

AFRICA ENERGY MARKET PLACE

The energy sector of **Angola:**

Vision, Action Plan and Investment Opportunities



AEMP Round 3 25 – 26 June, 2019





Country Energy Sector Overview







Angola believes that access to electricity is key to economic growth and country development, benefiting the overall population's standard of living and welfare.



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Long term Vision & Objectives

Angola's strategy to Light up and power Africa by 2025









Angola Energy Sector Action Plan

Key pillars

Ensure and Increase Electricity Supply

Industry Competitiveness

System Sustainability

- Increase the electricity access rate from 30% to 60%
- Quadruple generation capacity from current ~2.000 MW to ~9.500 MW in 2025
- Extend more than 2.500 km of lines and substations in the transmission grid, and establish international interconnections
- Rehabilitate distribution networks, adding more than 1,5 million consumers
- **Improve the efficiency** of public companies
- Implement a new market model that allows for cost reductions
- **Develop a new regulatory model** encouraging efficiency
- Reduce tariff subsidization
- **Develop an optimal generation mix**, making better use of Angola's natural resources
- Develop the capabilities of the local workforce







Angola Energy Sector Snapshot

32%

Potential 1.3 - 2.118.3 3.9 3.7 GW *MWh/m²/year* GW GW Average solar irradiance Hydro energy to be exploited Total wind energy potential **Biomass and waste potential** 6.7 GW more of hydro are expected by Angola has a solar potential of 17.3GW 604 MW, or 13 projects, have conditions for · This potential for electricity generation is 2025. distributed over 368 projects quick grid connection . Several of these sites Angola's Energy 2025 vision sets a target of spread over 42 projects 100MW for small hydropower plants. are close to the main network which minimizes **PV systems** are the most appropriate Planned investments until 2025 will technical restrictions or significant investments. • 3.3 GW of projects are forestry related. technology to harness the solar potential. represent only 30% of utilization. **Production Key Indicators** Peak energy 82 MW 6,400 MW 1650 Households without 3.4 M consumption **Total Installed Capacity** Of supply is generated by IPPs MW power (reached in 2014) Electricity production by source (2014) Energy consumption per client (2014) Losses 14% Thermal Industry Residential 9% 47% 45% Average consumption Access Rate 36% growth rate 15.5% Population electrified localities / **Total Population** (2008-2014)Services



Hydro

53%

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Angola Energy Programs, Policy & Reforms

Energy Sector Stakeholders

- The Ministry of Energy and Water of Angola (MINEA)
- IRSEA-Regulator
- **PRODEL** Generation Company
- RNT Transmission Company
- **Distribution Company** ENDE –
- GAMEK Project Development

*On a local level, Provincial Governments (18 in total) have their own Directions of Energy and Water

Country generation programs/Expansion plans

- More than 6,000 km of very high voltage transmission lines and over 40 substations are planned.
- Plans exist to link the grids through a north-central south backbone and expand the grid from 3,354 km to 16,350 km by 2025 and to connect to the Southern Africa Power Pool (SAPP) through Namibia (ANNA) and the Democratic Republic of Congo (Inga).

Country's Priorities

The Angolan Government has an ambitious Action Plan for the period up to 2025 with around US \$18 billion worth of investments into renewables underway, and it has a long-term vision for the power sector with a clear roadmap to provide modern electricity services to 60% of the population by 2025.

Energy Policies and Reforms

- The AfDB jointly with JICA supported the Government with US\$ 1.2 billion through its Power Sector Reform Support Program to support the energy sector reforms undertaken by Angola between 2014 and 2017.
- Order no. 11/17: to review and extend the Angola's • National Vision of 2025 to 2050.





To successfully achieve the proposed goals in the energy sector a large amount of investment is necessary in generation assets and grid infrastructures.

Installed capacity



Quadrupling generation capacity is a key pillar for **electrification** and **supply security**

Transmission grid Kilometers



A significant investment extending transmission lines to **connect the new generation** and unify the four transmission systems

The expected growth in generation is followed by **the extension of the distribution network** and consumer base

Sources: Data 2012 – MINEA Expanded Council Board; Financial Reports ENE e EDEL; Estimated data PSEA, 2009, Data 2019 - MINEA



Consumers Millions





Angola is managing large, concurrent infrastructure developments, carefully planned to take advantage of Angola's unique national resources – natural gas, hydro, wind and solar



How to take advantage of Angolan natural resources

- Benefit from the hydro potential of Kwanza river – Laúca and Caculo-Cabaça
- Install combined cycle gas turbines, partnering with Sonangol/ Angola LNG
- National integration of transmission systems
- International interconnection with Namibia and Congo
- Rural electrification with distributed renewables sources



The Electricity Sector Transformation Program (PTSE) sought to improve efficiency by unbundling activities and a new market regulation that allows private participation.















Project #1: Hydroelectric Power Plant – CHICAPA II



Deal Snapshot

- Financing the construction and operation of the Hydroelectric Power Plant of Chicapa II, • in Lunda Sul, which will increase the energy generation of Chicapa I, from 86.9 GWh/year to 135 GWh/year and improve the power supply to Saurimo, a growing city, to local mining industries as well as support the expansion of the transport network in the Eastern Region.
- Indicative Investment Amount: USD 180 million

Alignment with Action Plan

- Expansion on Electricity Access on urban areas, capitals of Municipalities and rural ٠ areas:
- Construction of the new water supply system from the river Chicapa, one of the weaker ٠ provinces in access to drinking water;



Chicapa River in Lunda Sul



Chicapa I in Lunda Sul





Project #2: Hydroelectric Power Plant – LUACANO



Deal Snapshot

- Financing the construction and operation of the Hydroelectric Power Plant of Luacano, which will benefit the municipalities of Lucano, Luau and those located at border ot the Upper Zambezi region;
- Indicative Annual Production: 140.2 GWh
- Indicative Investment amount: USD 390 million

Alignment with Action Plan

- Increase generation capacity in the East System;
- Rural electrification;

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• Link with the rehabilitation and expansion of water supply system in Luacano;



Location of the Hydroelectric Power Plant of Luacano (Google Earth)





Project #3. Hydroelectric Power Plant – Vuka



Deal Snapshot

- Financing the construction and operation of the Hydroelectric Power Plant of Vuka, which will benefit the municipalities of Cuango e Luzamba, Cafunfo, Luremo, Xá Muteba, Capenda Camulemba. In the future will support and stabilize the connection in Very High Tension between the North and the East Systems; Indicative annual production: 209 GWh
- Indicative Investment Amount: USD 320 million

Alignment with Action Plan

- Increase generation capacity in the East System;
- Interconnectivity of the transmission systems;
- Rural Electrification.

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Cuango River





II. Investment Opportunities in Solar Energy



Region	Capacity (in MW)	Annual Production (MWh/yr)	Emission savings (CO ₂ ton/ yr)
Central	30	57.51	36.61
South	70	136.33	86.79
Total	100	193.84	123.40

Alignment with Action Plan

- Expansion on Electricity Access on urban areas, capitals of Municipalities and rural areas;
- Rural Electrification;
- Priority projects include: Namacunde (10 MW), Camongue (10 MW) and Caraculo (10 MW).









II. Investment Opportunities in Wind Energy



Region	Capacity (in MW)	Annual Production (MWh/vr)	Emission savings (CO, ton/ Yr)
Central	168	414.62	263.95
North	134	373.63	237.86
South	350	747.69	475.98
Total	652	1535.94	977.79

Alignment with Action Plan

- Expansion on Electricity Access on urban areas, capitals of Municipalities and rural areas;
- Rural Electrification;
- Priority projects include: Chibia (78 MW) and Cacula (88 MW).



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The social, economic and environmental sustainability is the third building block for development in the Angolan electricity sector.







- Establish new electricity market conditions
- Reduce governmental tariff subsidization
- Develop regulation capabilities to promote efficiency
- Management professionalization
- Expand rural electrification, boosting growth and development in these regions
- Ensure long-term sustainability and independence of local capabilities
- Deliver results to society in the short term

- Adopt a **better installed capacity mix** focused on Angola's natural resources
- Choose thermal powerplant technologies with reduced CO2 emissions
- Develop pilot projects to expand renewable energies
- Promote electricity efficiency with mass installation of prepayment meters





Thank you for your attention.







APPENDIX







Public Investment Programme For 2018-2022

Generation	Transmission	Distribution & Rural Electrification
 Rehabilitation and relocation of Thermal plants; Optimization of thermal plants Installation of Ocean thermal plants in the North, Centre and South with reconversion to gas New regulation Hydro at the East for 2025/2030 Rehabilitation of Large hydropower Plants 	 Laúca and Caculo Cabaça Hydro power evacuation Interconnection of North – Central grids Interconnection Capacity building of RNT Interconnection of South- Centarl grids Eastern grid connection at 220 KV Support to Municipal and rural Electrification at 110 kv Dembos and Malanje 	 Conversion to Pre-paid meters and tele metering in MT universal Electrification of Provincial Capital cities Rural and Municipal Electrification (northern, central, southern and eastern grids) Rural Electrification with Renewable energy





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Projects Open For Private Investors' Participation

Conventional Large & Medium-	New & Renewable	Municipal & Rural Areas
Size Power Plants	Energy	Distribution
 NGCCPP Soyo 2 (750 MW); NGCPP Malembo 2 (100 MW); NGCPP Ocean Terminal Lobito 1 & 2 (750 MW) Large & Medium size Hydro - Catumbela River; Large & Medium size Hydro - Queve River; Medium Hydro in the East. 	 Solar Energy Programme (200MW); Hybrid solar-Diesel Power Plants (58 MW); Biomass Thermal Plants and Urban solid waste thermal plants (Luanda & Benguela); First Wind park in Angola (100 MW); Studies for the relaunching of the Mini-Hydro programme. 	 Management Contracts for municipal networks connected to the grid; Licencing of Municipal off-grid networks and creation of managing entities through partnership; Rent of individual solar units for isolated areas.







