



***The Programme for Infrastructure Development in Africa:  
Transforming Africa through Modern Infrastructure***

### ***THE PIDA ENERGY VISION***

***To harness all African energy resources to ensure access to modern energy for all African households, businesses and industries by developing efficient, reliable, cost effective and environmentally friendly energy infrastructure resulting in poverty eradication and vigorous sustainable development of the continent.***



## Reducing Energy Costs, Increasing Access

Power demand will increase six-fold between 2010 and 2040, an average annual growth of nearly 6%. To keep pace, installed power generation capacity must rise from present levels of 125 gigawatts to almost 700 gigawatts by 2040.

Through full implementation of the PIDA energy sector program, Africa will reap savings on electricity production costs of US\$30 billion a year through power interconnectors which will integrate the African power market through Power Pools and enable large-scale hydropower generation projects to be developed resulting increased access to power by business and households as power will move from surplus to deficit areas through inter-regional trade. Power access will rise from 39% in 2009 to nearly 70% in 2040, providing access to 800 million more people.

## Energy Sector Status & Outlook

Only 39% of the African population has access to electricity, compared to 70-90% in other parts of the developing world. According to the African Development Bank (AfDB), Africa's power connectivity is at 39MW per million inhabitants, the lowest in any developing region.

More than 30 African countries experience recurrent outages and load shedding, with opportunity costs amounting to as much as 2 per cent of the total annual value of the economy.

Key challenges facing Africa's electricity sector include the recurrent shocks in oil and gas markets, inefficient supply and consumption practices, growing demand, unstable rainfall patterns as well as limited generation capacity and lack of inter-connectivity of power grids.

Behind the under-exploitation of energy resources lies limited capacity to mobilize financing for investment, especially from private sources, owing to policy, institutional and regulatory issues which need to be addressed to create the necessary enabling environment for the much needed investments in energy to be made.

*"More cost-effective power is critical for driving faster economic growth and equitable social development," said AfDB President, Mr. Donald KABERUKA.*

The modernization of Africa's economies, coupled with social progress and a commitment to widening access to electricity, will boost energy demand in Africa by an average 5.7% annually through 2040 to 3,188 TWh, a 5.4-fold increase.

### Drivers of growth:

Increase in population from 1 billion in 2010 to about 1.8 billion in 2040

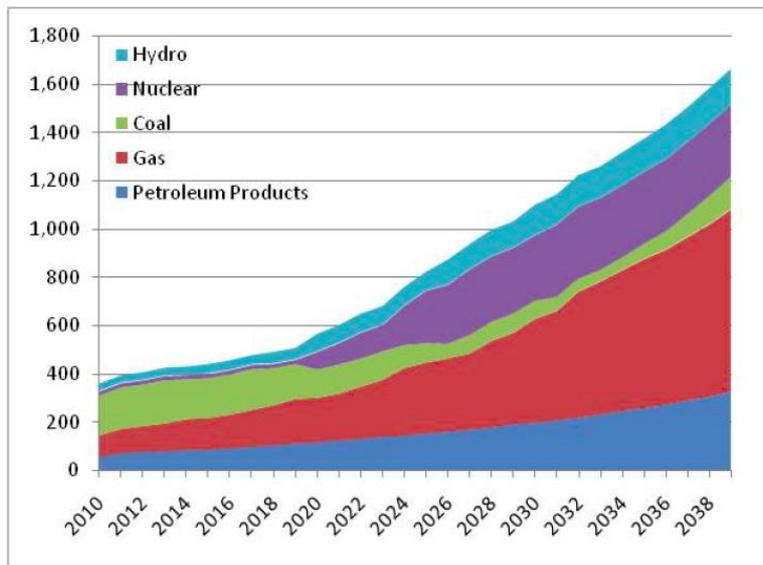
An increase in urbanization from 40% in 2010 to 56% in 2040

Average annual growth of 6.2%; multiplying the GDP of African countries six times by 2040 and raising per capita incomes to US\$10,000

International trade is expected to grow seven-fold, to 3.5 billion metric tons, over the next 30 years

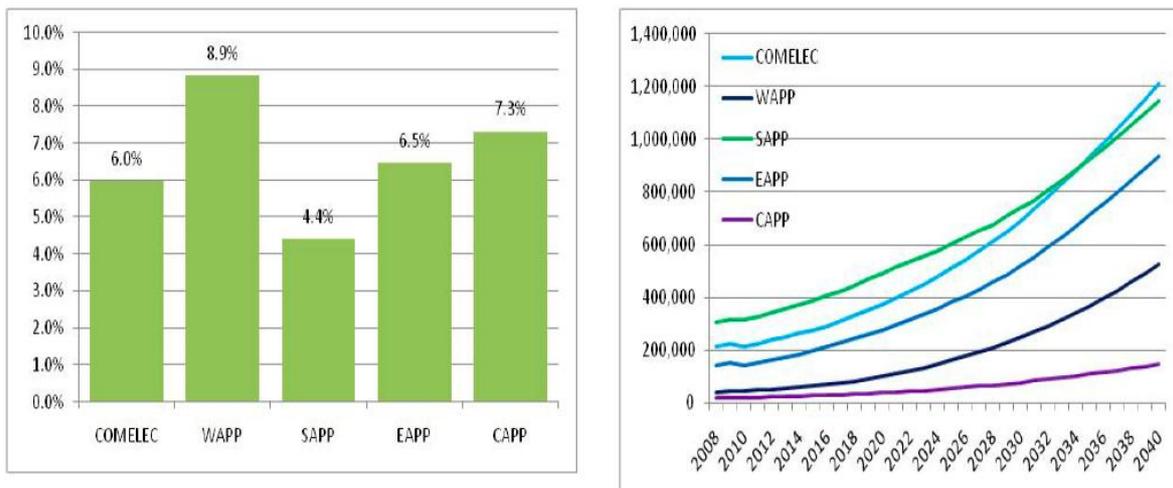
- Per capita energy consumption is expected to rise from its current level of 612 kWh per capita in 2011, the lowest of any world region, to 1,757 kWh per capita by 2040
- Total demand from industry is projected to increase from 431 TWh in 2011 to 1,806 TWh by 2040, an annual growth rate of 5.1%
- To keep pace, generation capacity must increase by 6% per year to 694 GW in 2040. Presently, the whole of Africa has just 125GW of generating capacity
- The role of coal will fall as gas and nuclear power are developed. The rapid increase in consumption of liquid petroleum products will challenge Africa to meet demand through the development of refineries supplied by African crude and of pipelines to transport increasing volumes of petroleum products.

Figure 4.1. Consumption fossil and hydro primary energy of Africa (in million TOE)



Source Africa Energy Outlook 2040.

Figure 3.5. Annual growth rate (%) and increase in demand (in GWh) by power pool, 2011–40



Source Africa Energy Outlook 2040

## The Solution

The essential benefit of regional infrastructure is to make possible the formation of large, competitive markets in place of the present collection of small, isolated, and inefficient ones. Regional infrastructure does this by providing lower-cost energy for agricultural, industrial, mining, and communications. Greater integration will lower fuel costs but require greater capital investment in large-scale hydropower plants.

According to PIDA research, a realistic integration scenario would save US\$860 billion over the 2014-40 period – 17% of the cost of electricity, representing an annual gain of US\$33 billion. Although it will not significantly lower investment costs, regional integration has the potential to save Africans billions of dollars in operating costs, savings that can make investments affordable. The fuel savings that could be obtained from regional integration represent 75% of investment costs. An additional 800 million Africans could gain access to electrical power for a relatively modest investment.

Energy efficiency policies have the potential to save 139MW (16.7%) in capacity needs and 634 TWh in energy produced (16.6%), highlighting the importance of diligent implementation of energy efficiency policies.

PIDA estimates the spending requirements to meet forecast demand to 2040 as follows:

- The average annual investment needs for the power sector are estimated at US\$42.2 billion, with US\$33.1 billion for generation, \$5.4 billion for interconnections, and US\$3.7 billion in access.
- Interconnection investment is urgent and needed upfront to meet the forecast energy demand in 2020 for an average of US\$5.4 billion per year.
- A relatively small investment – US\$3.7 billion per year is needed to ensure no country has an access rate below 60% by 2040.
- An estimated US\$1.3 billion per year will be needed for gas and petroleum product pipelines.





The main challenge will be financing the large capital investment requirements of the power sector, especially the need to increase private sector financing and sector cash flow by some 7-10 times their current levels. Realizing this without increasing the average wholesale tariff of power from around US\$0.10/kWh, would require a major improvement in collection performance and much larger sector cash flow volumes generated by the utilities.

Restoring the creditworthiness of electricity utilities and enforcing payment discipline are the key policy challenges in the energy sector.

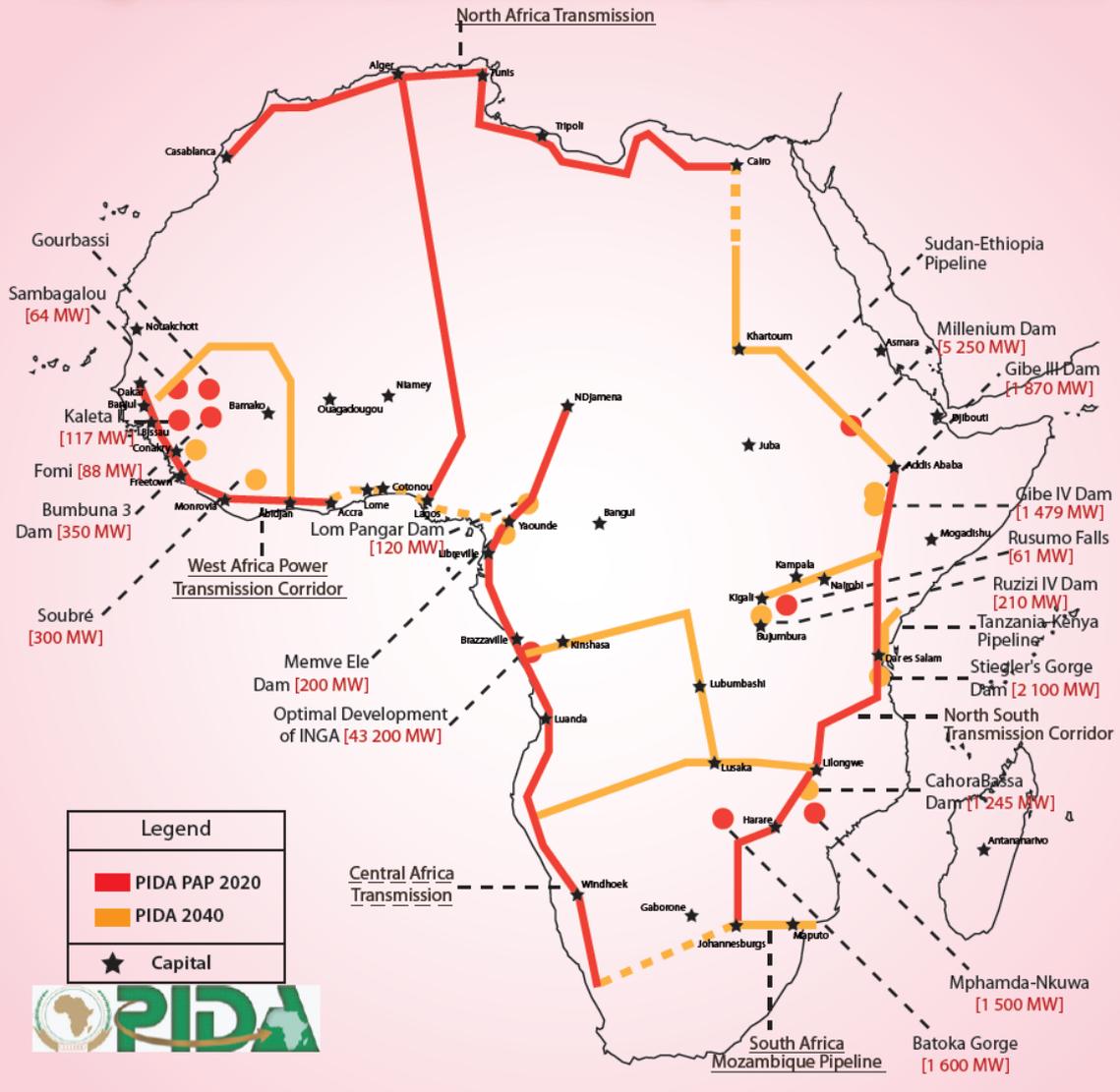
### **PIDA Energy Sector Projects**

Researchers for the Programme for Infrastructure Development in Africa (PIDA) identified projects in the energy sector with the greatest transformative potential until 2040 (the PIDA Priority Action Plan or PAP), with a sub-set of priority programs to expand existing capacity to handle 2020 trade forecasts. The primary objective is to **reduce energy costs and increase access**.

The PIDA energy infrastructure plan calls for the development of major hydroelectric projects to generate the electricity needed to meet forecasted increase in power demand resulting from increased consumption of households, industry and agriculture, as well as wider access to electricity. PIDA plans also include transmission lines to connect the continent's power pools and permit a large increase in inter-regional energy trade. One regional petroleum-product pipeline and the Nigeria-Algeria gas pipeline are also included in the PIDA plans.

# ENERGY

## Programme for Infrastructure Development in Africa (PIDA)



There are fifteen (15) energy sector projects in the PIDA PAP at a total cost of US\$40.3 billion (excluding the Nigeria-Algeria Gas Pipeline)

	<b>Project Title</b>	<b>Stage</b>	<b>Cost (US\$ m)</b>	<b>Countries</b>	<b>REC(s)</b>
EN01	<b>Great Millennium Renaissance Dam</b>	S4	8,000	Nile Basin (Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda)	COMESA/IGAD
EN02	<b>North South Power Transmission Corridor</b>	S2	6,000	Kenya, Ethiopia, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, South Africa	COMESA/EAC/SADC/IGAD
EN03	<b>Mphamda – Nkuwa</b>	S2	2,400	Zambezi Basin (Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe)	SADC
EN04	<b>Lesotho HWP Phase II – hydropower component</b>	S2	800	Orange-Senqu River Basin (Botswana, Lesotho, Namibia, South Africa)	SADC
EN05	<b>Inga III Hydro</b>	S2	6,000	Congo River (Angola, Cameroon, Congo, DRC, Tanzania, Zambia)	ECCAS
EN06	<b>Central African Interconnection</b>	S1	10,500	South Africa, Angola, Gabon, Namibia, Ethiopia	ECCAS
EN07	<b>Sambagalou</b>	S3	300	OMVG (Gambia, Guinea, Guinea Bissau, Senegal)	ECOWAS
EN08	<b>West African Power Transmission Corridor</b>	S2	1,200	Guinea, Guinea Bissau, Gambia, Sierra Leone, Liberia, Côte d'Ivoire, Ghana	ECOWAS
EN09	<b>North Africa Transmission</b>	S2	1,200	Morocco, Algeria, Tunisia, Libya, Egypt	AMU
EN10	<b>Kaleta</b>	S3	179	OMVG (Gambia, Guinea, Guinea Bissau, Senegal)	ECOWAS
EN11	<b>Batoka</b>	S3	2,800	Zambezi Basin (Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe)	COMESA/EAC
EN12	<b>Ruzizi III</b>	S3	450	Burundi, Rwanda, DRC	COMESA/EAC
EN13	<b>Rusumo Falls</b>	S3	360	Nile River Basin (Burundi, Rwanda, Tanzania)	COMESA/EAC
EN14	<b>Uganda-Kenya Petroleum Products Pipeline</b>	S4	150	Uganda, Kenya	COMESA/EAC
EN15	<b>Nigeria – Algeria Pipeline</b>	S2	13,000	Nigeria, Niger, Algeria	UMA/ECOWAS

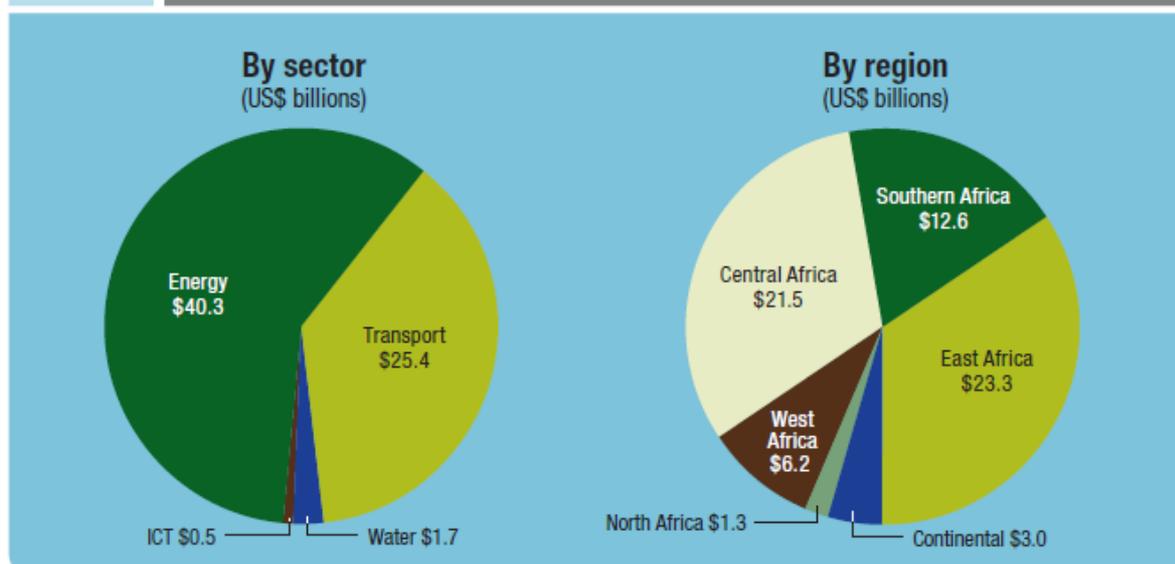
## PIDA Priority Action Plan (PIDA-PAP)

US\$ billions

Sector	Number of projects	Cost	Region	Number of projects	Cost
Transport	24	25.400	Continental	7	3
Energy	15	40.300	North Africa	2	1.3
TWR	9	1.700	West Africa	16	6.2
ICT	3	0.5	Central Africa	9	21.5
			Southern Africa	6	12.6
			East Africa	11	23.3
<b>Total</b>	<b>51</b>	<b>67.9</b>		<b>51</b>	<b>67.9</b>

Figure 1

**Total capital cost of PIDA's PAP by sector and region: \$67.9 billion through 2020**



For further information on the Programme for Infrastructure Development in Africa, please contact:

**Mr. Shem SIMUYEMBA**  
African Development Bank  
15 Avenue du Ghana  
BP 323 – 1002  
Tunis – Belvédère  
Tunisia  
Email: [s.simuyemba@afdb.org](mailto:s.simuyemba@afdb.org)

**Mr. Aboubakari BABA-MOUSSA**  
African Union Commission  
P.O. BOX 3243  
Roosevelt Street  
W21 K19 Addis Ababa  
Ethiopia  
Email: [moussaA@africa-union.org](mailto:moussaA@africa-union.org)