The Rapid Expansion of Access to Power in Mozambique: *The Role of Government Policies*

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*By*

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As I stated earlier, Africa is endowed with enormous and diversified energy resources, most of which remain untapped, for a number of reasons, including technology transfer and know-how in:

a. Hydropower potential;

b. Coal reserves;

c. Oil and natural gas reserves;

d. Solar, wind, tidal and geothermal potential;

e. Biomass (including biofuels) potential.
Despite this abundance, Sub-Saharan Africa is still confronted with:

a. Extremely low development and exploitation of energy resources to meet African countries’ economic and social needs;

b. Extremely limited flow of investment into energy infrastructure development over the past 20 years or so; this lack of investment has led to the current energy supply insecurity that needs to be addressed through the implementation of concrete measures with the aim of:

1. Overcoming the insufficient power generation capacity;
2. Dealing with the extremely low level of access to energy for business basic services and households, with a view to maximizing its use as a tool to fight poverty, and generate wealth;

3. Addressing the overall limited access to modern energy services in Sub-Saharan Africa.
c. In spite of all the visible efforts by many African countries to expand electrification and access to electricity (e.g.: Mozambique rose from 7% access to electricity in 2004 to 40% in 2013), the challenge of improving from the current 8% average in Sub-Saharan Africa is a daunting one, and requires coordination and creative and innovative cooperation approaches on the part of all countries, irrespective of being energy rich or poor!
AFRICAN ENERGY APPROACH

a. Our approach to the new vision for Africa as it enters a new era of responsibility is based on the principle that African countries need to:

b. Establish a conducive investment climate through the development of adequate institutional and legal framework;

c. Establish energy sector Regulators to attract private investment in energy infrastructure development, as well as in power intensive industries in areas such as manufacturing, mining, among others;

d. Adopt an effective and coherent alignment of the energy institutional and legal framework with all the other investment legislation and regulation, for a smooth development of public energy infrastructures, such as the national and regional power transmission lines, as well as the legislation and regulation on the development of Industrial Free Zones and Special Economic Zones;
AFRICAN ENERGY APPROACH (Cont.)

d. Adopt appropriate mechanisms for jointly addressing the problems associated with energy supply security and sustainability;

e. Share common and individual responsibilities in the efforts to overcome the challenges facing the energy sector, in both energy rich and poor countries;

f. Ensure adequate coordination in planning and implementation of energy projects;

g. Enable the implementation of integrated transmission grids and pipelines to ease cross-border energy trading flows;

h. Create and develop scale economies and competitiveness in energy infrastructure development;

i. Increase access to modern and reliable energy sources and promote price affordability to improve effectiveness of rural electrification as a tool to fight poverty and generate employment, self-employment, income, and wealth;
AFRICAN ENERGY APPROACH (Cont.)

j. Establish strong research and development programmes to ensure that all available renewable energy resources are used efficiently to the benefit of the poorest among the poor;

k. Prioritize the implementation of regional energy projects with the aim of:

1. Increasing access to reliable and affordable energy supply (affordability is critical);

2. Promoting the productive use of energy, particularly in rural areas, to allow the consumers to generate the income they need to pay for the electricity they consume;

3. Reversing environmental degradation, through the substitution of wood fuels by modern, cleaner and healthier energy sources;

4. Exploiting our abundant hydropower and solar energy potential;

5. Integrating transmission grids and pipelines to boost cross-border energy flows.
AFRICAN ENERGY APPROACH (Cont.)

I. Pay special attention to sectors in need of major energy supply in competitive conditions for a greater economic and social impact, such as the mechanization of agriculture to increase per hectare yields with a view to coping with the rising food demand and for income generation and poverty reduction, and wealth creation.

With these principles correctly aligned with an appropriate vision, we would be in a better position to combine our abundant energy resources with our government strategies to craft adequate development plans and implementation mechanisms to the benefit of our countries and peoples.
In Mozambique, like elsewhere in Sub-Saharan Africa, we are endowed with abundant energy resources in hydropower, coal and natural gas reserves, as well as in renewable energy resources; our choice of development strategy is based upon the strengthening of public private partnerships (ppp) and cooperation at different levels;

We equally attach high value to the important role of regulation; that is one of the reasons why an Advisory Body, known as CNELEC (National Electricity Council) has been in place for some time as part of the overall energy sector reform undertaken by the Government, with the aim of establishing a modern legislation, and a more predictable and transparent licensing system. A process to elevate this Body to a full fledged regulator is underway. We expect it to be considered by Parliament soon.

In keeping with the above background, we have been involved in the implementation of a number of generation and transmission projects. But before I talk about the projects, let me introduce Mozambique to you.
COUNTRY PROFILE

- **Location:** South-eastern Africa
- **Area:** 799,380km²
- **Climate:** Tropical to subtropical
- **Population:** 23 million (Maputo 2 million)
- **Language:** Portuguese (Official), many local languages
- **Independence:** 25 June 1975
- **Gov. Type:** Republic, President
- **President:** Armando Emilio Guebuza
- **Currency:** Metical (MZN) 30/$
- **GDP(PPP):** $22 billion
- **External debt/GDP:** 23%
- **Inflation Rate:** 7%
- **Export commodities:** gas, aluminium, prawns, cotton, sugar, electricity
- **Import commodities:** machinery, fuel, metal products, chemicals, vehicles
- **Resources:** coal, titanium, natural gas
• 2800 Km of coastline;

• 3 Main Ports Maputo (South), Beira (Centre) and Nacala deep water port (North);

• 3 Main Development Corridors: Maputo, Beira and Nacala;

• Common land borderer with 6 Countries: Tanzania, Malawi, Zambia, Zimbabwe, South Africa and Swaziland
THE MOZAMBICAN ECONOMY HIGHLIGHTS

- Average annual GDP growth rate: 7% over the past 10 years; in 2012 it was 7.4%, forecast for 2013 is 8%, and projection for 2014 is 8.6%.
- Real per capita GDP 2011: around US$ 600;
- Projected Per Capita GDP for 2013-2016: US$700-US$900;
- The good performance (8.1%) of the agricultural sector (23.5% of GDP), accelerated growth in transport and communications (8.9%), and sharp growth of the financial and mining sectors (22.1% and 18.9%, respectively)
- Coal exploitation will substantially increase its contribution to GDP from 2015 as the export infrastructure is under development. Mozambique can export between 100-150 million tones per year, within 10 to 15 years.
- The discoveries of natural gas in the Rovuma basin, announced by Anadarko and ENI, with total resources currently estimated at 170 trillion cubic feet (TCF), will potentially result in an investment of USD 18-50 billion between 2014 and 2018 and generate accelerated industrialization of the country.
- An acceleration of GDP growth rate over 8% per annum is expected for 2013, supported by forecasts of good agricultural performance and continued strong foreign investment and spending on infrastructure in the context of less restrictive monetary and fiscal policies by the Central Bank and Government.
The existing Legal Framework has proven to be adequate and provides a conducive environment for investment in various activity areas, the details of which can be found on our Investment Promotion Centre (CPI) website at: www.cpi.co.mz. These include: the Investment Law, the Code of Fiscal Benefits, the Public-Private Partnership Law, the Exchange Rate Law, the Petroleum Law and its Regulation, the Mining Law and its Regulation, the Fiscal Regime for Mining Operations, the Fiscal Incentives for Petroleum and Mining Operations, the Electricity Law and its Regulations, and Other relevant Regulations. Other energy sector specific laws, rules and regulations can be found on our Ministry of Energy website at: www.me.gov.mz.

Attractive terms and conditions have been provided to investors through the establishment of Industrial Free Zones and Special Economic Zones, as well as the establishment of GAZEDA - Office for Rapid Economic Development Zones, a governmental entity set up to promote investments and assist investors in Special Economic Zones and Industrial Free Zones, namely: Beluluane in Maputo, Nacala in Nampula province, and the Zambezi Valley, among others.
RURAL ELECTRIFICATION

- **Rural Electrification Program**: comprises several power distribution projects to provide access to electricity for households at affordable costs and for productive use; the rural electrification intensification programme, combining national power grid expansion with renewable energy sources, has led to the rise of the rate of access to electricity from 7% in 2004 to 40% at the end of the I Semester of 2013; from 51 district headquarters in 2004 to 112 in 2013, and from 1.3 million beneficiaries in 2004 to 10 million in 2013; this has pushed Mozambique into the first place in the SADC region in terms of new household connections per year, and from the last three to the top three in terms of the rate of access to electricity.

- This tremendous success was made possible thanks to the Government of Mozambique’s decision to implement this programme, including through a cross-subsidy, where financial resources are transferred from the most profitable areas to finance the less profitable ones, as a contribution to the reduction of regional asymmetries throughout the country.
RURAL ELECTRIFICATION (Cont.)

- **1977**: 51 districts connected to the grid (40%)
- **2005**: 112 districts connected to the grid (87.5%)
- **2008**
- **2009**
- **2010**
- **2013**: 112 districts connected to the grid (87.5%)
The effective and timely implementation of the newly identified viable energy projects in Mozambique would contribute to sustainable power with a total of 4.348MW of new generation capacity, namely:

**In hydropower:** 7 projects (3.715MW);

**In thermal power:** 5 projects (1.173MW) from coal and natural gas, taking advantage of the enormous coal and natural gas reserves discovered in Mozambique;

**In transmission:** The Tete-Maputo 3.100MW (Backbone) aims to evacuate the power from the generation centres in the Zambezi Valley to the load centres in the south and the SADC region. An additional 1.000MW transmission project is the Caia-Nacala line (the Northern Backbone).

On the next slide the projects are sorted by nature and geographical location: hydro (blue), coal (black), natural gas (red).
LURIO BASIN
120 MW + 80 MW

- CAHORA BASSA - 2075 MW
- CB Norte – 1250 MW
- MPHANDA NKUWA – 1500 MW
- BOROMA - 200 MW
- LUPATA – 600 MW
- MOATIZE (Coal) – 300 MW (phase1)
- BENGÁ (Coal) – 300 MW (phase1)
  - Ncondezi – 650 MW (phase1)
  - JINDAL - NHATSANGA 660 MW – phase1

REHABILITATION OF THE HYDROPOWER PLANTS
- CHICAMBA – 40 MW
- MAVUZI I – 50 MW

TEMANE (GAS)
80 MW

Massingir (Hydro) – 28MW
Ressano Gas Projects – 350 MW
Kuvaninga Gas Project – 50MW
Mozambique is endowed with an enormous energy resource potential, which include:

**Hydropower:**
- More than 18,000 MW,
- Installed capacity – 2300 MW;

**Coal:**
- 23 billion tonnes of identified potential,
  - 3 billion tonnes of proven reserves and under exploitation;

**Natural Gas:**
- *Pande & Temane Gas fields* – 2.5 TCF of proven reserves and under exploitation since 2004;
- *Rovuma Basin* – 170 TCF fully studied and proven, with the production expected to start by 2018;
- A Natural Gas Master Plan for Mozambique is under preparation, where preliminary results recommend the following options for the use of gas: LNG for exports, power generation plants, fertilizers (urea), GTL plants, industrial consumption, and domestic consumption;

**Renewables:**
- solar, wind, hydro, and biomass potential are available throughout the country; a mapping exercise for these resources is underway in Mozambique, which is expected to culminate in the publication of a Renewable Energy Atlas by this year’s end.
THE ROLE OF RENEWABLE ENERGY

The expansion of the national electricity grid into the rural areas has allowed us to reach the rate of access to electricity I mentioned before, particularly taking into account that 90% of generation is hydro (renewable), which is helping replace firewood and other unclean sources with clean energy; more than 10 million Mozambicans are benefitting from this effort;

The contribution of other renewable energy resources has also been growing rapidly: from 51,000 beneficiaries in 2004, it has now reached more than 3.5 million people in 2013 (about 14%); the electrification of 220 rural schools, 209 rural clinics, houses for teachers and nurses, public buildings and the distribution of fridges for vaccine conservation, is benefitting a significant number of our citizens in the rural areas; with this effort, we are helping our rural women to get safer births, go to school in the evening, thus improving their living standards;

We are building a solar panel assembly plant in Maputo, which started experimental production last Monday, and full operation in the coming November.
THE ROLE OF RENEWABLE ENERGY

The ongoing renewable energy mapping exercise, aimed at the publication of a Renewable Energy Atlas for Mozambique has identified the following:

**In Hydropower:** more than 1,400 sites studied, and a potential of 18,000MW was identified, of which more than 4,700MW can be developed immediately, at a competitive cost;

**In Wind Power:** a total potential of 3,900MW was identified in 12 sites studied, of which 1,108MW can be developed immediately, at a competitive cost;

**In Solar Power:** the sun is the main source of renewable energy in Mozambique, with a potential of 23,000,000MW, and it is consistent along its national territory. But only 1,260MW can be developed immediately in 60 sites, where the connection to the national power grid is possible, at a competitive cost;

**In Biomass Power:** From a potential of 2,000MW identified in 33 sites studied, only 98MW can be developed immediately, at a competitive cost;

**In Tidal Power:** despite the fact that Mozambique has a 2,800km coastline, the potential of sea waves power is very poor, almost inexistent. It is argued that the proximity with Madagascar affects the quality of winds;

**In Geothermal:** this is another area of renewable energy that needs further studies. The existing studies show very little potential.
MOZAMBIQUE ENERGY MATRIX (2010-2030)
SUMMARY OF RENEWABLE ENERGY POTENTIAL

Solar power is the most abundant, but hydropower is the most viable source of priority projects.

Total power from priority projects:
- Solar: 1.260 MW
- Hidrica: 4.732 MW
- Eólica: 1.108 MW
- Biomassa: 98 MW
- Total: 7.198 MW
HOW TO EXPLORE THIS ENORMOUS POTENTIAL?

The Government of the Republic of Mozambique plans to do the following:

1. **Define targets for new renewable energies by 2020, namely:**
   
   a. At least 100 to 200 MW for non hydro:
      
      - 60 to 150 MW wind power
      - 20 to 50 MW solar power
      - 20 to 50 MW biomass
   
   b. At least 100 to 200 MW for small and medium sized hydropower plants;

   – Note that there is a technical/economic potential to develop up to 1,000 MW:
      
      - 400 MW mini-hydropower;
      - 400 MW wind power;
      - 100 MW solar power;
      - 100 MW biomass.

2. **Approve legislation on feed-in tariffs, calculated on the basis of avoided cost, differentiated for wind power, solar power, biomass power, and mini-hydropower, namely:**
   
   a. Decreasing tariffs up to 2020 for solar power, wind power and biomass power;
   
   b. Tariffs paid in Meticais (Mozambican currency), adjusted to the $ exchange rate;
   
   c. Tariffs to be treated within the framework of the Investment Law as infrastructures, with a view to securing access to fiscal benefits, and the alteration of the amortization regime for hydropower projects.

3. **Run tenders for the construction and exploration of at least 9 solar photovoltaic power projects of 3 MW each throughout the country (at least 1 per province):**
   
   a. Mobilise concessional financing of at least $50 million to be on-lent to FUNAE. FUNAE will be guaranteed access to solar power tariff;
   
   b. Integrate EPC tenders during construction phase with operation and maintenance to be paid on the basis of energy delivered to the national power grid.
4. Run various tenders for the first wind power and biomass power projects:
   a. Tenders for 30MW wind power pilot projects on sites with the best potential, on a PPP basis, making sure that the power is compatible with the existing national power grid connection infrastructure;
   b. Evaluate the possibility of running a tender for the 100MW wind power in Namaacha, combined with a natural gas power station, through the supply of 3MGJ of natural gas per year;
   c. Tenders among existing sugar producing companies for a 20 to 30MW license for an autonomous biomass power station from the sugar can foliage, with employment generation on a PPP basis or on an IPP regime;
   d. Tenders for 2 forest biomass projects of 10MW in Niassa and Zambezia on a PPP or IPP basis.

5. Undertake studies and prepare for the launching of multiple tenders for mini and medium sized hydropower projects.

6. Define a PPP policy for renewable energy:
   a. Ensuring the support of the Ministry of Finance in the mobilisation of concessional financing, and grants, in order to mitigate the need to invest up-front;
   b. Defining the structure and financial model, as well as the counterpart of the private sector players (EDM/FUNAE, EDM, FUNAE, HCB, ...)

1 IPP – Independent Power Producer
BIOFUELS: THE RIGHT TO DECIDE

Energy security and sustainability requires the identification of alternative supply options, particularly in countries of Sub-Saharan Africa. This is particularly true for net oil importing countries, such as Mozambique, which are more exposed to the uncertainties of the international oil market. Our decision to embark on the promotion of production and use of biofuels in Mozambique was driven by a number of factors, namely, the need to:

• Face international oil price instability and volatility;
• Enhance energy security and reduce dependency;
• Contribute to the mitigation of global warming;
• Fight poverty, through the promotion of agriculture;
• Protect the environment, through the promotion of appropriate technologies in agriculture and manufacturing;
• Generate income and employment, including self-employment, in rural areas;
• Promote the use and improvement of poor land, through the cultivation of certain biofuels crops, such as jatropha curcas;
• Give small farmers an opportunity to add value to their products by processing them into biofuels, as opposed to being mere feedstock producers;
BIOFUELS: THE RIGHT TO DECIDE

There are challenges that need to be adequately addressed, namely:

• How to prevent potential land conflicts with local communities;

• How to strike an adequate balance between bio-fuels and food production, to promote food security; in order to achieve this, in the short run, we have decided the use of sugar cane and sweet sorghum for the production of ethanol, and jatropha curcas and coconut for the production of biodiesel; no food crops are allowed;

• How to secure seeds and fertilizers at affordable prices; note that in some cases seeds and fertilizers are needed!

The Government of Mozambique responded by adopting, in March 2009, the National Biofuels Policy and Strategy for 2009-2025, with the aim to:

• Stimulate sustainable use of local energy resources;

• Reduce dependency;

• Promote rural development;

• Diversify its energy matrix;

• Reduce fuel costs;

• Protect the economy and the consumer against the high volatility of fuel prices;

• Promote energy supply security;

• Stimulate the development of indigenous or community-based technologies;

• Promote food and nutritional security;
For the development of the domestic biofuels market, we have adopted the following time-line (subject to adjustment if the need arises):

• Phased mandatory blending:
  • **Pilot Phase** (2009-2015) – Reach the blending level of 10% in ethanol (E10) and 5% in biodiesel (B5);
  • **Operational Phase** (2015-2021) – Increase the blending level up to E20 e B20;
  • **Expansion Phase** (2021-.....) - Development of a parallel distribution network for blending, above E75 to E100 e B100.

The Policy and Strategy has created stimulus for biofuels development in the country, with most of the benefits being retained at producer’s level. Small farmers in remote rural areas are experiencing dramatic changes in their lives for the better. Biofuels commercial farming is also taking place at a very satisfactory pace, and in growing numbers, including the recovery of depleted land by bad crops.
CONCLUDING REMARKS

- We need to ensure that the energy sector development relies on diversified sources, even if in a particular country there is one abundant type of resource;
- The diversification of the energy matrix allows for a balanced use of natural resources and increased security of energy supply, stability and affordability;
- This implies the use of improved technologies, such as Carbon Clean Technology, whenever it is needed;
- A high degree of regional energy integration and cooperation is critical to collectively ensure energy supply security, regional competitiveness, and effective environmental safeguard and protection;
- An adequate coordination in project planning and implementation becomes critical, through the strengthening of Regional Bodies, such as Regional Economic Commissions, Regional Power Pools and Regional Power Regulators;
CONCLUDING REMARKS

• The strengthening of public–private partnerships and cooperation at different levels, as well as a joint identification of alternative solutions to the challenges facing the energy sector in Africa is also very critical;

• All this requires the strengthening and consolidation of the right policies and reforms that are being implemented to ensure the consolidation of macroeconomic stability and efficient fiscal management.

With regard to biofuels, international scrutiny is, on most occasions, based on facts that cannot be easily verified or on assumptions that may be proven inaccurate. We cooperate with and we inspire ourselves in countries with proven expertise in the field, such as Brazil, the United Kingdom, Italy, Sweden, Germany, and both public and private sector institutions from these and other countries.

We invite people to come and visit some of the projects, and discuss with us and interact with the communities and investors involved. We cannot simply deny our communities the unique opportunity they have today to help themselves fight poverty through their participation in biofuels production and use.
THANK YOU !

Minister of Energy

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