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ROMANIAN NUCLEAR POWER PROGRAMME

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ROMANIAN NUCLEAR POWER PROGRAM

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IAEA
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ROMANIAN NPP SHORT HISTORY (1)

- ✓ **1949:** first Romanian nuclear research entity **Institute for Atomic Physics (IFA)** Magurele was founded.
- ✓ **1955:** after the first Geneva International Conference on the Peaceful Uses of Atomic Energy, the **Committee for Nuclear Energy** was set up.
- ✓ **1957:** first nuclear research reactor imported from former Soviet Union was commissioned in IFA Magurele.
- ✓ In the same year, Romania became the foundation member of the International Agency for Atomic Energy (IAEA) Vienna.
- ✓ Romania started to analyze the introduction of the nuclear power in the energy mix in **1965-1970,** by preparing knowledgeable decision for the first NPP.

ROMANIAN NPP SHORT HISTORY (2)

- ✓ **1970:** decision for the introduction of the first NPP in Romania was taken.
- ✓ **1970:** as a consequence of the decision to develop the Romanian Nuclear Power program, the **Institute for Nuclear Technology (ITN) Pitesti** was created.
- ✓ **1975:** Romanian Government decided to use for the first NPP the CANDU nuclear power reactor, based on the comparison of the different nuclear technology available on the NPP market.
- ✓ Specific studies were performed for the first NPP project implementation in the country, including nuclear power infrastructure development, NPP site selection and characterization and localization.

ROMANIAN NPP SHORT HISTORY (3)

- ✓ First NPP site was selected near Cernavoda town, in Dobrogea (south-east part of Romania).
- ✓ **1978-1980:** commercial contracts for Cernavoda Unit 1 were signed with AECL Canada (nuclear island), ANSALDO NUCLEARE Italy and GE USA (balance of plant).
- ✓ **1981:** Cernavoda Unit1 site works started.
- ✓ **1983-1984:** decision to build additional 4 units and the civil works started in parallel for all Cernavoda 5 units.
- ✓ **1990:** all the NPP works were stopped and the Romanian Government requested an IAEA pre-OSART mission.
- ✓ IAEA pre-OSART report recommended to improve the project management.

ROMANIAN NPP SHORT HISTORY (4)

- ✓ **1991**: a new contract was signed with the traditional partners (AECL, ANSALDO NUCKLEARE and GE) only for Cernavoda Unit 1 finalization and the others units were stopped.
- ✓ **1996 December**: Cernavoda Unit 1 was commissioned and started the commercial operation.
- ✓ **2001**: contract for Cernavoda Unit 2 completion was signed and this unit started the commercial operation in **2007 November**.
- ✓ **2009**: Romanian Government decided to finalize Cernavoda Unit 3 and 4, using an innovative financing model. These units should be in commercial operation after 2017.

NUCLEAR POWER
PART OF THE ROMANIAN ENERGY STRATEGY

- ✓ Romania is closely observing the energy policy of the European Union.
- ✓ The national energy strategy approved by the Government, considers the importance of improving the
  - **security of supply,**
  - **competitiveness,**
  - **environment protection** and
  - **optimization of the use of domestic resources.**
- ✓ Nuclear power represents a significant part of the Romanian Energy Strategy, which includes completion of Units 3 and 4 of Cernavoda NPP and clearly indicate the long-term commitment to nuclear energy.

WHY NUCLEAR POWER IN ROMANIA ?

- ✓ As a proven and safe technology, nuclear power has an important role to play in terms of ensuring secure electricity generation without any CO2 emissions.
- ✓ Nuclear power is an excellent source of base-load power.
- ✓ Well-developed nuclear infrastructure in Romania:
  - Heavy water plant
  - Nuclear fuel fabrication plant
  - Technically qualified and experienced staff
  - Domestic uranium resources
- ✓ Excellent performance in operation of the CANDU units, including Unit 1 and 2 of Cernavoda NPP.

NATIONAL INFRASTRUCTURE FOR NUCLEAR POWER

- **Ministry of Economy and Commerce** is responsible for the national strategy in the energy field and for NPP project implementation and NPP operation, as well for technical support (research & engineering), nuclear fuel and heavy water.
- **Romanian Nuclear Agency and Radioactive Waste** has the responsibilities for promotion of nuclear energy in Romania and to develop the strategy of nuclear field in Romania. Also this agency has the responsibility for final disposal and decommissioning, including the development the secondary legislation related to waste management, final disposal and decommissioning of nuclear facilities.
- **Romanian Nuclear Safety Regulatory Body (National Commission for Control of Nuclear Activities - CNCAN)** has the responsibility of licensing and control the nuclear facilities operation and up-dating of the nuclear safety norms, standards and regulations.

MAIN PLAYERS IN ROMANIAN NUCLEAR ENERGY

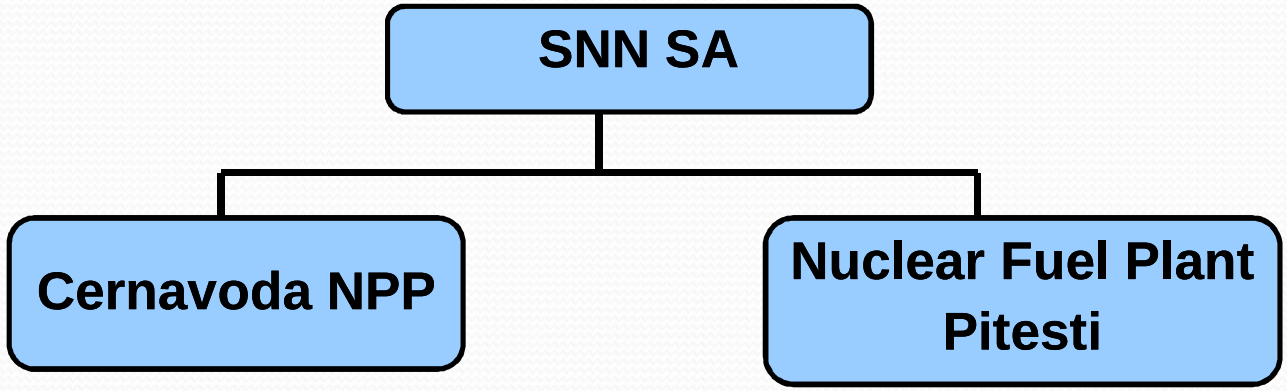
- ✓ **NUCLEARELECTRICA (SNN)** – national company, responsible for Cernavoda NPP UnitS 1&2 operation and nuclear fuel fabrication (FCN Pitesti).
- ✓ **Regia Autonoma for Nuclear Activities (RAAN)** – national company for heavy water fabrication (ROMAG), nuclear research (SCN Pitesti) and nuclear engineering (SITON Bucharest Magurele).
- ✓ **National Company for Uranium (CNU)** – responsible for uranium extraction and purification – supplier of Romanian nuclear fuel manufacturer.
- ✓ **Romanian Supliers for Goods and Services** – involved in Cernavoda Unit 1 & 2 finalization and in preparation for Unit 3 an 4 construction.

NPP OWNER/ OPERATOR

Societatea Nationala Nuclearelectrica (SNN)

- Shareholders: Romanian Government – **91%** and Property Fund – **9%**

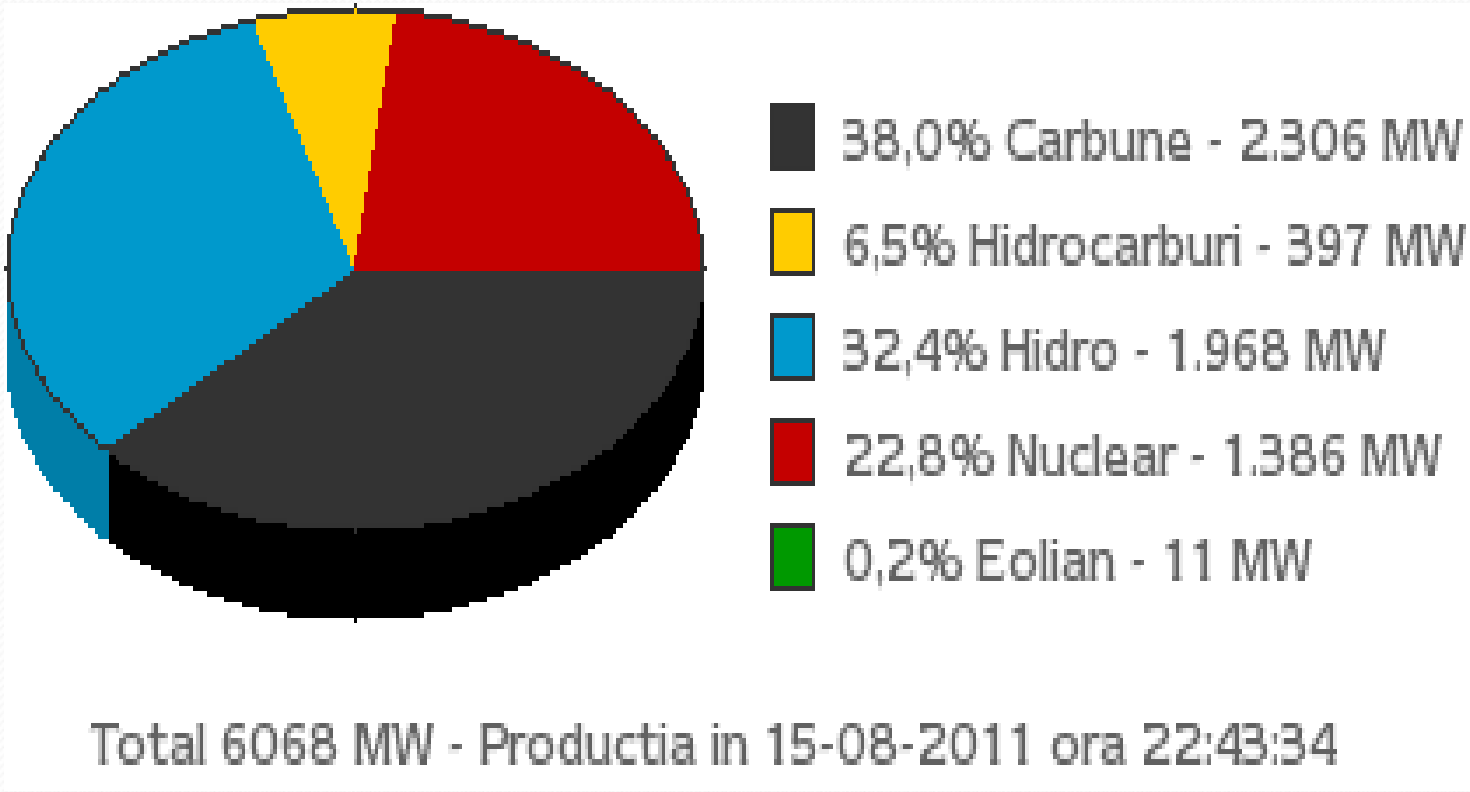
- Activity: Production of Electrical and Thermal Power, and Natural Uranium Nuclear Fuel; Development of New Projects.



RADIOACTIVE WASTE MANAGEMENT AND CERNAVODA NPP DECOMISSIONING

- ✓ The radioactive waste produced in the NPP operation are temporarily storage on the Cernavoda NPP site.
- ✓ Based on the national strategy, the Low and Medium Radioactive Waste National Final Repository shall be build in Saligny, near Cernavoda NPP.
- ✓ The High Level Radioactive Wastes Repository (spent nuclear fuel) shall be develop later, taking into account the intermediate storage of the spent fuel on Cernavoda NPP site.
- ✓ The Cernavoda NPP started the decommissioning preparation performing specific studies, which will identify the applicable technical solutions and will evaluate in detail the decommissioning cost.
- ✓ The specific legislation for radioactive waste management and decommissioning financial resources was approved in 2006 by Romanian Parliament.

ELECTRICITY PRODUCTION IN ROMANIA



ROMANIAN NUCLEAR FACILITIES LOCATION

IFA MAGURELE NUCLEAR RESEARCH REACTOR

IFA MAGURELE VVR-S RESEARCH REACTOR

PITESTI TRIGA NUCLEAR RESEARCH REACTOR

ROMANIA CERNAVODA NPP
UNITS 1 AND 2 IN OPERATION (1996 DECEMBER, 2007 NOVEMBER)
UNITS 3 AND 4 UNDER CONSTRUCTION (2017-2018)

CERNAVODA NPP SITE

CANDU 6 UNITS

CERNAVODA 1&2

QINSHAN 1&2

EMBALSE 1

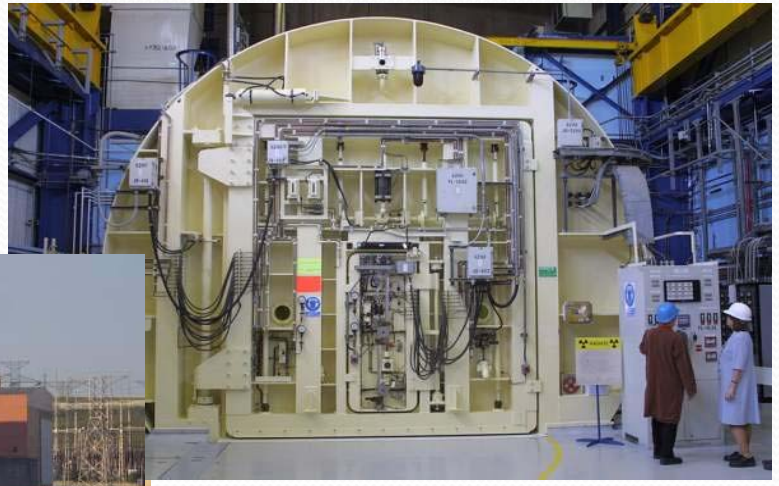
GENTILLY 2

POINT LEPREAU 1

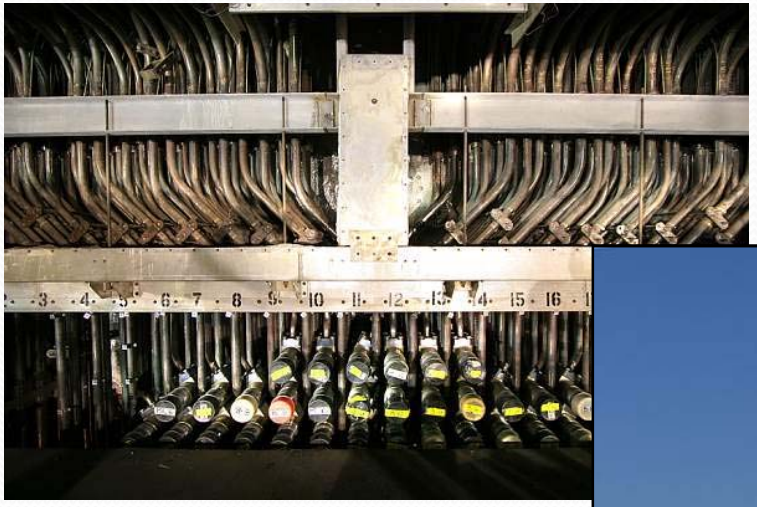
WOLSONG 1/2/3/4

ROMANIA CERNAVODA NPP
UNITS 1 AND 2 IN OPERATION (1996 DECEMBER, 2007 NOVEMBER)

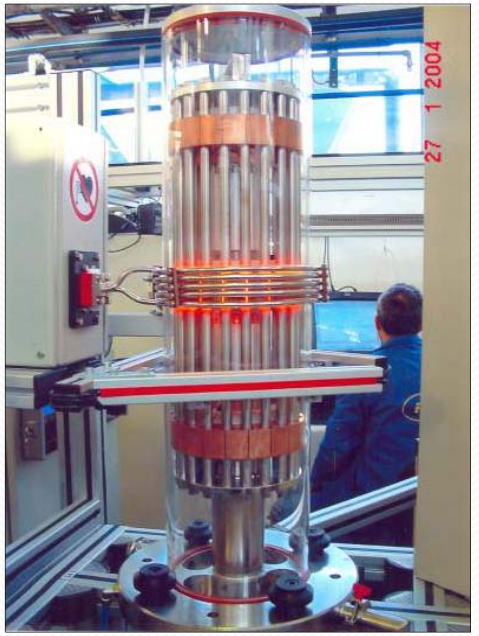
UNIT # 1 – 14 YEARS OF COMMERCIAL OPERATION



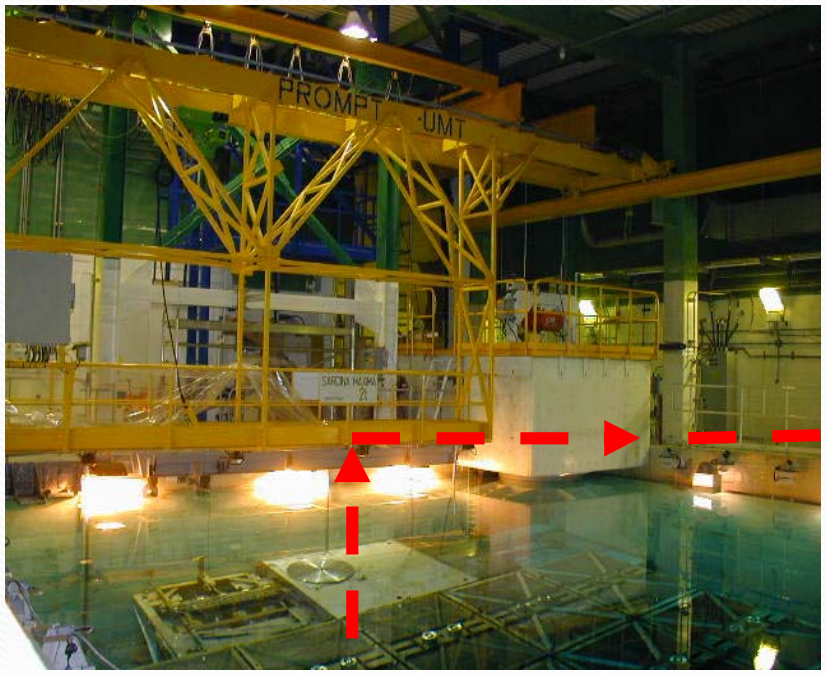
UNIT # 2: 3 YEARS OF COMMERCIAL OPERATION



PITESTI CANDU 6 NUCLEAR FUEL PLANT



CERNAVODA NPP SITE
INTERIM DRY SPENT FUEL STORAGE FACILITY



MACSTORE Type (AECL Canada) – first module operational from 2003; second – 2006; third – 2008, forth -2011
Final profile: 27 modules – 50-80 years of storage for 2 CANDU Units.

CERNAVODA UNIT # 3 & 4

(to be finalized in 2017/2018)

COOPERATION WITH THE LOCAL COMMUNITIES

- ✓Acceptability of nuclear power is dependent of cooperation with local community.
- ✓Benefits to the local community (social program, cheap heat to the community supply by Cernavoda NPP, substantial taxes for the local budget, etc.).
- ✓Public information centres at Cernavoda and Constanta.
- ✓Public debates for the Cernavoda NPP Unit #2 and Dry Storage Facility in Cernavoda, Constanta and Medgidia, using Environmental Impact Assessment Reports.

COOPERATION WITH THE LOCAL COMMUNITY. SOCIAL PROGRAM [bridge, school, hospital]

LEARNED LESSONS

- ✓ **Properly planning of the energy sector,** reflecting the specific needs of the country (security of supply, competitiveness, climate change).
- ✓ **Technological improvement and design optimization,** using operational feedback, NPP reference plant knowledge data base and up-graded technologies.
- ✓ **Optimization of construction schedule,** based on the modern construction methods and modern tools and software to be implemented for the management of the Project in all specific phases.
- ✓ **Good cooperation with public and local communities and transparency in information and decision,** for better acceptability of nuclear power.
- ✓ **Political and Governmental support for nuclear power,** based on the excellent performance of the existing nuclear power capacities and minimum impact on the environment and public.

CONCLUSIONS (1)

- ✓ Governments have clear responsibilities to enable nuclear energy's role in future sustainable energy mixes.
- ✓ Romania developed the proper national infrastructure for implementation, management and supervision of the nuclear energy installations and future NPP projects.
- ✓ Nuclear power is part of the energy strategy approved by the Romanian Government to develop the nuclear energy as part of the European policy, considering (1) sustainable development, (2) security of energy supply and (3) competitiveness.

CONCLUSIONS (2)

- ✓ Coherent national nuclear safety policy, consistent with the European initiatives, represents a strong guarantee for a reliable nuclear program.
- ✓ The Romanian Nuclear Power Program has an important international dimension, representing a good example of cooperation with partners from Europe and North America.
- ✓ The private investors will play an important role for the future of nuclear energy in Romania (Cernavoda Units 3 and 4 finalization).


When the lights go on in Europe...
...half of them are nuclear-powered
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