EXPERIENCE ON MODELLING ENERGY SYSTEMS IN SENEGAL

Presented by

Cheikh NIANE
13 Million people

High energy demand for household use and commercial production
ENERGY SITUATION IN 2014

- **HUGE CRISIS IN ELECTRICITY SECTOR SINCE MORE THAN 10 YEARS WITH**
  - PERMANENT DETERIORATION OF THE SERVICE QUALITY (LOAD SHEDDINGS)
  - FINANCIAL PROBLEMS OF SENELEC (UTILITY)
    - Deficit of generation fulfilled by 150 MW Diesel power plant rental at an annual cost of 106.8 billions CFA Francs (217 Millions USD)
    - Very old, saturated networks without any emergency system

- **INADAPTED MIX OF ENERGY (85% OF LIQUID FUEL)**

- **VERY HIGH GENERATION COST OF kWh** (C$34/kWh – C$ 38/kWh) **WHILE THE kWh IS SOLD TO THE CUSTOMERS AT C$ 23.6/kWh**

- **UNAFFORDABLE LEVEL OF SUBSIDIES** (200 – 240 Millions USD per year)

- **LIMITED ACCESS TO ELECTRICITY FOR THE POPULATION & DIFFICULTIES TO ATTRACT INVESTORS**
ENERGY SITUATION IN 2012

UNSERVED ENERGY DUE TO LACKS OF FUEL

- Generation Failures
- Lack of Fuel

Cost OF kWh

Source of Energy:
- 49.26% HFO
- 38.51% Gas
- 9.92% Hydro
- 0.00% Coal
- 0.00% Renewable
GOAL OF THE GOVERNMENT

- Energy Sector Development Policy Letter (ESDPL) signed in October 2012:

  « a Senegal where electricity is
  - Available in quantity and quality,
  - Competitive,
  - Generated from diversified energy mix including coal, natural gas, hydroelectricity, renewable energy (wind, solar, biomass)
  - While Senelec main utility recover its normal operational parameters »

  BY YEAR 2017, COST OF kWh ENTRE 12 & 16 USD Cents
### Puissance de pointe (MW) - Réseau Interconnecté

<table>
<thead>
<tr>
<th>Année</th>
<th>Ventes (GWh)</th>
<th>Pertes techniques et non-tech.</th>
<th>Énergie à livrer au RI (GWh)</th>
<th>Demande en puissance (MW)</th>
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<td>1 984</td>
<td>398</td>
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PLANNING CRITERIAS

• Plant life
  ➢ Supply system
    - diesel : 25 years
    - Gas turbine : 20 years
    - Coal power plant : 30 years
    - Wind power plant : 20 years
    - Solar power plant : 20 years
  ➢ Transmission system
    - Distribution and transmission grids : 30 years

➢ Base year: 2012 for the power plants features
➢ Period: 2010 - 2030
RESULTS IN MESSAGE

EVOLUTION OF ELECTRICITY PRODUCTION DURING THE PERIOD
RESULTS IN MESSAGE

EVOLUTION OF TOTAL INSTALLED CAPACITY DURING THE PERIOD
ANALYSIS OF RESULTS

The optimization of the power production and its prospects of evolution in Senegal are given the following results in MESSAGE:

➢ **Evolution of power production**

From 2016, Electricity production will be dominated by:

- ✓ Coal fire plant IPPs (350MW installed with Kepco and CES)
- ✓ The LNG IPP with the company Liberty (300 MW)
- ✓ The coal IPP Candidate, with low production cost will substitute the other plants more expensive

➢ **Evolution of fuel consumption**

Following the trend of production, it will be dependent on majority of coal (for IPP Kepco and CES, and the IPP Coal candidate) as the consumption of LNG will be important over the period for plants using gas
Evolution of Installed Power Plants

The power generation will be very diverse, but mostly dominated by coal-fired plants and gas plants.

We also denote the presence of hydro-electricity plants with OMVS (regional river cooperation with Manantali, kaleta, Sambangalou ...) and the presence of renewable energy sources with the Wind turbines and solar power plants.

The diversity of technologies in installed capacity in power are in line with the policy of energy mix in the Government of Senegal short and mean term strategy
THANK YOU FOR ATTENTION