Tunisia
Nuclear Power Programme

Jilani SAADOUNI

IAEA Technical Meeting on Technology Assessment of Small Modular Reactors for Near Term Deployment

2 – 5 October 2017
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Overview
Tunisian Republic:
• Area: 164,000 km²
• Population: 11 million (2015)
• GDP: US$ 45 billion
Energy Balance

• Continuous Energy Deficit since 2001

• National Resources Limited and in decline

*Ref: WB study (2014)
Overview of the electricity sector in Tunisia

- The Tunisian Company of Electricity and Gas (STEG) is a public and non-administrative company established in 1962.
- Production, transmission and distribution of electricity.
- Transmission and distribution of natural gas.

Main characteristics / 2015

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Number of electricity customers</td>
<td>3 725 475</td>
</tr>
<tr>
<td>National Production (GWh)</td>
<td>18 256</td>
</tr>
<tr>
<td>Installed Capacity (MW)</td>
<td>5 224</td>
</tr>
<tr>
<td>Peak Load (MW)</td>
<td>3 599</td>
</tr>
<tr>
<td>Electrification Rate (%)</td>
<td>99.8%</td>
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Overview of the electricity sector in Tunisia

Installed capacity by technology

- Combined Cycle: 40%
- Gas Turbine: 34%
- Steam Turbine: 20%
- RE: 6%

The total installed capacity is about 5 224 MW /2015
Overview of the electricity sector in Tunisia

Peak load evolution (MW)

Average annual growth rate: 5%
Overview of the electricity sector in Tunisia

Electricity consumption by sector
2 Tunisian Nuclear Power Programme
• The Tunisian government decided to conduct a feasibility study on the development of nuclear power production, on 3rd November 2006.

• The Tunisian Electricity and Gas Company (STEG) was responsible, in collaboration with the Ministry of High Education and Scientific Research, for conducting a technical and economical feasibility study to introduce the first nuclear power plant in Tunisia.
Organisation and stakeholders

President Of Government

National Nuclear Energy Agency

National Atomic Energy Commission

National Center for Nuclear Science and Technology

Ministry of Higher Education and Scientific Research

Ministry of Energy, Mines & RE

Tunisian Nuclear Safety Agency

Ministry of Public Health

Nuclear Power Plant Project

National Radiation Protection Center

Organism to be created
Existant organism
CNEA (National Commission of Atomic Energy)

**Chair**: Minister of High Education and Scientific Research

**Role**: Consultative Committee which is coordinating all national nuclear related activities

**Members**: Representatives of different ministries in relation with nuclear activities:

- Defence
- Industry
- Transport
- Foreign affairs
- Health
- Electricity utility
- Environment
- Agriculture
- Radioprotection
**CNSTN**

Name: National Centre of Nuclear Sciences and Techniques  
Role: R&D in nuclear field  
Number of staffs: 146

**CNRP**

Name: National Centre of radioprotection  
Role: National radioactive material control  
Number of staffs: 40
**STEG**

**Name:** Tunisian Electricity and Gas Company (STEG)  
**Role:** Electricity and gas production and distribution  
**Number of staffs:** 12700

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**NPP project**

- **Project Manager**
- **Human Resources and Communication Group**
- **Siting Group**
- **Techno-Economic Group**
- **Legislation / Regulatory Group**
Cooperation & assistance

- Technical Cooperation projects with IAEA
- Inter-government agreement (France)
  AFNI (Agence Française Nucléaire Internationale)
- External expert assistance
Pre-Feasibility Study
A Strategic Action Plan (SAP) was elaborated following the IAEA milestone approach (NG-G.3.1).

The SAP defines also the responsibilities of the different stakeholders for each objective.
Achievements:

- The project of the nuclear law (3S and liability included)
- The project of the law creating the Tunisian Nuclear Safety Agency (RB)
- Reviewed by IAEA (Office of Legal Affairs) and the French RB ASN; and waiting for promulgation by the parliament

Ongoing action: Decrees being written by a national commission
Energy plan model

Results of Energy mix Study at 2030 horizon

- Coal: 2016
- Nuclear: 2023

- Gas Turbine: 28%
- Combined cycle: 15%
- Steam Turbine: 4%
- Nuclear: 13%
- Wind: 11%
- Hydro: 1%
- Eolien: 11%
- Charbon: 28%
- Turbines à gaz: 28%
Siting

19 Regions of interest

Exclusion criteria + authority’s consent

2 candidate sites

- Geology, Neotectonic & Capable Faults (ONM)
- Meteorology & Seismology (INNM)
- Marine Hydrodynamics (INSTM)
- Bathymetric Survey (MDN)
- Development of Access & Materials research (STEC)
- Risks of External aggressions (COB)
- Dispersion of radioactive materials (ENIT)
Siting

North of Tunisia

125 hectares
Siting

south of Tunisia 200 ha
Human Resources development

- Identification of competences needed for all phases of the nuclear programme

- Elaboration of a strategy study to define how to provide, develop and maintain these competences

STEG recruited young engineers (10/year) to pursue nuclear engineering at INSTN France.

They integrated the NPP project team with other general engineers recruited after their studies in France.
Techno-economic issues

- Technology assessment: 700-1000 MW PWR and SMR technology
- Local Industrial involvement: rate of 10%
- Grid: grid code, reinforcement plan
- Fuel: open cycle with possibility of uranium extraction from phosphate
- Waste: interim storage & final geologic disposal
- Financial & funding: export credit…
Safety

• Taking into account Safety requirements in all considered issues (following IAEA guides).

• Referring to international safety standards such as NRC, ASN
PFS Status

- Achievement of the PF draft report
- Ongoing Self evaluation 2015-2017
- Preparation of the INIR mission 2017-2018
Challenges
Finalizing the Legal & Regulatory infrastructure

Political decision should be taken based particularly on the provided objective conclusions of the PFS

Maintaining and Developing Human Resources

Reinforcement of the international cooperation
Thank You
Tunisia
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