability of off-grid solutions to meet the ambitious targets set for them.

Among important initiatives, the European Commission and Dutch DFI the Netherlands Development Finance Company (FMO) began implementation of the Electrification Finance Initiative (ElectriFI) to coincide with the UN Convention on Climate Change (COP21) in late 2015. Rwanda has requested $50m from the Scaling Up Renewable Energy Programme (SREP) to back its Renewable Energy Fund, which aims to catalyse private sector investments in off-grid and mini-grid solar PV by developing a comprehensive strategy for off-grid electrification.

Pilot mini-grid projects initiated by NGOs and charitable and corporate foundations have become sufficiently established for private sector developers and government utilities to begin pilots of their own (see *Access*).

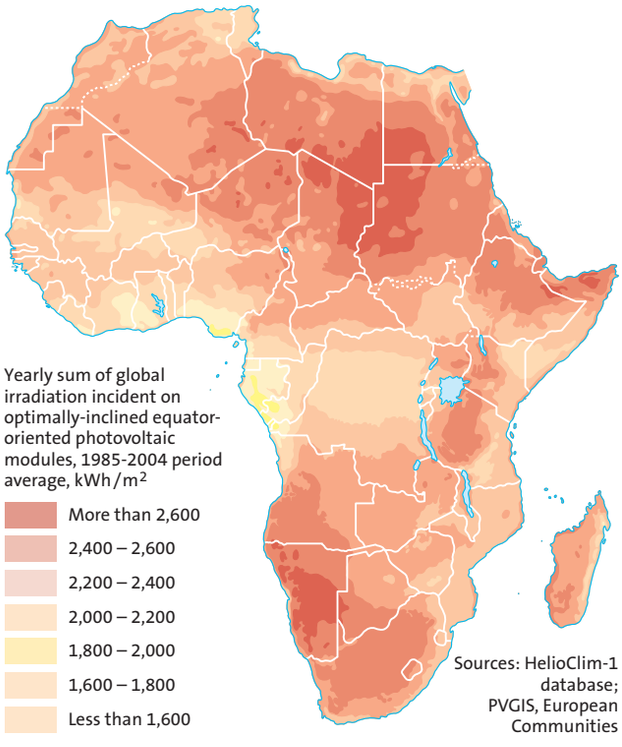
The market for solar products such as lanterns and mobile recharging stations is growing rapidly. SolarAid – a charity founded by renewable developer SolarCentury and funded in part by 5% of its profits – and its social enterprise SunnyMoney has sold 1.7m of its solar lamps, priced at $10 each, in rural communities in Africa. It aims to eliminate the use of kerosene lanterns, which are expensive and contribute to indoor air pollution. The market is deepening. In its 2015 impact report, SolarAid said that in 2009 it sold just 5,000 lanterns in Tanzania but by autumn 2015 had sold a cumulative 904,528.

Solar generation capacity, 2010-15



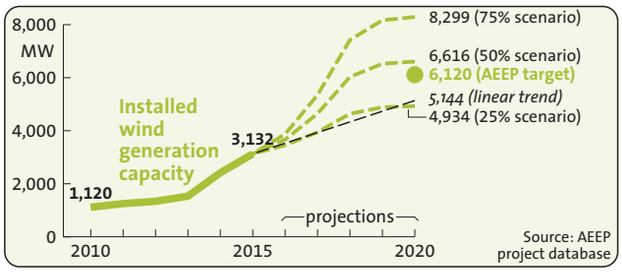
Source: AEEP project database

Photovoltaic solar electricity potential



Sources: HelioClim-1 database; PVGIS, European Communities

Wind power

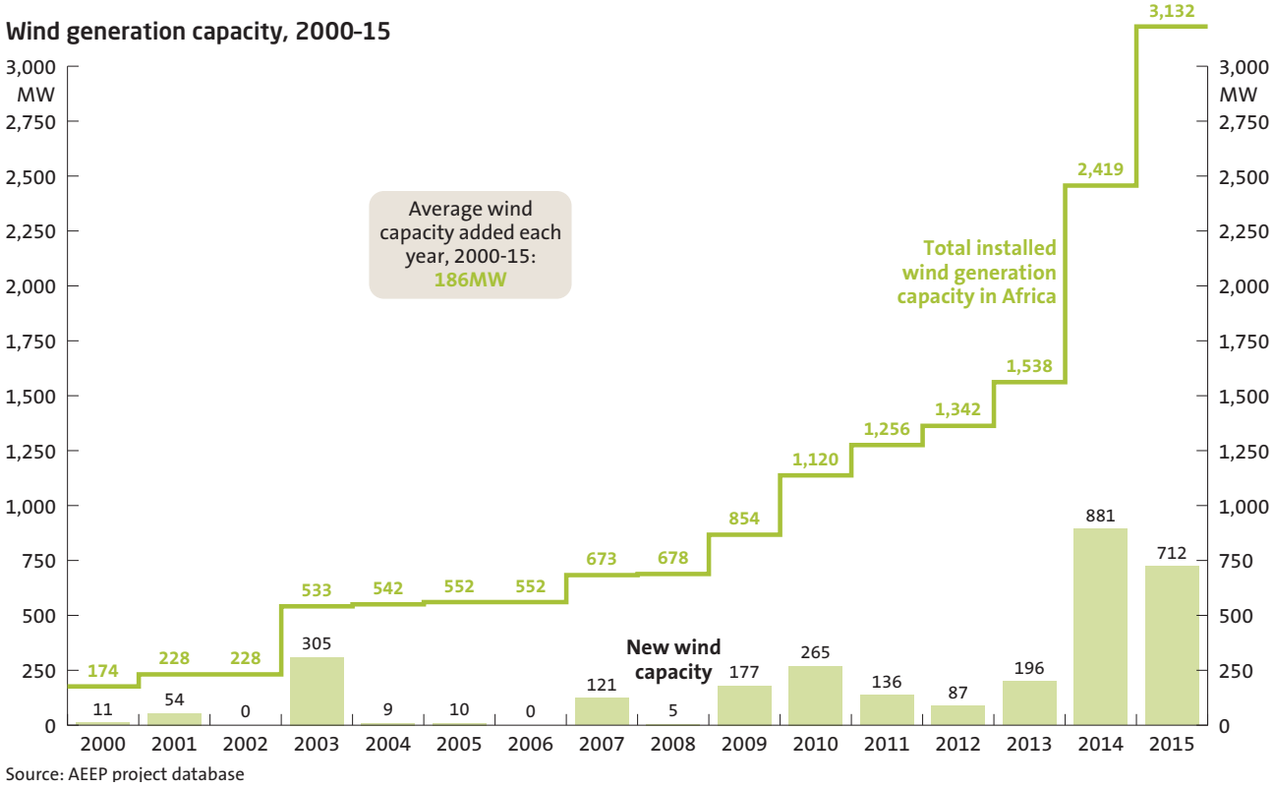


As one of the cheapest sources of renewable power, wind technology can play a big role in the development of the electricity supply industry in Africa. To date, major wind power projects have been largely restricted to the industrialised countries of North Africa and South Africa. The industry suffers logistical constraints on the continent, for example a lack of large cranes and poor access roads, while also being heavily impacted by disputes over land rights and compensation. But it has the potential to drive industrial development, as well as produce essential energy; this is underlined by Siemens' decision to invest in a turbine manufacturing plant in Morocco and a growing number of projects in Republic of South Africa (RSA). Investment in RSA has been encouraged by the great success of the government's Renewable Energy Independent Power Producer Procurement (REIPPP) programme.

An analysis of projects that have announced expected commercial operation dates in the AEEP Power Project Database suggests the AEEP Political Target of adding 5,000MW wind power by 2020 can be met, by ensuring that 43% of projects in the pipeline are completed on time. Since 2010, 2,132MW of wind power has been added, more than doubling the 2010 capacity of 1,120MW.

The gains are heavily concentrated in the continent's most industrialised countries. The regional breakdown shows that most countries are being left behind. While North Africa has capacity to date of 1,807MW and South Africa 1,070MW, East Africa has only 223MW, West Africa 31.4MW, and Central Africa and Southern Africa (excluding RSA) have less than 1MW between them.

Wind generation capacity, 2000-15



Source: AEEP project database

The project pipeline looks set to maintain this trend, with only 533MW projects planned in East Africa and 256MW in West Africa. In Southern Africa (ex-RSA) only 45MW is planned.

Problems to confront

Kenya shows the opportunities and challenges that Sub-Saharan countries are facing in developing wind power projects. While the 310MW Lake Turkana project has been successfully financed and is scheduled to start a three-year commissioning process later this year, the 428km transmission line required to connect the project to the grid has been delayed following problems with wayleave. This means that offtaker KenGen may have to make payments under the take-or-pay arrangement for power it cannot evacuate until the transmission line project is complete.

There are also issues of grid stability in Kenya and many other jurisdictions, including RSA. DFIs have been working with Kenyan national transmission utility Ketraco to help mitigate the impact of integrating Lake Turkana's wind power with the grid. Such is the concern, that the World Bank has pulled back from the transmission project.

Issues of securing land can be problematic. Also in Kenya, the 60.8MW Kinangop project has run out of funds after long-running – and at moments violent – disputes over compensation for landowners. These issues are a feature of developing wind power projects across the continent. There have also been protests in South Africa over some wind projects.

Procurement successes

Such issues cannot be ignored by developers and their financiers, but the wind sector can also point to some considerable successes. These include the Cabeólica project in Cape Verde,which was showcased in the 2014 *Status Report* (page 33).

The largest procurement programmes in wind are currently in Egypt, Morocco and RSA. Egypt's 547MW Zafarana wind complex is the largest on the continent, and more units are planned to be added through the country's feed-in tariff and other programmes.

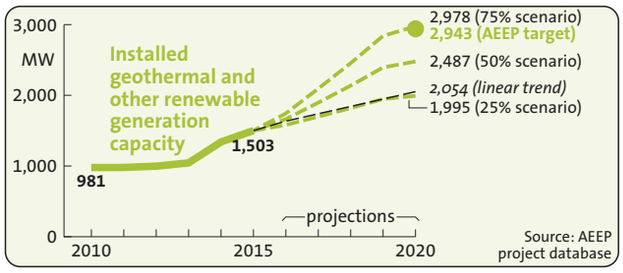
Falling costs have made wind very competitive. Having called for bids to develop five wind power projects with 850MW combined capacity, Moroccan state utility Office National de l'Electricité et de l'Eau Potable (ONEE) eventually received a leading bid of $0.03/kWh from seven submissions.

In RSA, onshore wind power projects have proved by far the cheapest source of projects procured through the REIPPP programme. In the fourth round of the programme

the fully indexed price of power was R0.62 ($0.04)/kWh. The REIPPP's success is evident in the price, which has been halved from R1.363 ($0.09)/kWh in the first round.

Wind power has proved successful in developing local manufacturing bases in North and South Africa. Siemens is planning turbine blade manufacturing facilities in Morocco and Egypt while facilities have already been opened in South Africa, which have supplied components to wind power projects in the country.

Tripling other renewables



Generating electricity from biomass and geothermal sources offers many advantages. Both energy sources can provide reliable baseload power at low prices. Geothermal can be developed on a large scale and is well suited to supplying the grid 24 hours a day; costs can be low, at between $0.04-0.08/kWh. Exploiting this technology forms part of the rationale behind the Ethiopia-Kenya interconnection project, where Kenyan geothermal baseload is likely to be traded for peak hydropower from Ethiopia, once the transmission line is complete. Biomass fuelled by agricultural waste can be used to power remote areas and stabilise the grid. However, progress expanding the use of both has been slow.

Despite huge geothermal resources along the Rift Valley – Africa's most promising region for harnessing energy from the earth's core – only the Olkaria complex in Kenya has been exploited so far on a large scale, while developments at other sites have been delayed. There is a serious push to develop geothermal power in Ethiopia (led by the 1GW Corbetti project), and Djibouti has projects, but other countries have yet to take off. Biomass is similarly limited in its use for electricity generation to more industrialised countries, despite it potential in poorer economies.

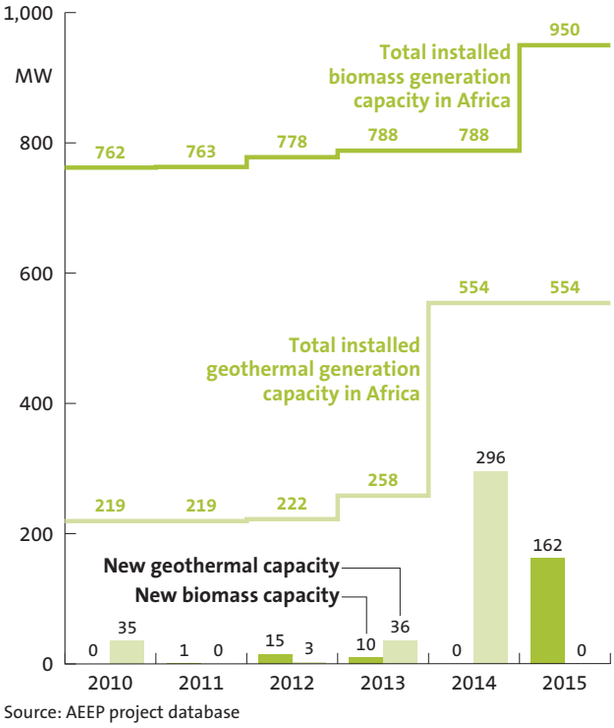
The AEEP's Power Project Database shows that some 1,410MW will need to be added from other renewable sources to treble the amount of generation from biomass and geothermal resources from their 2010 levels. Analysis of the current project pipeline suggests that because the timelines for a number of larger geothermal projects in Kenya have slipped, 73% of projects would have to be completed on time for this target to reached. Between 2010 and 2015 the completion rate was around 75%.

While biomass in 2015 had more capacity – 950MW compared with 554MW for geothermal – the project pipeline is considerably smaller. The lead times on biomass projects are potentially quite short, and the industry is responsive to positive regulatory and financial reforms, but a majority of developments are moving slowly. At current rates, geothermal capacity is anticipated to overtake biomass in around 2017-18. Other renewable resources are being explored, but have yet to impact on the AEEP data. These include landfill gas, of which many projects are planned, but take an age to develop.

Geothermal projects have benefitted from financial instruments designed to overcome the risks associated with the early stages of development, led by the Geothermal Risk Mitigation Facility (GRMF), which has awarded grants in Comoros, Djibouti, Ethiopia, Kenya, Rwanda, Tanzania and Uganda to private companies and state-owned enterprises. The GRMF was established by the African Union Commission (AUC), German Federal Ministry for Economic Co-operation and Development and EU-Africa Infrastructure Trust Fund (ITF) via KfW in 2012. It received an initial €20m from Germany and €30m EU-ITF-KfW. The UK has come in with £47m, since the 2014 *Status Report* (page 49), where the GRMF was a Case Study.

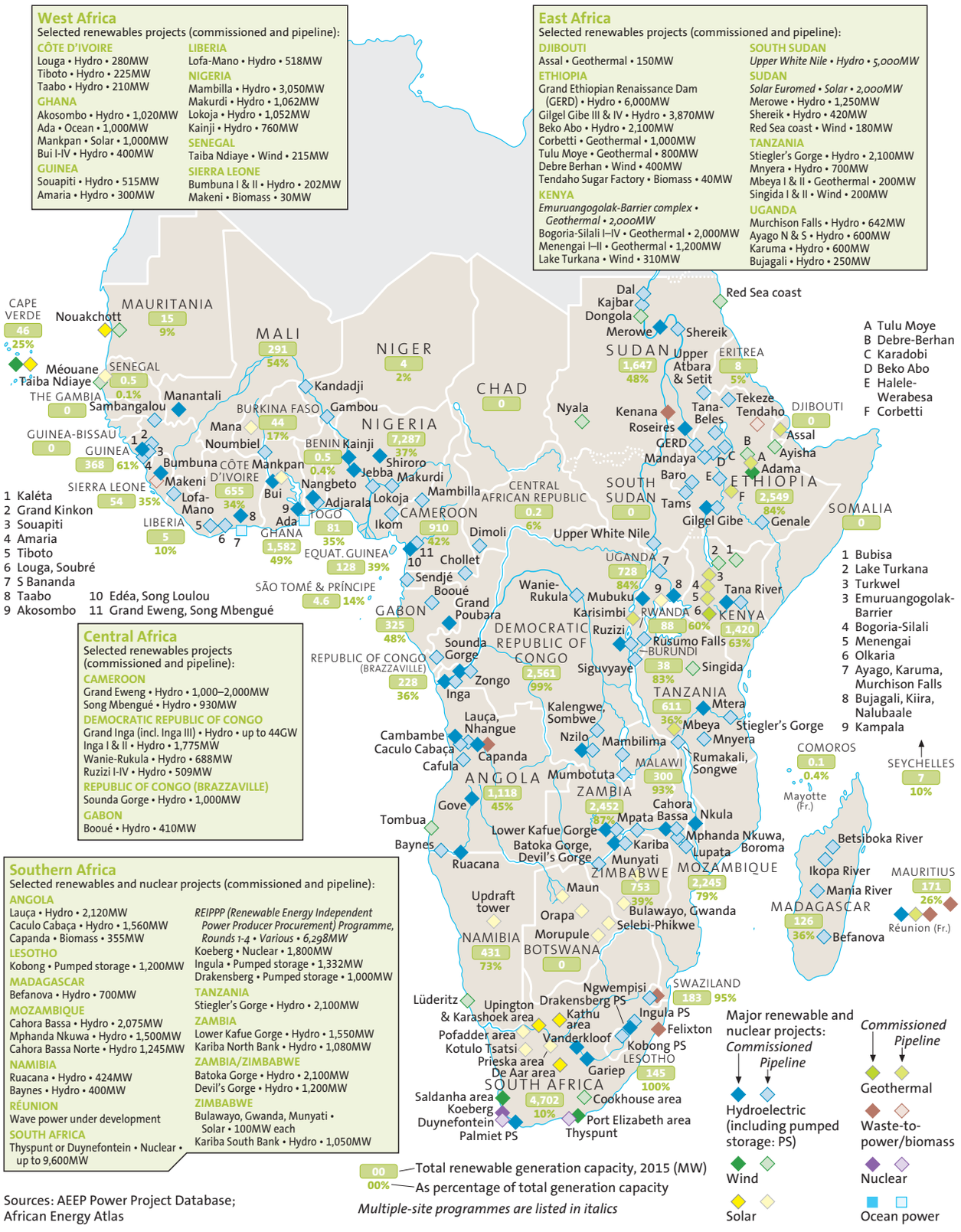
Biomass projects have predominantly been developed by private sector industrial players to meet some or all of their own power requirements.In 2015, 52.2% of biomass capacity was in Southern Africa, overwhelmingly in South Africa, 37.4% in East Africa, 5.4% in West Africa, 2.9% in North Africa, and 2% in Central Africa.

Biomass and geothermal generation capacity, 2010-15



Source: AEEP project database

Sub-Saharan renewables projects



Sources: AEEP Power Project Database; African Energy Atlas

Energy Efficiency

Energy efficiency (EE) is a core component of measures for reducing carbon emissions and for raising economic performance by the ensuring scarce resources are not wasted. However, across Africa the benefits of EE are often overlooked, or policies are poorly implemented, even though well-designed EE programmes can reduce costs for households and enterprises. Even in one of the most proactive countries, Morocco, CGEM employers association president Miriem Bensalah Chaqroun observed in April 2016 that "the level of implementation of planned energy efficiency investments hasn't reached 5%".

Efficiency is difficult to quantify It manifests itself in different ways – in better appliances, new industrial processes, changes in economic structure and an effective electricity supply industry . Initiatives to improve EE can take many forms, from improved insulation to regulations.

As a result, there are a number of different ways to measure EE, each of which has deficiencies. With proxies for EE, such as total primary or total final energy intensity, data is relatively easy to retrieve, but difficult to interpret. These potentially reflect a wide range of determining factors, such as climate (heating and cooling needs), economic structure (in terms of sectors), the size of a country (with regard to transport needs), the exchange rate, electrification rate or extent of biomass usage.

As the AEEP's 2014 *Status Report* observed, energy intensity can be at least as much an indicator of national economic performance, since it captures structural changes and fluctuations in an economy at least as much as any changes in EE. Therefore, a low level of energy intensity does not necessarily mean high efficiency. This is nicely demonstrated by an example taken from the International Energy Agency – of a small, service-based country with a mild climate that would certainly have a much lower intensity than a large industry-based country in a very cold climate, even if energy is more efficiently consumed in the latter country than in the first.

Sectoral energy intensity, as shown in the table on page 40, provides somewhat more informational value since it allows an initial assessment of trends in energy consumption and comparisons across countries. Then there are disaggregated indicators, such as sub-sectoral or end-use indicators within various sectors, such as residential, services, industry, or transport (passenger and freight). Process or appliance indicators capture even more disaggregate information at the unit energy consumption level. One indicator example could be energy consumption per unit of appliance.

In this report – for reasons of data availability and consistency with earlier reporting – final energy consumption per GDP at purchase power parity has been chosen as the main indicator. Data is drawn from the SE4All Global Tracking Framework.

For the electricity sector, network losses are a measure of an efficient sector in good condition. Reducing losses through transmission and distribution reduces the need for generation, while at the same time improving the quality of supply by increasing the availability of power and stability of the grid.

AEEP workstream

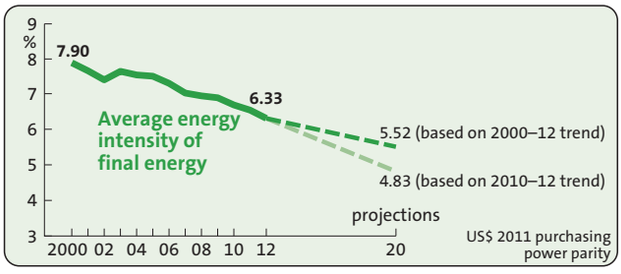
The AEEP established an Energy Efficiency Workstream with the aim of supporting stakeholders in the private sector, academia and civil society. It has been preparing a draft strategic plan to 2017, with its first workshop to be held in May 2016. Work is ongoing to identify stakeholders to map EE initiatives and strategies, which will be used to develop a matrix containing clear recommendations to promote energy efficiency in an African context.

EE Laws and Regulations

To complement the quantitative monitoring of energy efficiency data, a table was compiled for the 2014 AEEP *Status Report* that showed the extent of legal and institutional infrastructure across the continent. The Energy Efficiency Laws table (on *Status Report* pages 56 and 57) – and associated collection of relevant legislation and regulations – could be updated as a future workstream, to provide an overview of the extent of policy coverage in each of the 55 countries covered, and to monitor progress in introducing and implementing legislation to help implement policy, create or reinforce institutions that regulate energy efficiency measures, provide financial incentives and oversee projects.

Work is under way to support the regulatory framework and enabling environment for improving energy efficiency, with support from the EU's Technical Assistance Facility (TAF) for the SE4All Initiative and other European instruments.

Energy intensity



The data used from the World Bank SE4All database suggest the African continent has seen a decrease in average final energy intensity of 20% (or an average 2.9% per year) from 7.9MJ at 2011 US dollar ($) purchasing power parity (PPP) to 6.3MJ/$ PPP over the period 2000 to 2012. This compares with the more modest decrease of 6% (or average 1.8% per annum) from 6.7MJ/$ PPP to 6.3MJ/$ PPP between 2010 and 2012. The data thus shows that a seemingly positive trend – given all data and conceptual qualifications – seems to have slowed down considerably.

In comparison, average primary energy intensity for Africa (encompassing data from 53 African countries) has decreased from 10.4MJ/$ PPP in 2000 to 8.9MJ/$ PPP in 2012 (average annual rate of 1.3%) – or by an average 2% per year between 2010 and 2012 (9.2MJ/$ PPP in 2010).

Average energy intensity by sector – as measured by the ratio between energy consumption in the respective sector and the sector value-added at purchasing power parity (or the number of households for the residential sector) – seems to have decreased in almost all sectors – except for agriculture – over the past 12 years. However, data for the past three years points to a stagnation of this trend, too.

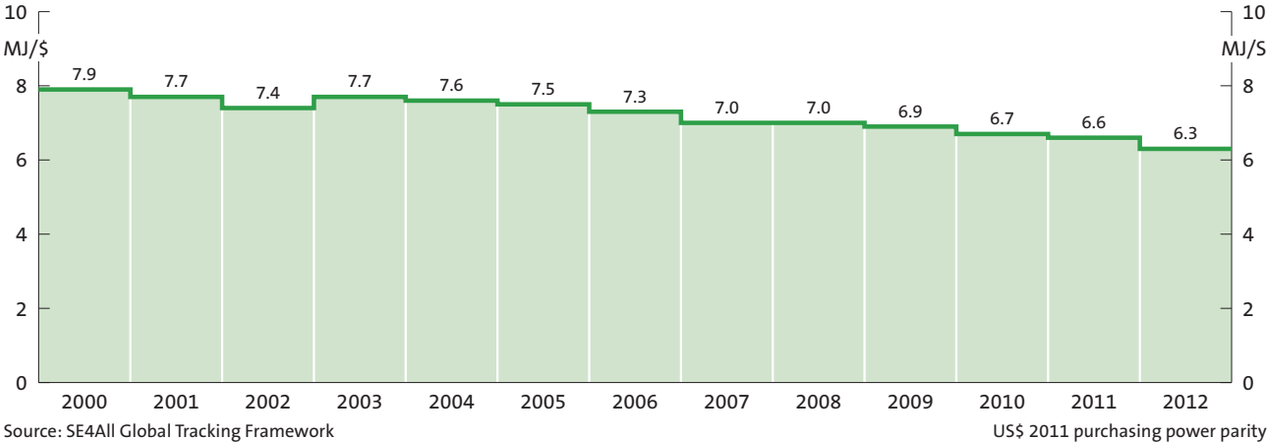
The data is surprisingly consistent across regions, aside from Southern Africa. Final energy intensity in the average North African country was 6.4MJ/$ PPP in 2012, in East Africa it was 5.4MJ/$ PPP, in West Africa 5.5MJ/$ PPP and Central Africa 4.8MJ/$ PPP. The figure in Southern Africa was 9.6MJ/$ PPP, or 10.2MJ/$ PPP without South Africa. This suggests caution is required when working with the energy intensity target.

It is clear that less industrialised regions of Africa have a tendency to have lower energy intensity, so it is possible that the lower intensity may be down to a much smaller industrial base. However, a closer inspection of the figures shows that many of the poorest countries such as the Democratic Republic of Congo, Somalia and Liberia have very high energy intensity. While it is possible that the limited industrial base in these countries is energy inefficient, it should also be remembered that an unusually low GDP could result in a high energy intensity figure.

The regional breakdown implies that energy intensity measures might most usefully be targeted at the industrialised countries of North Africa and South Africa. The scale of industry in these countries means that the potential energy efficiency savings are substantially larger.

Another aspect of the way energy intensity is measured – energy use divided by GDP– is that the figure may fall because the industrial base is shrinking. For example, it is possible that energy intensity may decline in line with the fall in mining output across the continent, due to low

Average energy intensity of final energy, 2000-12

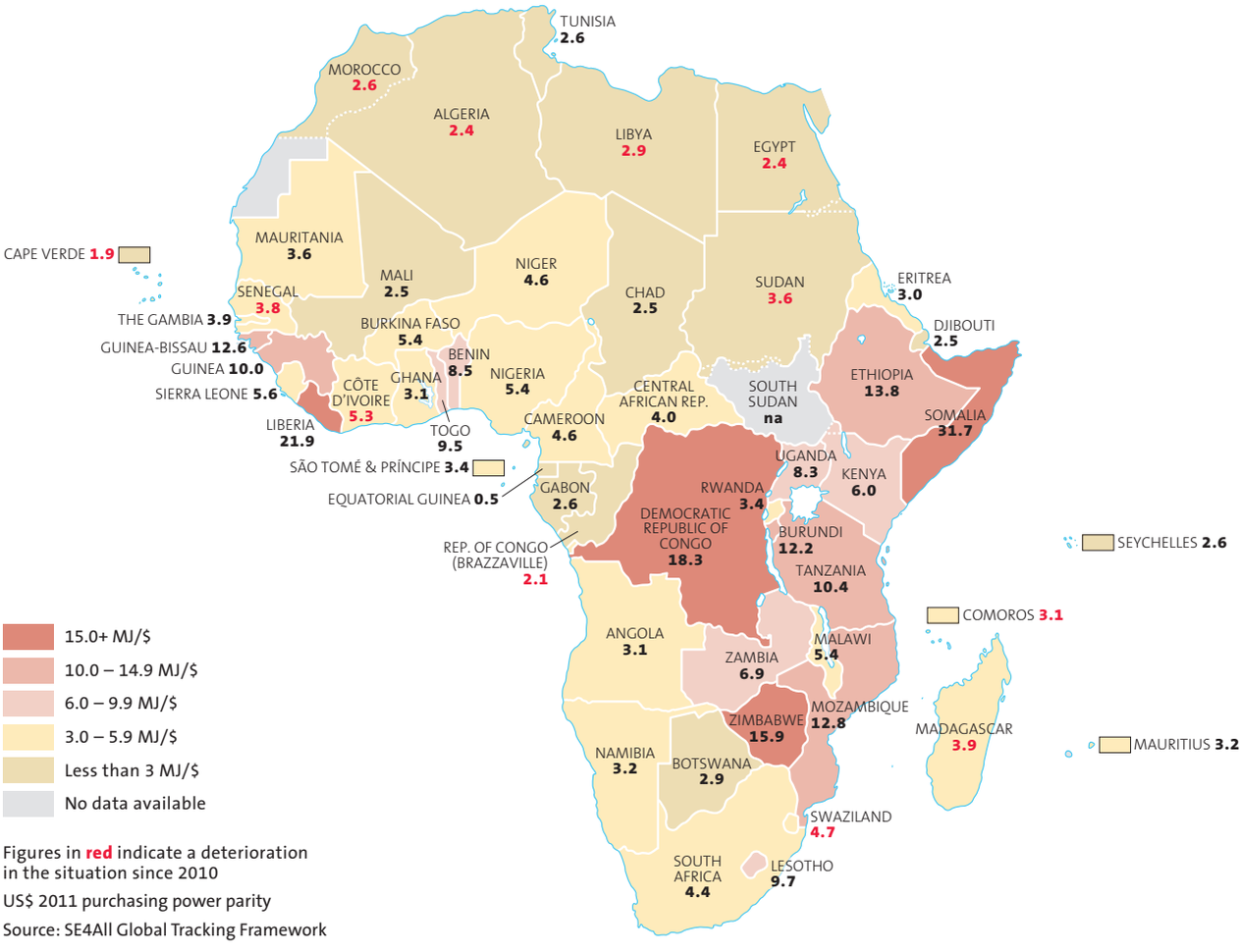


Source: SE4All Global Tracking Framework

US$ 2011 purchasing power parity

commodity prices, for example. In this case there would be no energy efficiency benefit or the reduction might only be temporary. Africa only commands roughly 1.5% of the world's total manufacturing output, according to the United Nations Industrial Development Organisation (Unido), and even this tiny share of global production is heavily concentrated in the few industrialised countries. This suggests that energy intensity trends over the next decade are likely to mirror more closely trends in economic composition, rather than energy efficiency.

Energy intensity level of final energy, 2012



Figures in **red** indicate a deterioration in the situation since 2010

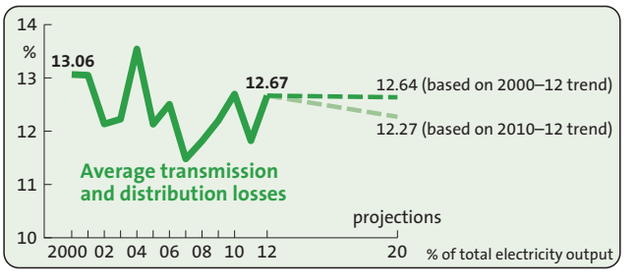
US$ 2011 purchasing power parity

Source: SE4All Global Tracking Framework

Energy intensity projections						
Energy intensity by sector*	Energy intensity			CAGR 2000-2012	CAGR 2010-2012	Country coverage
	2000	2010	2012			
Residential (GJ/Household)	46.2	42.8	42.9	-0.6%	0.1%	52
Transport	19.2	12.2	12.0	-3.9%	-0.9%	49
Industry	4.2	3.4	3.4	-1.8%	-0.1%	46
Agriculture	1.4	1.9	1.9	2.4%	0.6%	22
Services	0.8	0.5	0.5	-3.3%	2.3%	30

* All sectors MJ/$ at 2011 purchasing power parity. **Source: SE4All Global Tracking Framework.**

Network losses



Electricity transmission and distribution (T&D) losses are an important aspect of supply side efficiency that continue to be a challenge in many African countries. Compared to Europe or the US, where average network losses of 7% can be assumed, many African countries need to cope with sometimes sizable quantities of power lost between generation locations and the end-user.

Inadequate distribution infrastructure and damaged power lines are factors that can account for this phenomenon. Other factors include technical as well as non-technical losses arising from unmetered, unbilled and unpaid electricity, including theft. However, the International Energy Agency (IEA) has established that the location of primary energy resources (such as hydro-lakes and coal seams) and large loads (cities and industries) can have an even more dominant effect on aggregate network losses. These indicators cannot be properly accounted for without detailed analysis.

For the purposes of this report, annual average T&D losses have been calculated as their sum in GWh for all countries for which data was available, divided by the sum of total electricity output in GWh for the same sample countries.

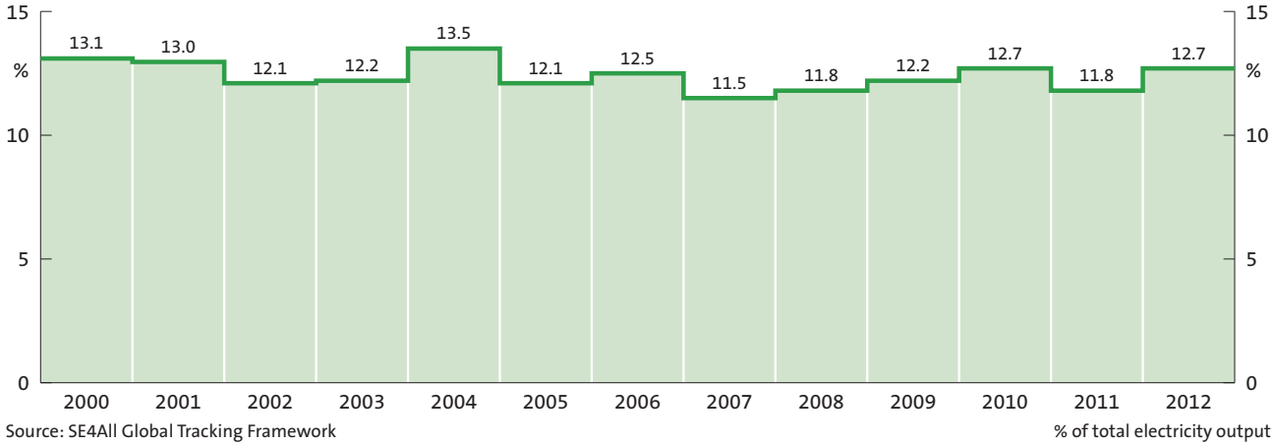
Average network losses for Africa exhibit a quite stable trend, with only a 0.4% decrease between 2000 and 2012 (from 13.1% to 12.7%) and no change between 2010 and 2012. This tendency is similar when comparing SE4All/Global Tracking Framework data with statistics provided by the US Energy Information Administration (EIA), even when accounting for total electricity output plus electricity imports as the denominator.

If African average T&D losses are measured as the average of the percentage losses per country for each year of the same sample, this results in losses of 21.5% for 2000, 21.4% for 2010, and 26% for 2012. The 2012 increase was largely due to Botswana, which as a net electricity importer displays losses as high as 158%; this makes the link between generation and distribution appear implausible, but as mentioned above, the overall trend for Africa remains broadly the same even if electricity imports are accounted for.

It should be pointed out that the numbers in the World Bank/SE4All database seem to have changed significantly in some instances since the last AEEP *Status Report*, which was published in 2014 and used a dataset that concluded in 2010. Further, the data show large fluctuations in T&D losses year-on-year for some countries. This could be due to varying electricity imports. Alternatively, the validity of the data must be questioned.

Looking at average regional network losses, all regions have remained at more or less similar levels over time, except for West Africa which has improved its T&D losses by more than 20 percentage points from 36.6% in 2000 to 15.9% in 2012. The data suggest that, in West Africa, Nigeria has made notable improvements, from 51% of

Average transmission and distribution losses, 2000-12



Source: SE4All Global Tracking Framework

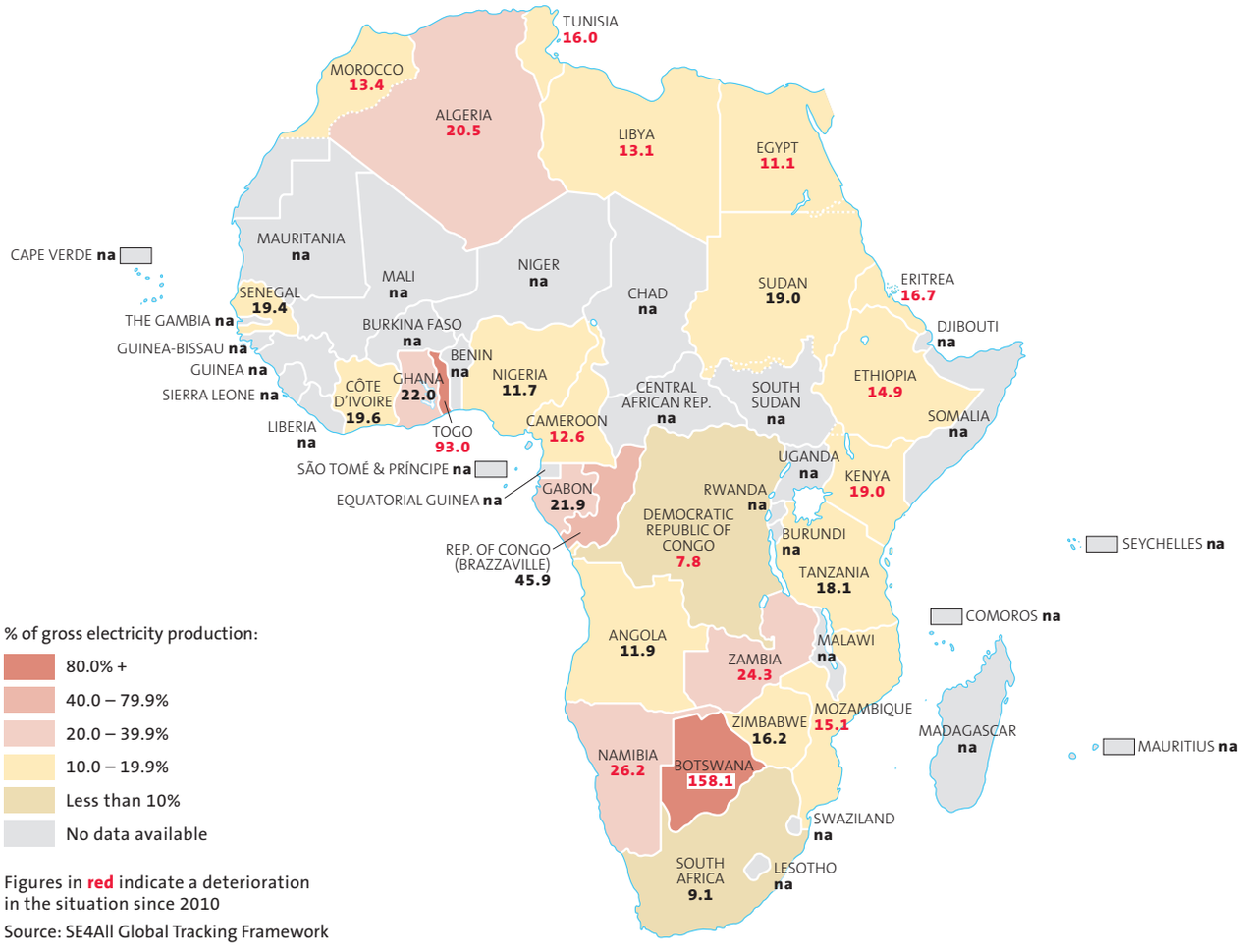
% of total electricity output

losses in 2000 to 23% in 2010 and 12% in 2012. Senegal's network losses also fell, from 43% in 2000 to 19% in 2012.

Southern Africa – excluding the Republic of South Africa (RSA) – experienced considerable deterioration between 2000 and 2010. Since then, the situation has stabilised at about 18.6% of T&D losses. In Southern Africa, apart from the special case of Botswana, Zambia's losses worsened quite significantly from 3% in 2000 to 24% in 2010 and 2012. The fact that Zambian generation rose by about 50% in the same timeframe, led consultancy KPMG to conclude, in its 2015 *Power in Africa* report, that improvements in generation capacities had not been accompanied by an adequate build-up of distribution infrastructure.

The data show that Central Africa displays a very low level of network losses. One apparent reason for this is that in economies like Democratic Republic of Congo – with very low levels of access – generation capacity is often built for specific end-users, notably extractive industries, who do not require extensive distribution infrastructure.

Transmission and distribution losses, 2012

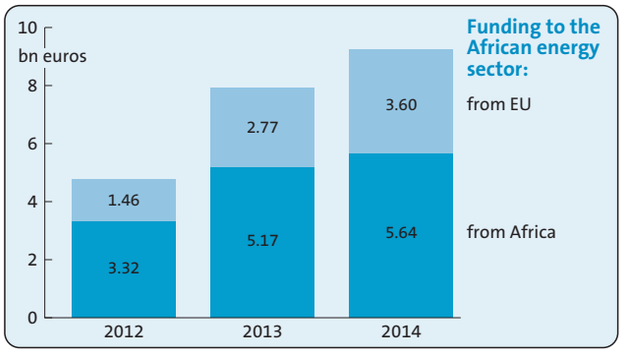


Figures in **red** indicate a deterioration in the situation since 2010

Source: SE4All Global Tracking Framework

Average network losses (%)						
	North Africa	West Africa	East Africa	Central Africa	Southern Africa	Southern Africa (minus RSA)
2000	14.6	36.6	18.9	13.2	9.0	11.5
2010	12.6	22.8	16.7	12.3	10.9	18.7
2020	13.6	15.9	17.9	14.1	10.5	18.6

African and European Contributions



European Union institutions, member states and their corporate and individual citizens play a very important role in helping to develop Africa's energy infrastructures and capabilities, but – as the 2014 *Status Report* pointed out – measuring the extent of that role remains problematic given the relative lack of data. Many of the shortfalls recorded then by the AEEP Secretariat and its consultants persist, for example showing that groups of development finance institutions (DFIs) do not yet collate data on their financing flows and outcomes. There are also issues in measuring contributions that pass via institutions such as the World Bank Group (WBG) and African Development Bank (AfDB) Group, both of which have a substantial European shareholding and, thus, a stake in their high levels of support for African energy projects.

The AEEP Power Projects Database cannot yet produce accurate numbers for each party's contributions to financing developments. Much more work is needed to identify each of the financial instruments that feed into the several thousand projects recorded. However, while a daunting information-gathering challenge which would require very considerable resources, there is no technical reason why this should not be possible.

Neither is there a complete record of European commitments to the African energy sector. The most complete time series of commitments by bodies within the EU is kept by the Infrastructure Consortium for Africa (ICA), which is managed by the AfDB in Abidjan. This useful tool has, over several years, tracked commitments made by the European Investment Bank (EIB), European Commission (EC), France, Germany and the UK. It has been working to expand its coverage, with significant success, and this data is used to inform this report.

African national government budget allocations

The ICA has also been expanding its coverage and analysis of infrastructure spending in African government budgets.

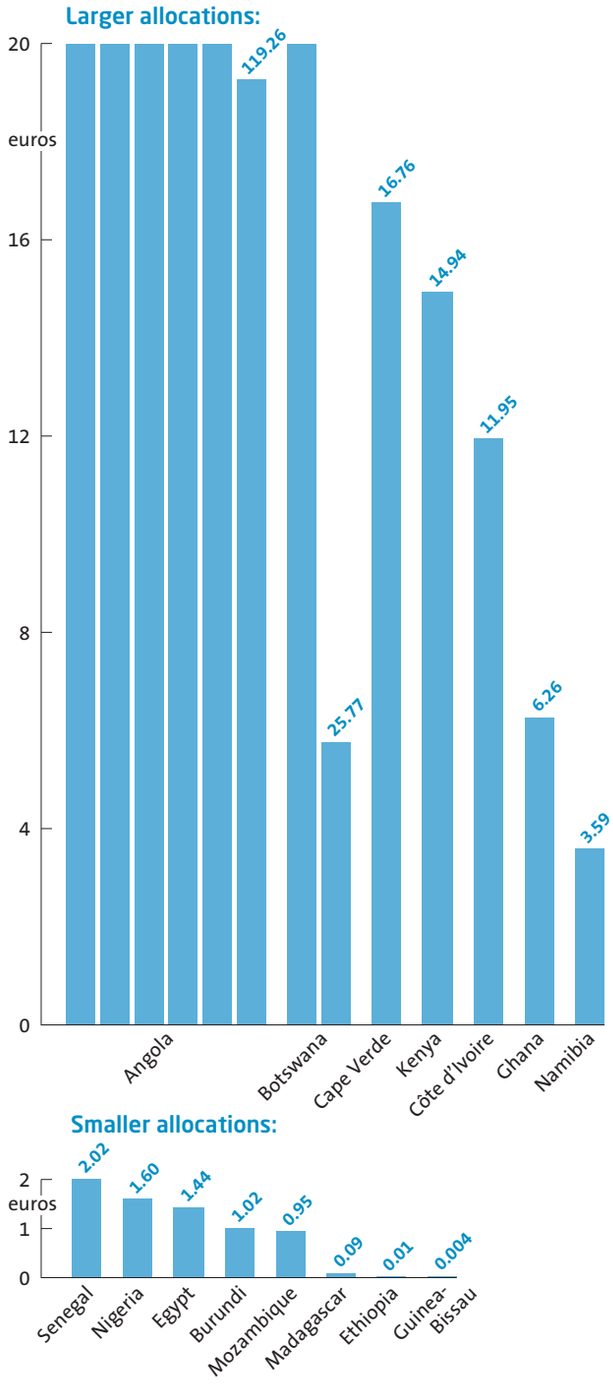
Available data suggests that African national governments' budget allocations, combined with commitments made directly or indirectly through the AfDB and WBG by EU member states appear to be on a steep, upward trend. This is shown in data produced for the ICA and calculations made by the AEEP Secretariat.

While the majority of African countries allocated most of their infrastructure capital spending to the transport sector, some have prioritised the energy sector. These include Algeria, Angola, Kenya and Tanzania, each of which in 2014 allocated more than $500m to energy through their annual budgets.

According to data published by 34 African governments, state funds of at least €5bn were committed to capital expenditure on energy projects in 2013 and 2014; this was rather more than the €3bn committed in 2012.

Given the differences in data availability on national budget allocations, the table on page 47 shows a control group of 21 African countries that have reported budget allocations on a consistent like-for-like basis for the three years to 2014. While some countries report broadly even allocations, there are some big fluctuations, as seen in the data captured for Angola, Ghana, Senegal, South Sudan and Togo. It appears encouraging that the total control group allocations rose sharply after 2012, but data can be deceptive, as this increase is almost entirely due to Angola's larger allocations.

African national government's budget allocations to the energy sector, per capita average 2012-14



Severe peaks and troughs in the control group data are similar to those found in external funders' contributions to the African energy sector. There are many reasons for these fluctuations, which include the project cycles of the largest schemes. Data can be skewed by a higher than usual injection of DFI funding into budget support mechanisms, such as the AfDB's $1bn loan commitment in 2014 for the Angola Power Sector Reform Support Programme, or the impact of investment, such as the €6.9bn committed by several funders in 2010 to the Eskom Investment Support Project.

Absolute national budget allocations lack meaning given the different sizes of the economies involved. In this context, the amount of spending per capita may be a more relevant measure.

Analysis of average national budget allocations per capita over the three years to 2014 show some very wide variations. This is based on initial work in this area by the AEEP's consultants, working with data from national finance ministries and central banks. Angola stands out as having by far the largest allocations to energy per capita (at around €95/head). Botswana is ranked second in this analysis (at €40/head), substantially ahead of third- and fourth-ranked Cape Verde (€16 /head) and Kenya (€14). These rankings should not be considered true guides to a country's commitment or overall spending on African energy infrastructure, which may be mainly made by a state utility or other subnational body.

Data considerations

Data for national budget allocations to Africa's energy sector in 2014 is based on analysis of 42 countries that published information on infrastructure capital spending in their budgets over a three-year period to 2014. This group – comprising 34 countries in 2014, 23 in 2013 and 27 in 2012 – published clearly identifiable allocations to energy infrastructure capital expenditure. Excluded from the data used for AEEP purposes are allocations that may include revenue spending, elements aimed at oil or gas infrastructure that fall beyond the type of infrastructure contemplated in the AEEP context, or allocations to multi-sector projects.

This implies data presented here may be understated. Neither can a degree of double-counting be excluded, where national budgets include spending funded by DFIs or some other external source. The extent of double-counting is difficult to assess and appears to vary greatly. Where budgets specify amounts of internal and external funding for an allocation, capital expenditure on energy in the Mozambican and Ugandan budgets was respectively 78% and 73% internally funded, whereas Ethiopia's budgets showed 74% was externally financed.

Subnational spending

One marked trend is towards increased subnational spending in Africa, by local governments, state utilities, regional and country-based development and infrastructure banks. However, these sources of funding

have yet to be accurately identified and screened for double-counting before they can be added to the data that monitors and assesses what resources are being committed to the energy sector.

African public sector funds flow into the energy sector from several sources. National government budget allocations are a major source, but the role of subnational funding should not be underestimated. Local or municipal government, or state utilities, are increasingly positioning themselves to deploy internally generated funds or leverage finance from financial markets (as has been established previously in other emerging regions such as Eastern Europe and Latin America). In some of Africa's largest economies – including Egypt, Republic of South Africa (RSA), Nigeria and Morocco – there is a very substantial emphasis on subnational financing.

In its 2014 budget, the City of Johannesburg, allocated €239m to infrastructure as defined by the ICA (transport, water, energy and information and communications technology, or ICT); this was equivalent to 45% of its capital expenditure. Johannesburg expected to raise €294m of its budget through internally generated taxes and service charges. In 2013, the Lagos State Government Bond–Series 2 raised €422m for infrastructure.

Morocco's advanced regionalisation programme embraces the concept of subnational government financing and mechanisms for infrastructure funding, through structures such as the Fonds d'Equipement Communal (FEC), which provides loans for specific investment projects and lines of credit for financing longer-term development programmes. FEC is financed through the local financial market notably through credit lines, bond loans and deposit certificates.

African regional development banks are also ploughing funds into the energy sector and leveraging financial markets. Participants in the Lake Turkana Wind Project financing included the East African Development Bank and PTA Bank, which concluded a milestone in November 2014 with a syndicated loan with a target of $200m; the facility closed at $320m, 1.6 times oversubscribed.

Other African sources of public sector finance include the participation of the Central Bank of Nigeria in Lagos-based infrastructure investor the African Finance Corporation along with other African (mainly Nigerian) financial institutions and corporate investors. Senegal's infrastructure finance system is now operated through the newly established Fonds Souverain d'Investissements Stratégiques (Fonsis).

There is considerable scope for international institutions to extend the charting, tracking and analysis of commitments and disbursements from this burgeoning cohort of existing and potential funding sources.

Emerging private sources

Privately sourced financing for energy infrastructure is emerging across Africa – and in other regions such as the Gulf states – as predicted by the 2014 *Status Report* (page 59), which observed that a trend towards parastatal, capital markets and other private sector sources of funding was emerging. A key focus for AEEP stakeholders is to intensify the 'blending' of public and private finance. Including more representatives of this trend among the AEEP's stakeholder community, and monitoring this important development are potential focal points for

African National Government Budget Allocations for Energy Infrastructure ($m)

Country	2012	2013	2014
Angola	627.958	2,691.854	2,270.628
Botswana	124.529	77.881	55.413
Burundi	7.300	11.994	10.565
Cape Verde	11.822	5.601	9.004
Cote d'Ivoire	142.761	167.389	272.350
Egypt	130.026	85.588	124.886
Ethiopia	0.524	0.678	1.379
Ghana	na	40.507	160.867
Guinea Bissau	0.022	0.138	0.006
Kenya	559.459	695.225	670.584
Madagascar	0.952	3.057	2.118
Mozambique	18.791	13.403	23.278
Namibia	7.824	4.849	7.871
Nigeria	338.506	353.033	283.453
Senegal	1.036	27.347	27.419
South Africa	378.346	334.037	248.939
South Sudan	7.708	0.222	0.470
Tanzania	157.643	205.586	411.946
Togo	6.342	1.559	11.372
Uganda	318.425	367.315	374.751
Zimbabwe	40.864	15.746	13.646
Total	**2,880.840**	**5,103.008**	**4,980.946**

future activity by the Partnership, as African infrastructure financing becomes established as an asset class, and local financial markets become deeper, allowing more African citizens and foreign funds to invest.

European contributions to funding African energy projects

The 28 EU Member States make substantial direct commitments to Africa's energy sector, on average over the five years to 2014 providing €1.7bn annually in concessional and non-concessional financing. Additionally, the EU has a strong and wide-ranging partnership with the WBG and AfDB, as do a range of EU institutions, including the EC, European Council, European Parliament and EIB.

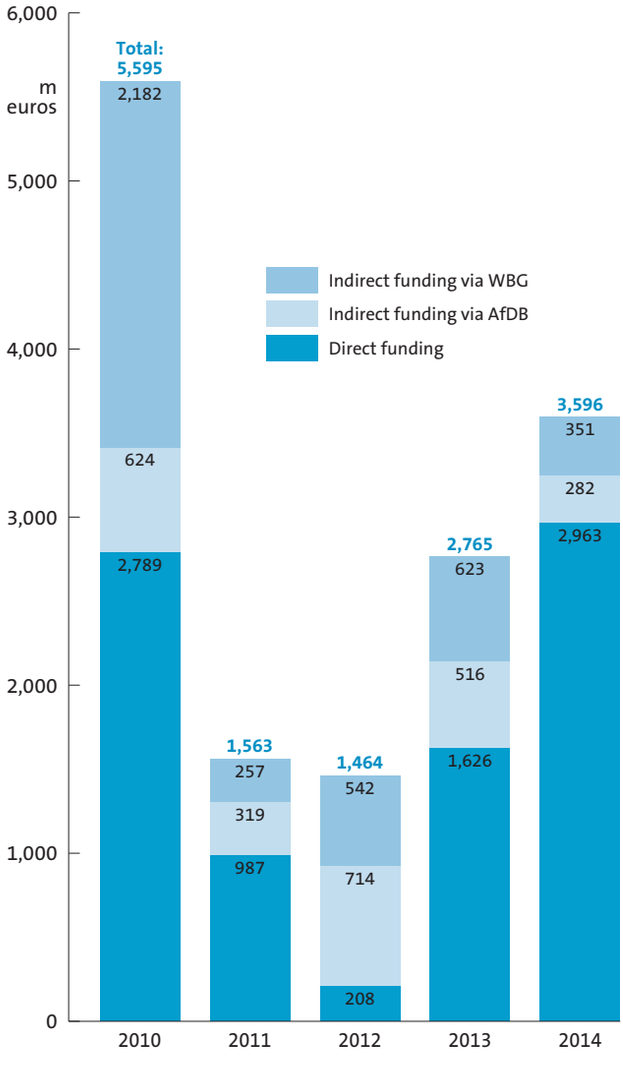
The Member States are major shareholders and partners in the work of the WBG, accounting for nearly one-third of shares in the International Bank for Reconstruction and Development (IBRD) and half of contributions to the soft-lending International Development Association (IDA).

EU institutions and member states provided 52.9% of paid-in contributions to the IBRD from 2006 to February 2015. If this percentage is taken as being indicative of the percentage Europeans have indirectly contributed to the WBG's African energy commitments, then their contribution, on average over the five years to 2014, has been an annual €791m.

European contributions to the AfDB are also substantial. EU Member States contributed 59.8% of pledges to the twelfth and thirteenth replenishments of the soft-lending African Development Fund, which provides the substantial amount of funds administered by the bank in the period 2011-16. If this percentage is applied to the AfDB's commitments to the African energy sector, then member states have contributed, on average in the period 2010-14, an annual €491m.

Based on these calculations, direct AfDB and WBG funding, and 'indirect' funding based on EU Member

EU member states' commitments to the African energy sector, 2010-16



States average support peaked in the AEEP baseline year 2010, at around €5.5bn. This was a very exceptional year that included several billion euro-plus commitments in North and East Africa and Mozambique, including the €10.4bn Eskom Investment Support Project.

Targets to 2020 and beyond

This *Status Report Update* gives strong pointers to the progress and problems experienced in meeting the Africa-EU Energy Partnership's 2020 Political Targets. Some developments have been exceptional since the Partnership was created – for example, the amount of solar capacity that has been installed, which is already much greater than envisaged when the AEEP was created at the Lisbon summit in 2007. The scale of international concern about the need to seriously tackle energy poverty in Africa is much greater than when African and European leaders first highlighted this global-scale problem.

The AEEP has been a pioneer in proposing policy directions and targets to overcome energy poverty, improve efficiency and underpin domestic and cross-border energy security in Africa and Europe. Now approaching its second decade, the AEEP has been instrumental in shaping the approach of global initiatives like the United Nations-led Sustainable Energy for All (SE4All), which have understood the need to collect and collate more accurate data that can inform the campaign to end energy poverty.

Through initiatives such as operationalising the AEEP Monitoring Tool – and its Africa Power Project Database, which now contains information on more than 3,250 operating and planned generation plants, plus electricity interconnections and other data – the Partnership has shown a steely commitment to establishing a strong empirical basis for understanding trends and tackling problems. In this approach, the Partnership – piloted by the AEEP Secretariat, as mandated by its member governments and co-chairs – has shown a refreshing capacity to be critical about data and policy. AEEP stakeholders generally agree that only by encouraging critical dialogue can Africa and Europe move forward.

The Lisbon 2020 Political Targets set the initial phase of work, providing goals that Africa and Europe should aspire to meet, and mandating the new Partnership to monitor those benchmarks. This *Status Report Update* continues that work in a spirit that typifies the AEEP – intended as a basis for further discussion, which is likely to focus on several areas.

Extending the targets

Following nearly a decade of growth in the African energy industries, it is relevant to ask whether the AEEP's political targets are still appropriate, both numerically and chronologically. The AEEP Power Project Database suggests that some targets could be reached already, while many – but not all – will be exceeded by 2020.

Some AEEP stakeholders argue that it may be appropriate to ask if the timeframe for the Political Targets should be extended. There are two main reasons for this. 2020 is fast approaching, and a decision to extend the deadline would allow for more rational planning of research and projects, for example allowing the AEEP Monitoring Tool databases to incorporate project projections that go beyond the current cut-off. A new target date would enable a wider coordination of programmes into the next decade.

It should also be considered that a number of more recent, complementary initiatives – including SE4All, which has strong support from the African Union and European Commission, and lately the African Renewable Energy Initiative – have taken 2030 as their target date. So have the United Nations' Sustainable Development Goals (SDGs), which are intended as a baseline for harmonising global action to tackle poverty, and will have an impact on energy, climate change mitigation and related sectors.

Harmonising efforts

Efforts to harmonise the growing number of international African energy-focused initiatives – a process in which the AEEP is playing a leading role – suggest that more should be done to avoid duplicating effort by encouraging cooperation in data-gathering and policy-making.

While the AEEP Monitoring Tool has established a niche in tracking generation projects, the AEEP Secretariat has adopted data gathered in the SE4All Global Tracking Framework for access and efficiency indicators. The SE4All database contains estimates of access to electricity and non-solid fuel for cooking, energy intensity and electricity transmission and distribution losses for all but a handful of African countries. AEEP stakeholders are already working with SE4All and the GTF process.

In the questioning spirit that typifies the AEEP, stakeholders have long discussed whether these – and other – indicators are appropriate measures for the partnership to be working with. Should, for example, energy industries' contribution to create jobs or other critical social issues be adopted as benchmarks? Such has been the AEEP's role in providing critical leadership in its core areas of interest, that such questions are not only appropriate, but should be asked.

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The **Africa-EU Energy Partnership (AEEP)** constitutes one of the initial eight partnerships under the Joint Africa-EU Strategy (JAES), a long-term framework for cooperation between the two continents. The African Union Commission, the Common Market for Eastern and Southern Africa (COMESA) Secretariat, Egypt, the European Commission, Germany, Italy are the Steering Group members providing political guidance to the Partnership.

AEEP Steering Group

The Africa-EU Energy Partnership (AEEP) constitutes one of the initial eight partnerships created under the Joint Africa-EU Strategy (JAES), a long-term framework for co-operation between the two continents. Africa and Europe work together through the AEEP to develop a shared vision, common policy approaches and actions.

Six Steering Group members – who now comprise the African Union Commission, the Common Market for Eastern and Southern Africa (COMESA) Secretariat, Egypt, the European Commission, Germany and Italy – provide political guidance to the Partnership. The AEEP Secretariat is hosted by the Partnership Dialogue Facility (EUEI PDF), which is an instrument of the EU Energy Initiative (EUEI).

The AEEP's overall objective is to increase the effectiveness of efforts to secure reliable and sustainable energy services and extend their access on both continents, with the aim of achieving the Sustainable Development Goals in Africa. The AEEP's efforts are focused on meeting a series of concrete, realistic and visible targets by 2020, as agreed by the Partnership's First High Level Meeting, held in September 2010, and developed through subsequent actions and meetings.

This report's aim is to provide an update of the AEEP's benchmarks and to monitor progress in achieving the Partnership's goals, while also pointing to directions for continued action.