

# Presentation of S.N. Nuclearelectrica S.A.

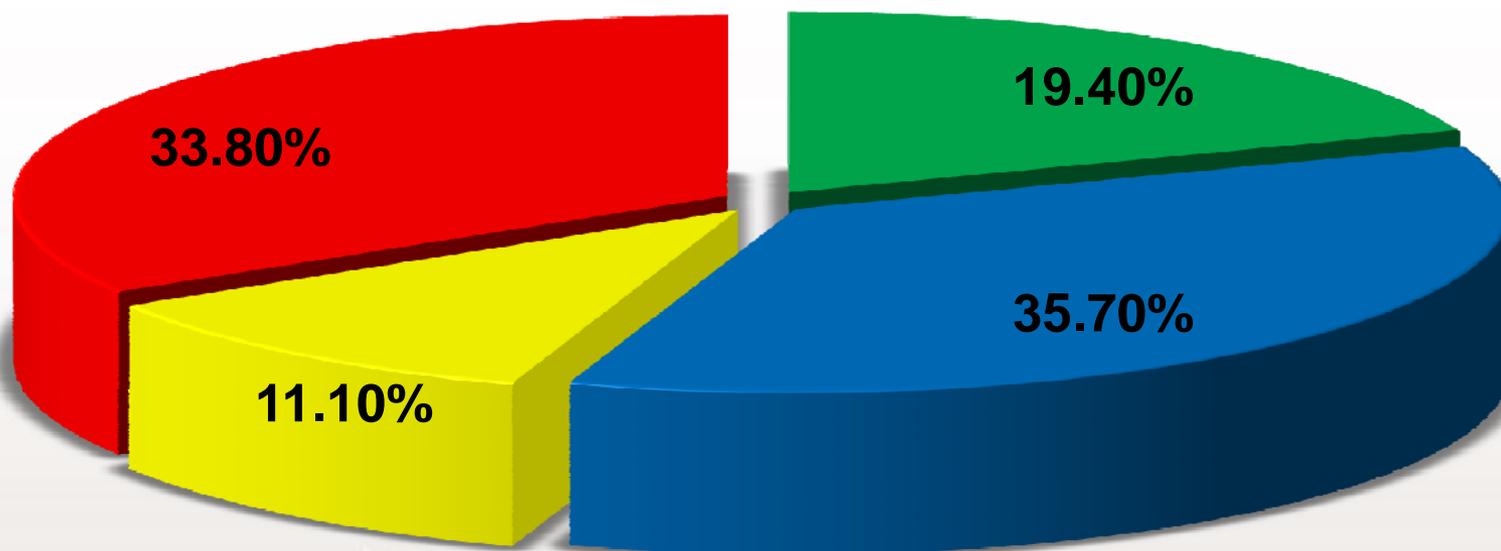


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**Strategy and Development Division Director**

# 2010 Romanian's Energetic Sector Structure



NUCLEARELECTRICA



■ Nuclear ■ Hidro ■ Hidrocarburi ■ Carbune

# Evolution and description of Romanian nuclear program

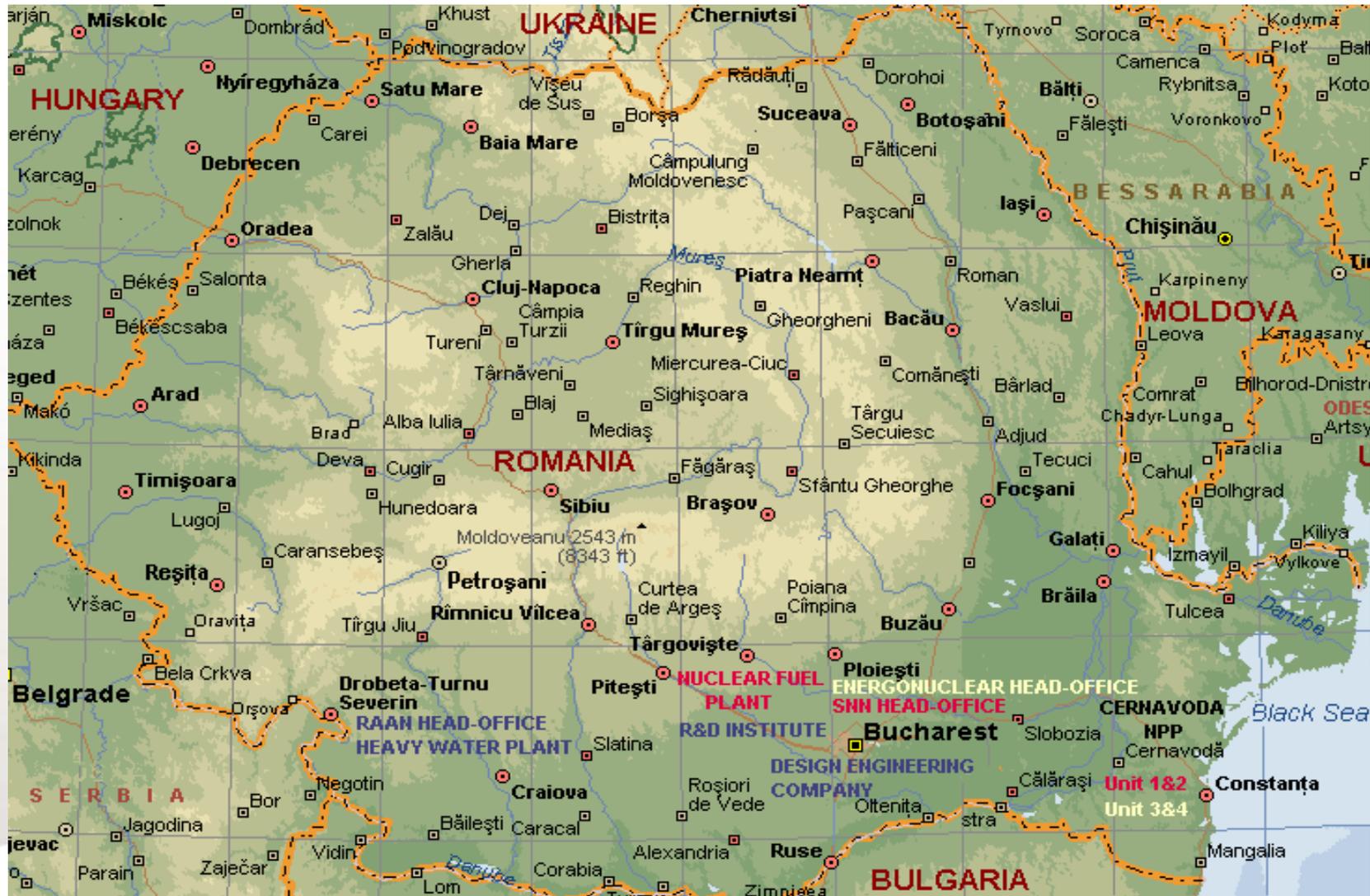


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**There are three distinct phases in the evolution of the Romanian Nuclear Program:**

- **“beginning phase” - before 1990;**
- **“transition phase” - between 1990 and mid 1998;**
- **“maturity phase” started in July 1998**

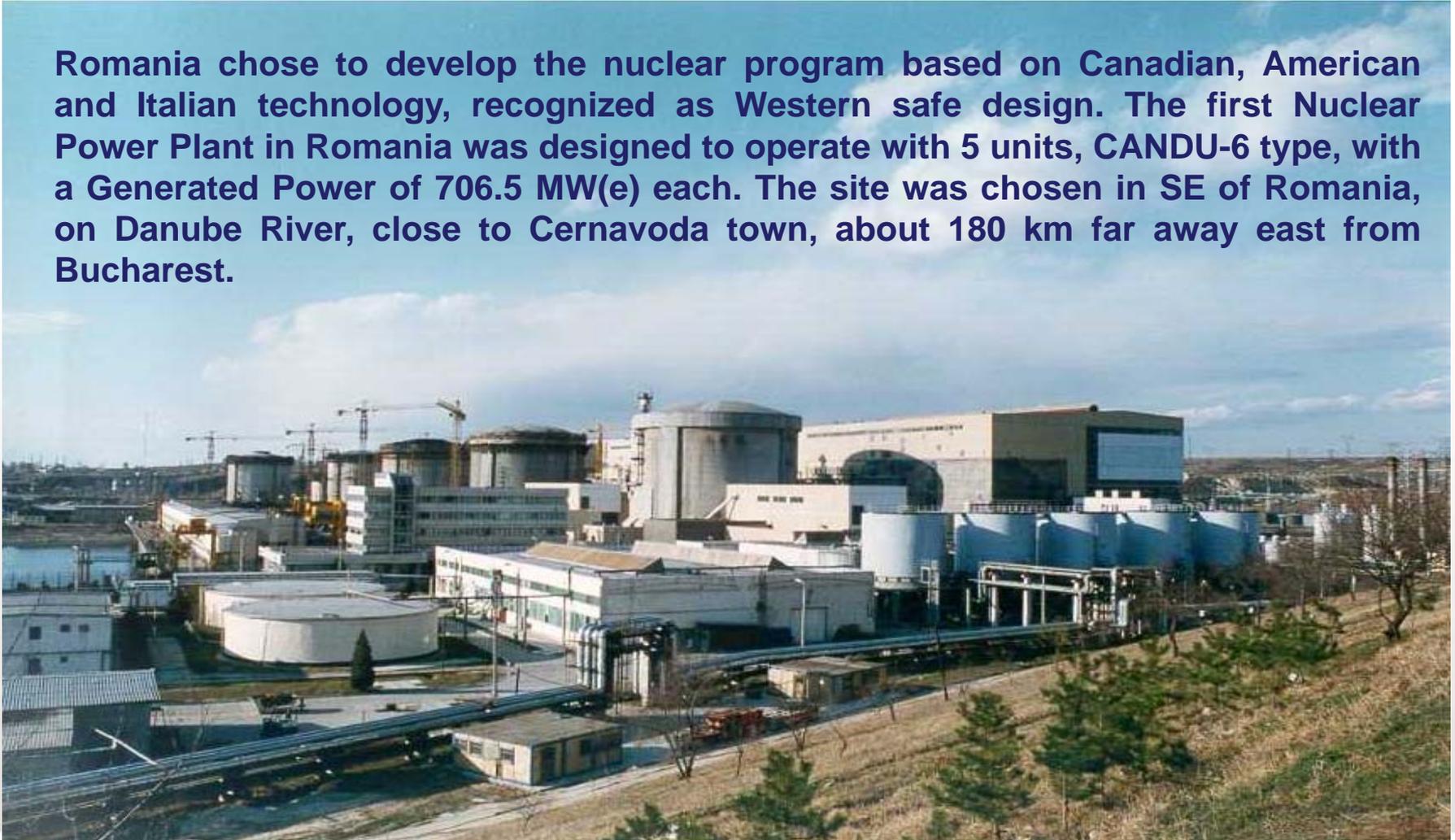
# Location of main Romanian nuclear power industry



# Cernavoda NPP



Romania chose to develop the nuclear program based on Canadian, American and Italian technology, recognized as Western safe design. The first Nuclear Power Plant in Romania was designed to operate with 5 units, CANDU-6 type, with a Generated Power of 706.5 MW(e) each. The site was chosen in SE of Romania, on Danube River, close to Cernavoda town, about 180 km far away east from Bucharest.



# Nuclearelectrica's Structure



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## Shareholders:

- Romanian State – 90.28%
- Property Fund – 9.72%

**Main Activity:** Electrical Power and Heat Production, NPP Construction and Commissioning and Nuclear Fuel Fabrication

SNN S.A.

Cernavoda NPP – Units 1&2

Nuclear Fuel Plant Pitesti

**Safe & Efficient operation of  
Units 1&2 – CANDU-6**

**Nuclear fuel fabrication for two  
units**



# Cernavoda NPP - Units 1 and 2



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## MAIN CHARACTERISTICS:

- Reactor type: **CANDU 6**
- Installed Output: **2 x 706,5 MWe**
- Reactor Life time:  
**30 years – possible extension to 50 years**



## Main characteristics of CANDU 6 type reactor



CANDU 6 reactor designed by AECL Canada, with following Characteristics:

- 380 horizontal fuel channels
- fuel: natural uranium ( $\text{UO}_2$ )
- moderator: heavy water
- cooling agent: heavy water under pressure (107 bar)
- fuel loading: during operation

Balance of Plant – designed by ANSALDO Italia

Turbine generator – supplied by General Electric USA.

# Units technical design characteristics



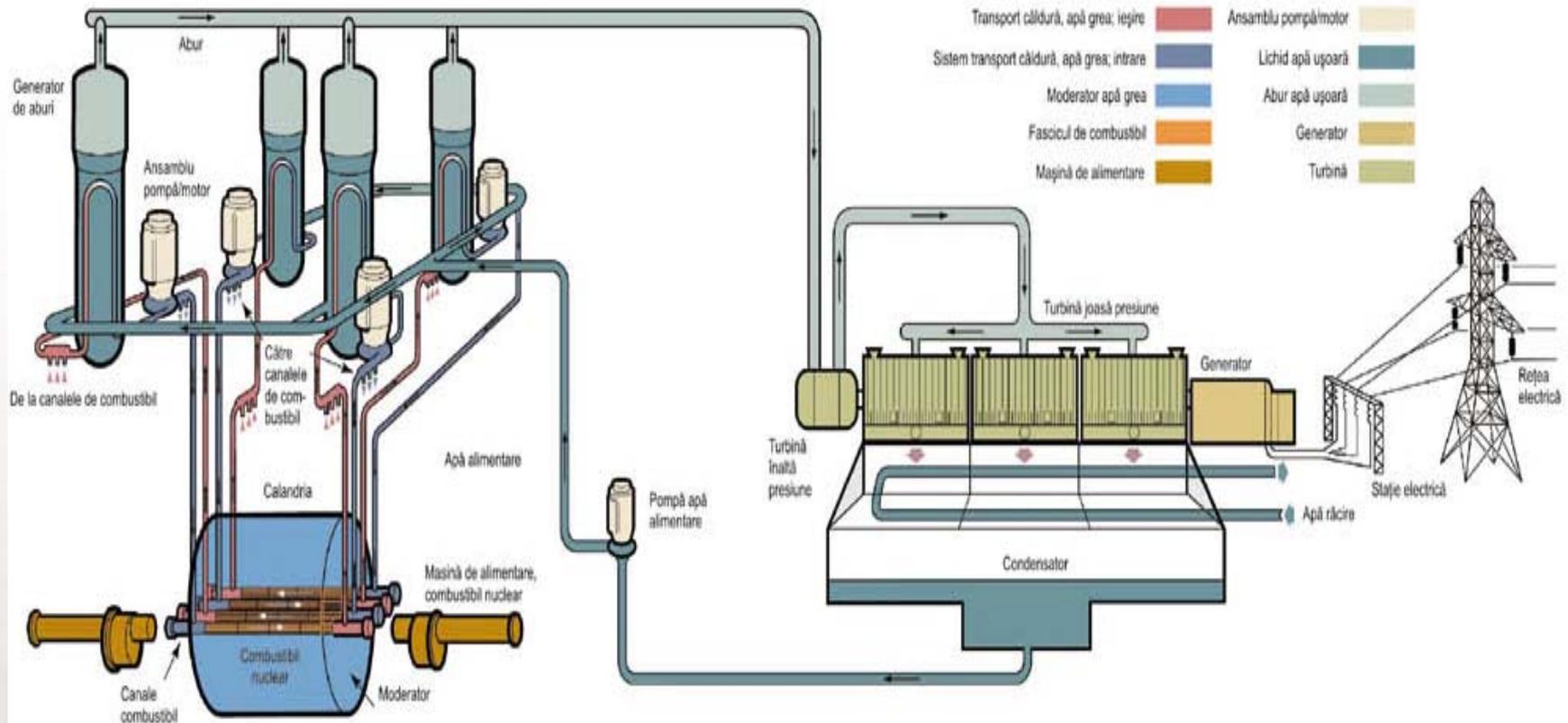
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Thermal power	MW(t)	2064
Gross installed capacity	MW(e)	706.5
Auxiliaries consumption	%	< 8
Fuel channels number	-	380
Loops number	-	2
Main primary pumps	-	4
Steam Generators number	-	4
(D <sub>2</sub> O) pressure inside the primary circuit	MPa	9.9
Temperature outside the primary circuit	°C	310
(H <sub>2</sub> O) pressure saturated steam	MPa	4.8
Supply water temperature	°C	187.2

# CANDU-6 type reactor layout of the main and auxiliary systems



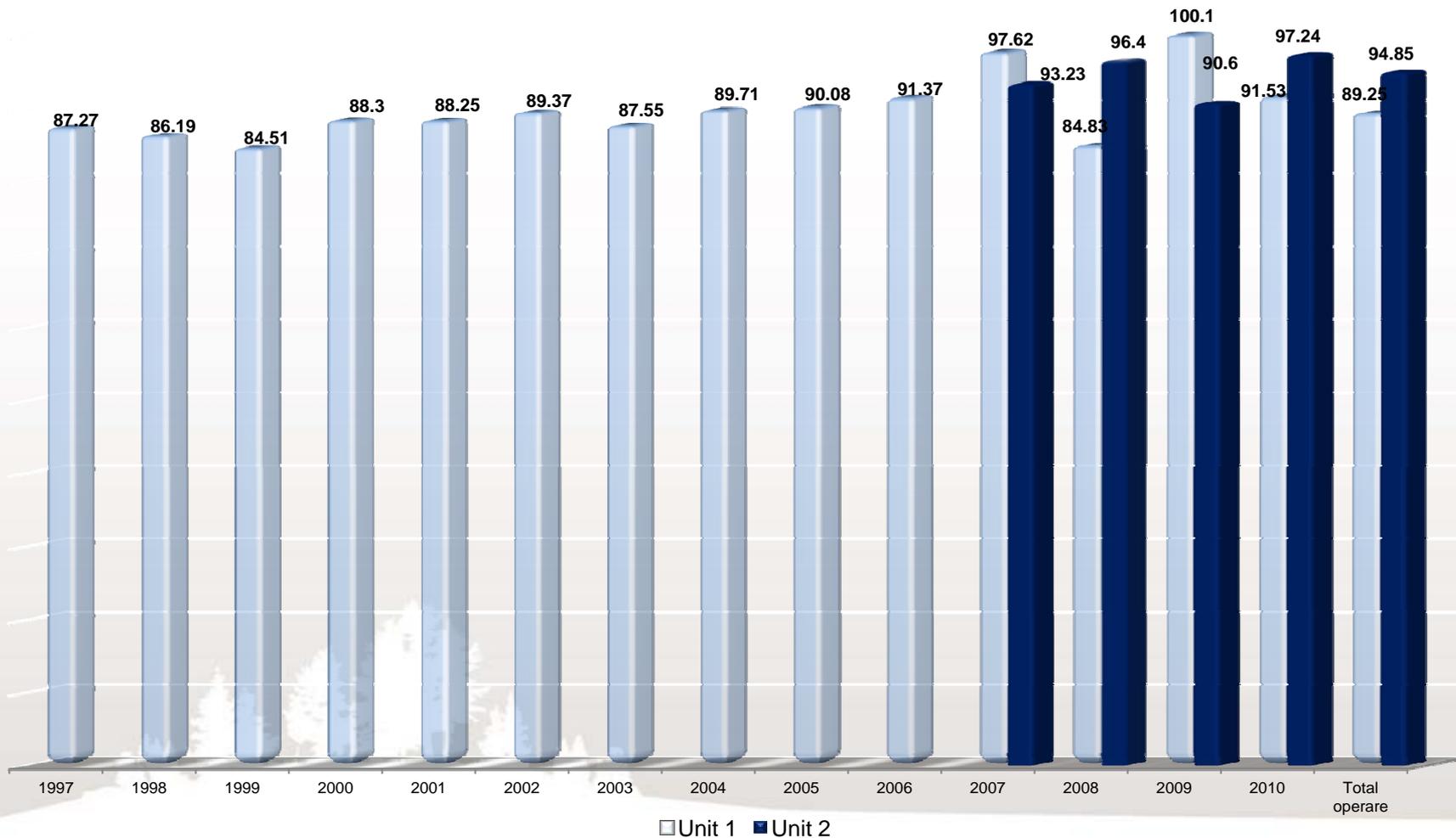
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# Capacity factor of Cernavoda NPP Units 1 and 2 (%)



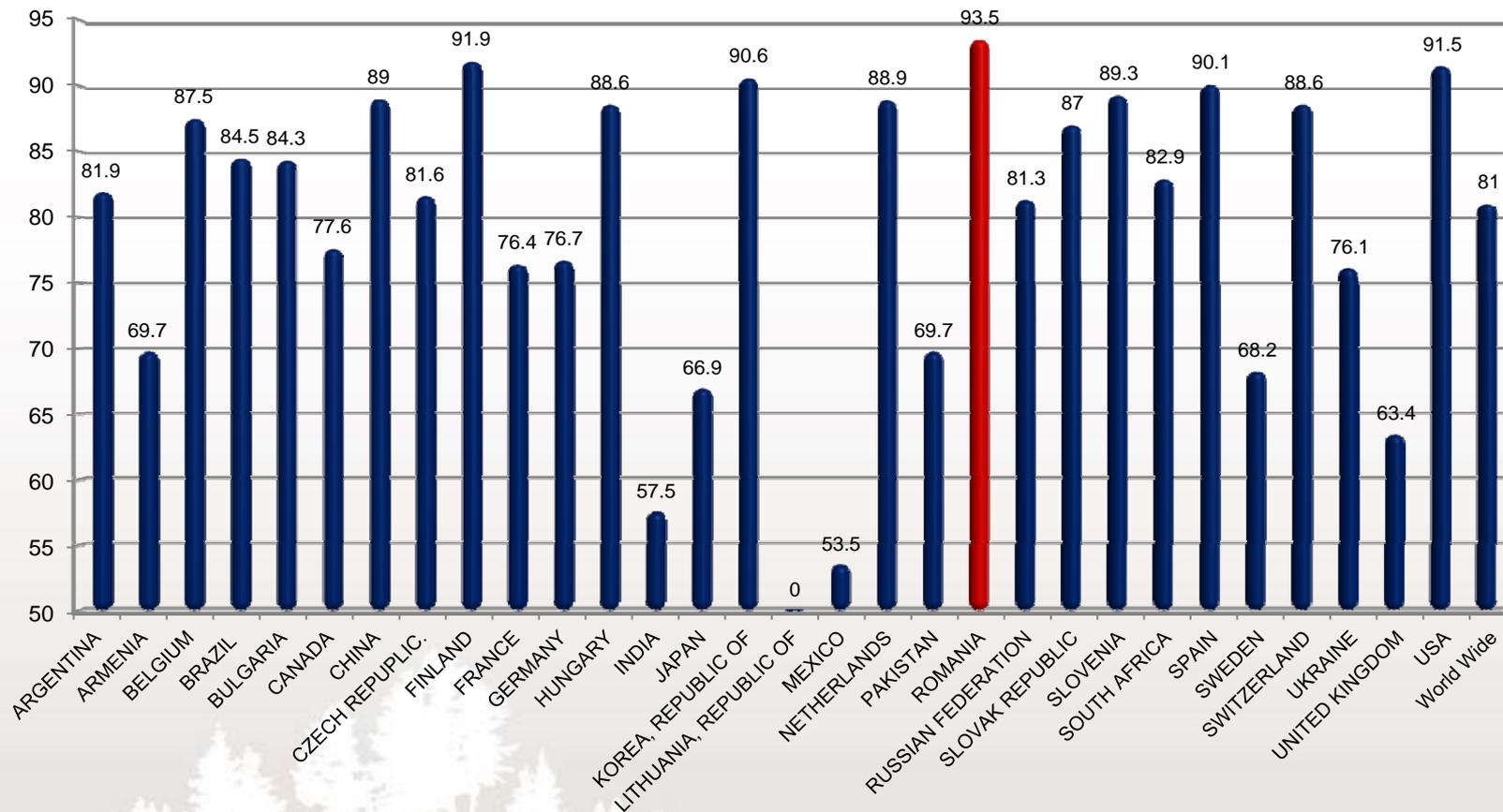
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# Country Energy Availability Factor (EAF) 2010



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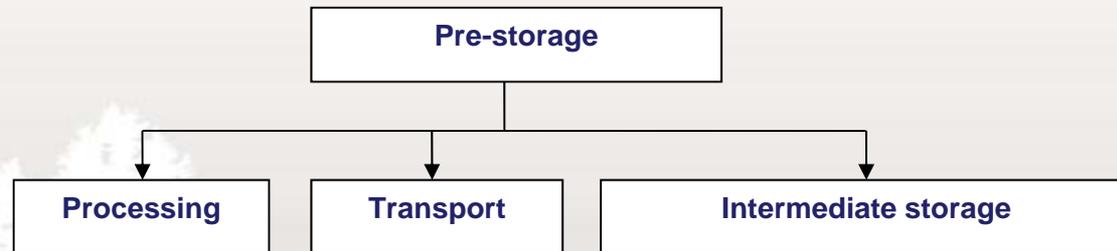


# Waste management at NPP Cernavoda



## Storage of the low and intermediate level waste

- The waste facility for solid radioactive wastes (DIDR) is designed for temporary storage of solid radioactive wastes that are coming from the operation of the Cernavoda NPP except used resins and burned fuel.
- The storage facility has the capacity for this wastes for the entire life of the NPP, so far it is only 20% full from entire capacity.



# Waste management at NPP Cernavoda



## Storage of the spent fuel

- **Storage of the spent fuel at the Cernavoda NPP aligns with international practice of CANDU reactor owners and it is done like so:**
  - **“Wet storage” in the pool of spent fuel of each reactor for minimum of 6 years;**
  - **“Dry storage” in the intermediate storage facility of burned fuel (DICA) for a period of minimum 50 years.**
- **The intermediate storage facility of spent fuel has a modular structure and is on Cernavoda NPP site.**
- **The storage capacity of one of this modules is 12.000 bundles. Until now are build 4 modules from which 3 are full and sealed by the IAEA inspectors and the 4<sup>th</sup> is currently filling.**

# Interim Dry Storage Facility (DICA)

In the actual configuration, the site ensures the necessary space for the fuel storage resulting from the operation of two units for the normal lifetime of the power plant

## Actual Configuration:

- Module 1 - 2003;
- Module 2 - 2006;
- Module 3 - 2007;
- Module 4 - 2010



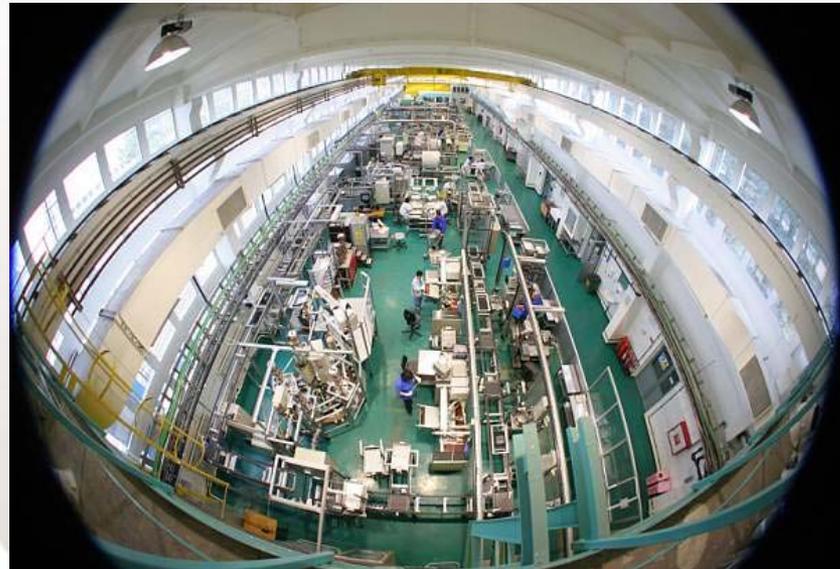
# Nuclear Fuel Plant - Pitesti



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**1980 - started the fabrication of the CANDU nuclear fuel started through Fuel Pilot Plant - Pitesti.**

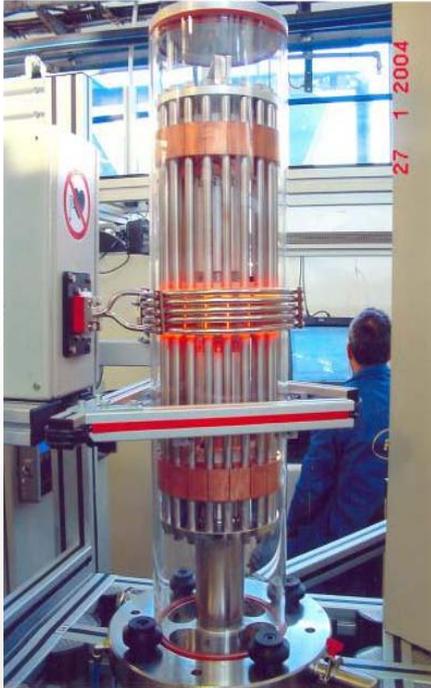
**1994 - AECL and Zircotec Precision Industries Inc. (Canada) qualified the Nuclear Fuel Plant (FCN) as a CANDU 6 fuel manufacturer.**



# Nuclear Fuel Plant - Pitesti



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**Present - Nuclear Fuel Plant (FCN) is producing CANDU 6 type nuclear fuel for Cernavoda Units 1&2 (approx. 11.000 fuel bundles / year)**

**Excellent behavior of the nuclear fuel**



# Cernavoda Units 3 and 4 Project



**INVESTORS**

**NUCLEARELECTRICA**

**EnergONuclear  
PCO  
UNITS 3 & 4**

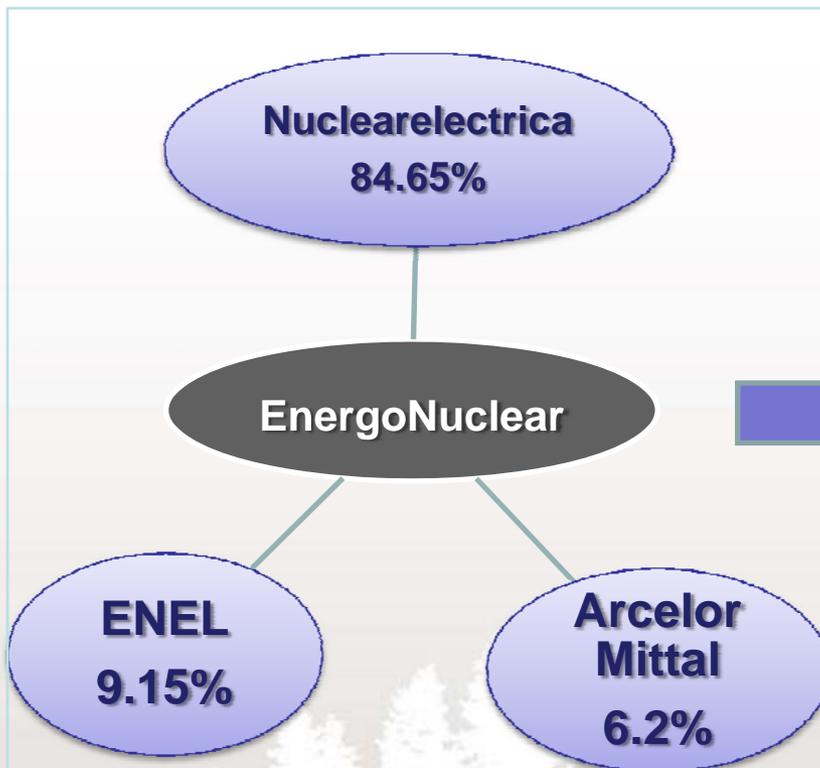
**Cernavoda NPP  
UNITS 1 & 2**

# Cernavoda NPP Units 3 & 4 Project

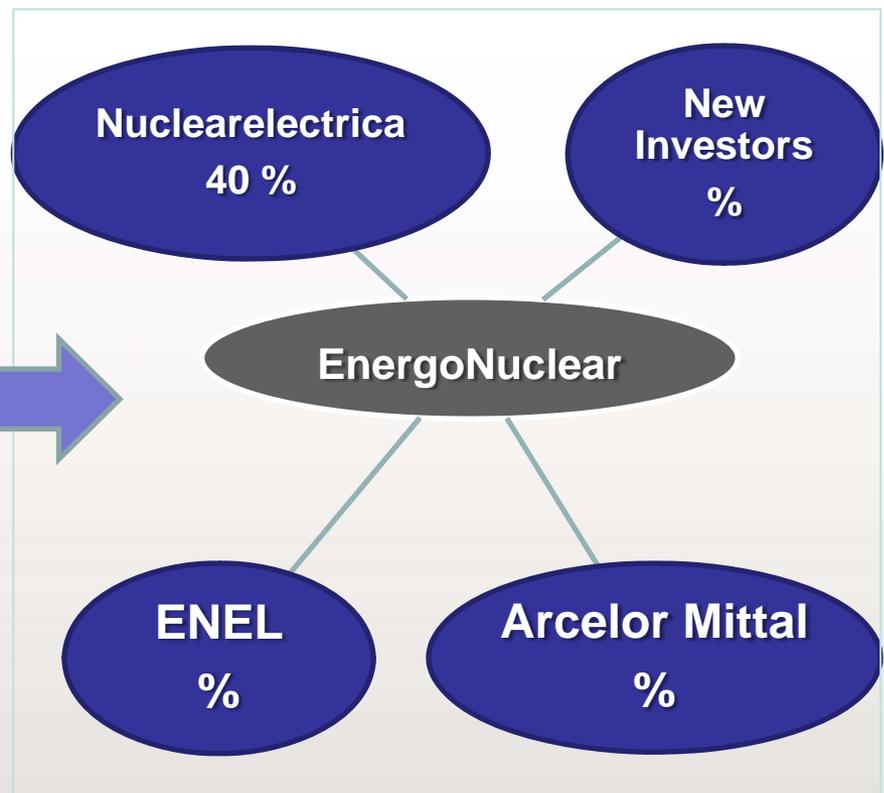


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## Current Shareholding Structure



## Target for Shareholding Structure



# Procedure for Selection of new investors for the completion of Units 3 and 4 Project



**Notice published: October 5, 2011**

## **The potential new investors**

- Profile: utilities, large electricity consumers, energy wholesale and/or retailers, investment funds, financial and credit institutions (including banks) and, in general, any major company who fulfils the requirements contemplated in the selection procedure and express the interest to become new investors in the Project
- Project related data available to the potential investors against a duly signed NDA

# Procedure for Selection of new investors for the completion of Units 3 and 4 Project



## **The most important deadlines:**

- 5th of November, 2011 – Deadline for receiving requirements for clarification on the Documents. After receipt of the Documents, potential new interested investors will be given an opportunity to consider the contents and to clarify the Project structure, the form of the binding offers and the process for submission of binding offers. All clarifications should be in writing and the responses will be made available to all potential interested new investors;
- 14th of November, 2011 – Deadline for common answer to all received requirements for clarification;
- 15th of December, 2011 – Deadline for submission of Binding Offers.