NUCLEAR ENERGY in ALGERIA

Presented by

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Historical Review

- Algeria interests in nuclear energy and its peaceful applications started in the seventies.
- A consistent program for training engineers and scientists in Nuclear Engineering was then set up.
- In parallel to extensive efforts in exploration and prospection for Uranium, opportunity and feasibility studies for the construction of NPP's were conducted between 75 – 84 in collaboration with: IAEA, Lahmeyer-international (Germany), Sofratome (France), Nucleotec (Canada)

Historical Review *(continued)*

- 1982 - 1992: Major actions were undertaken toward the implementation of basic nuclear infrastructures (nuclear research centers, Research reactors, ...) and the valorization of Uranium mines.
- 1992 – 2005: Slowing down period (causes: the Chernobyl accident, the drastic drop in the price of oil and gas, the economic recession, ...)
- 2006 and up: The recovery of the economy and the steady increase in energy demand for electricity and seawater desalination renewed, these last years, the interest of Algeria in the nuclear power option.

Present Status

NPP OPERATION AND CONSTRUCTION

- At present Algeria doesn't have NPP's; the country operates however the following nuclear installations:
  - Nur reactor: 1MW, MTR-type, light water moderated pool reactor. First Operation in 1989, devoted to training and research.
  - Es-Salem reactor: 15 MW, heavy water moderated, tank type reactor; First operation in 1992; Devoted to materials testing, radioisotopes production and training of reactor operators.
  - Nuclear Fuel Fabrication Unit: started operation in 1999 and is aimed at the development rod and plate type nuclear fuel elements.

Present Status *(continued)*

Public Opinion

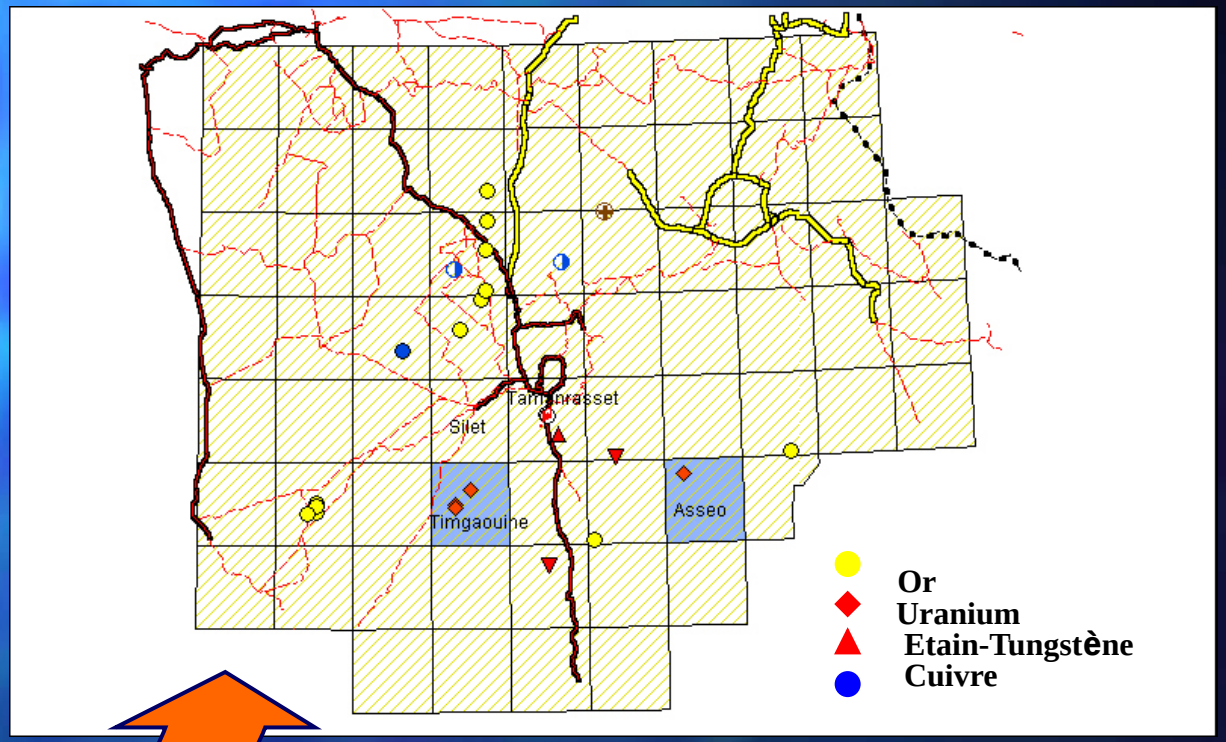
- At present, the general public has little knowledge about nuclear energy and no serious evaluation of public opinion on nuclear issues has been yet conducted.
- However spot surveys on population living near existing nuclear installations indicate that the perfect safety record demonstrated by such installations and their contribution to improving education and employment conditions in the area led to a good acceptance of nuclear energy.
- Specific strategies are slowly implemented for driving more public and governmental acceptance.

Present Status *(continued)*

Forward Plans

- The clear demonstration brought by Nuclear Power as being a sustainable energy source for the production of electricity and desalination of brackish water together with the presence of non negligible natural resources of uranium and the availability of basic nuclear infrastructures capable of supporting reliably the introduction of nuclear power in the country, have prompted Algerian authorities to plan the operation of a first NPP by 2022.
- Multidisciplinary groups are now working on various domains (energy planning, site, desalination, uranium)

URANIUM IN ALGERIA



Governmental Organizations

Two Organizations:

- The Commission of Atomic Energy (COMENA) and
- The Direction of Nuclear Energy (DEN)

Both organizations are under the authority of the Minister of Energy and Mines

DEN : Mission and Organization

- The Direction of Nuclear Energy is a newly created structure (Sept. 2007) within the General Direction of Energy at the Algerian Ministry of Energy and Mines.
- The main role of DEN is to:
  - Define the national policy for nuclear electricity production and to follow up its implementation
  - Define a national policy for nuclear applications and to follow up its implementation
  - Elaborate the regulations for nuclear security and safety and to enforce their applications
  - Follow up of nuclear cooperation

COMENA : Mission and Organization

- Constitutes the principal governmental agency for implementing the national policy in matter of promotion and development of nuclear power and nuclear techniques.
- Develops skills and infrastructures in :
  - **Nuclear fuel**
  - **Technology of nuclear facilities**
  - **Application of nuclear sciences and techniques for energy, health, industry, agriculture, environment,....**
- Has 4 nuclear research centers :

  CRNA, CRNB, CRND, CRNT

CRNA

(Algiers Nuclear Research Center)

- Located in the center of Algiers
- Develops R/D Programs in:
  - Nuclear physics and techniques
  - Nuclear applications
  - Health Physics
  - Environmental protection
  - Nuclear Safety
  - Waste Treatment and management
- Imports radioisotopes for national users
- Training of Human Resources in radiation protection and medical physics.

CRNB

(Birine Nuclear Research Center)

- Located in BIRINE at 200 KM south of Algiers
- Develops R/D Programs in:
  - Reactor physics and technology
  - Instrumentation and control of nuclear facilities
  - Radioisotope production
  - Nuclear Safety and environmental protection
  - Nuclear Waste
- Operates the Es-Salem reactor

CRND

(Draria Nuclear Research Center)

- Located in DRARIA at 15 KM south-West of Algiers
- Develops R/D Programs in:
  - Nuclear Fuel
  - Reactor engineering
  - Radio pharmaceutics production
  - Process simulation and expert systems
- Operates the NUR reactor
- Training of nuclear human resources in reactor operation and technology

CRNT

(Tamanrasset Nuclear Research Center)

- **Located in TAMANRASSET (Hoggar) at 2000 KM south of Algiers**
- **Develops R/D Programs in:**
  - **Prospection and exploration for Nuclear materials**
  - **Treatment of Uranium ores**

National Nuclear Policies

Goals and Policies

- Although Algeria is an oil and gas exporting country, acute problems raised by climate changes and the rapid depletion of fossil resources together with the quick rate of increase in domestic demand for electrical energy have prompted the government to pay high attention to the issue of energy security of the country.
- Several strategic decisions were taken:
  - Opening of the electric energy market to the private sector (national and international)
  - Introduction of specific taxes on environment polluting fuels (such as gas oil)
  - Development of renewable energies (Solar, wind,...)
  - Implementation of NP alternative in the energy mix of the country (electricity , seawater desalination, ..)

National Nuclear Policies *(continued)*

Goals and Policies

- **For the NP alternative, preliminary studies indicated the need to put in operation a first NPP (≈1000-1200MW) by 2022 and a second one by 2027-2030.**
- **it is expected that the base load in the national electric generating capacity, for the period 2030-2050, will rely on nuclear.**

Table-1: Expected evolution of electrical energy production and installed capacity

Year	2007	2012	2017	2022	2027
Production, GWh	38223	59190	82025	104687	133610
Installed Capacity, MW	8006	12326	16526	21092	26919
Nuclear Installed Cap. MW	0	0	0	1200	2400
% Nuclear in Inst. Capac	0	0	0	6%	9%
% Nuclear in Production	0	0	0	9%	14%

National Nuclear Policies *(continued)*

Goals and Policies

- **To support the program several actions are being undertaken:**
  - **Promulgation of the 'National Nuclear Law'**
  - **Creation of the 'Nuclear Regulatory Agency'**
  - **Finalization of the ratification and implementation of all pertinent conventions and treaties**
  - **Creation of the 'Algerian Institute of Nuclear Engineering'**
  - **Enlargement and valorization of Uranium resources**
  - **Preparation of adequate national potential (Basic nuclear infrastructure, industrial sectors, HR, ..) capable of playing an optimal role in the technical definition, acquisition, construction and operation phases of the first NPP.**
  - **Increase of the awareness of the public and local authorities on nuclear issues.**

National Nuclear Policies *(continued)*

International Cooperation

- **Algeria considers that International Cooperation in the field of pacific utilization of nuclear energy is the key for a successful implementation of its national nuclear power program.**
- **To support such Cooperation, Algeria ratified seven conventions and treaties in relation with non proliferation, safeguards and nuclear safety and security issues.**
- **Algeria has an excellent cooperation program with IAEA**
- **In addition to the collaboration agreements with its classic partners (China and Argentina), Algeria signed nuclear cooperation agreements with France, South Africa, United States, Russia, etc...**

Thank

For

Your Kind Attention