

# **RBMN PROJECT**

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## **REPOSITORY FOR LOW- AND INTERMEDIATE-LEVEL WASTES**

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**CDTN/CNEN**

# PRESENT SCENARIO

Angra 1  
Angra 2



Angra 3

[www.eletronuclear.gov.br](http://www.eletronuclear.gov.br)

# PRESENT SCENARIO

## INB Fuel Cycle



### ➤ Applications

- ✓ Medicine
  - ✓ Industry
  - ✓ Environment
  - ✓ R&D
  - ✓ And others.
- ~2,500 radioactive installations
- This scenario justifies the construction of a national repository.

# LEGAL FRAMEWORK

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- Laws 7.781 (1989) and 10.308 (2011)
  - CNEN is in charge to receive and store safely the radioactive wastes coming from the use of nuclear energy and radionuclides in Brazil.
  - CNEN is responsible for their disposal. The repository design, construction and implementation are under CNEN responsibility. These activities can be delegated, but the responsibility not.

# RBMN PROJECT

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- It starts in 2009, as part of the national solution for the storage of radioactive waste generated in Brazil.
- It aims at implementing the National Repository to store the low- and intermediate-level radioactive wastes from NPPs operation, and activities that use radioactive materials.

# INVENTORY – ASSUMPTIONS

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- Repository Operation
  - ✓ Start: 2018
  - ✓ Closure: 2080
- ✓ Nuclear Power Plants
  - ✓ Angra 1, 2 and 3
  - ✓ Four new ones
  - ✓ Operation: 60 years
- ✓ Brazilian Multipurpose Reactor (RMB)
- ✓ New Units of Production INB
- ✓ Decommissioning wastes

# ESTIMATED INVENTORY

Origin	LILW (m <sup>3</sup> )		VLLW (m <sup>3</sup> )	TOTAL (m <sup>3</sup> )	
	Minimum	Maximum		Minimum	Maximum
NPP operation	10,340	28,340	-	10,340	28,340
Other installations	1,083	1,517	-	1,083	1,517
Decommissioning	6,353	6,392	21,150	27,503	27,542
<b>TOTAL (m<sup>3</sup>)</b>	<b>17,776</b>	<b>36,249</b>	<b>21,150</b>	<b>38,926</b>	<b>57,399</b>

LILW= Low and intermediate-level wastes; VLLW= Very low-level wastes

Not included: Sealed disused sources; lightning sources and smoke detectors; NORM

# REPOSITORY: REFERENCES



FRANCE



- *L'Aube*
- *Operator: ANDRA*
- *Expected Volume:*  
 $1,000,000 \text{ m}^3$
- *Start: 1992*
- *59 NPPs*

SPAIN



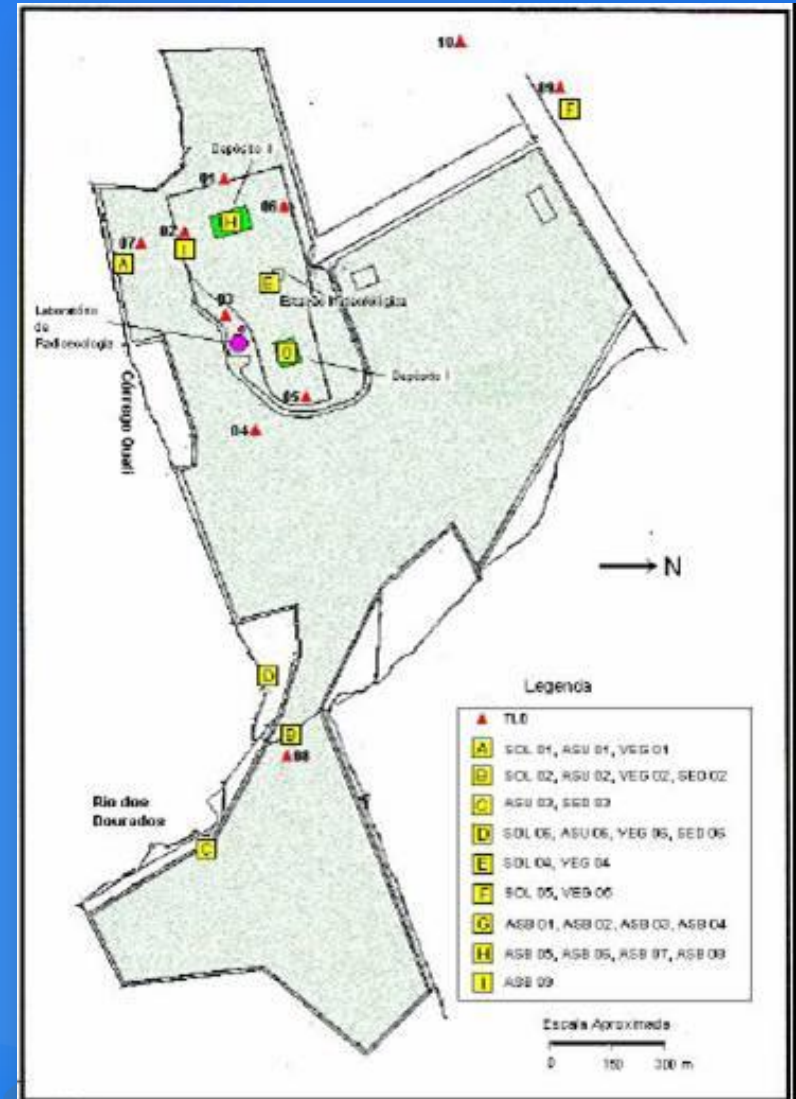
- *El Cabril*
- *Operator: ENRESA*
- *Expected Volume:*  
 $180,000 \text{ m}^3$
- *Start: 1992*
- *07 NPPs*



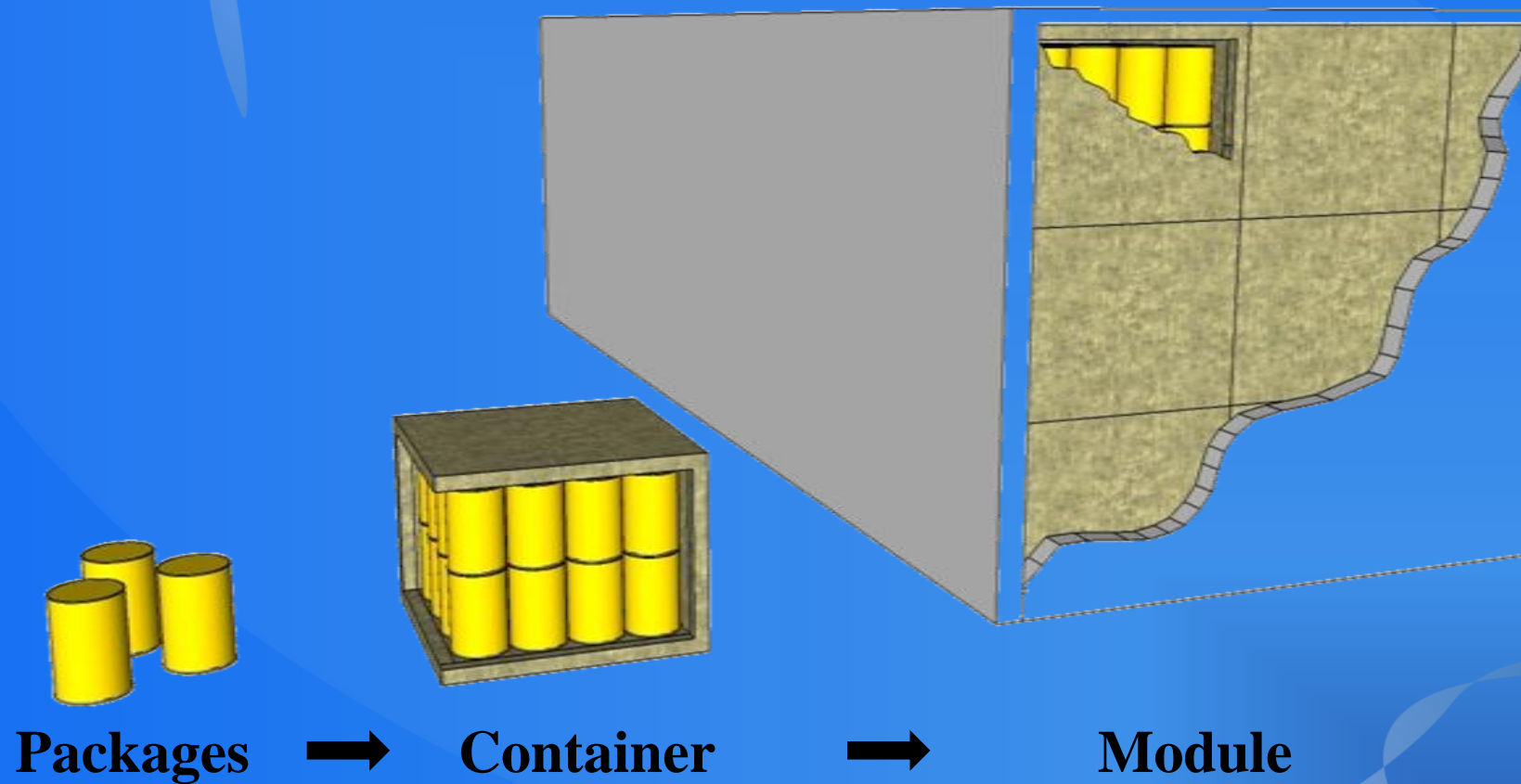
# PREVIOUS EXPERIENCE



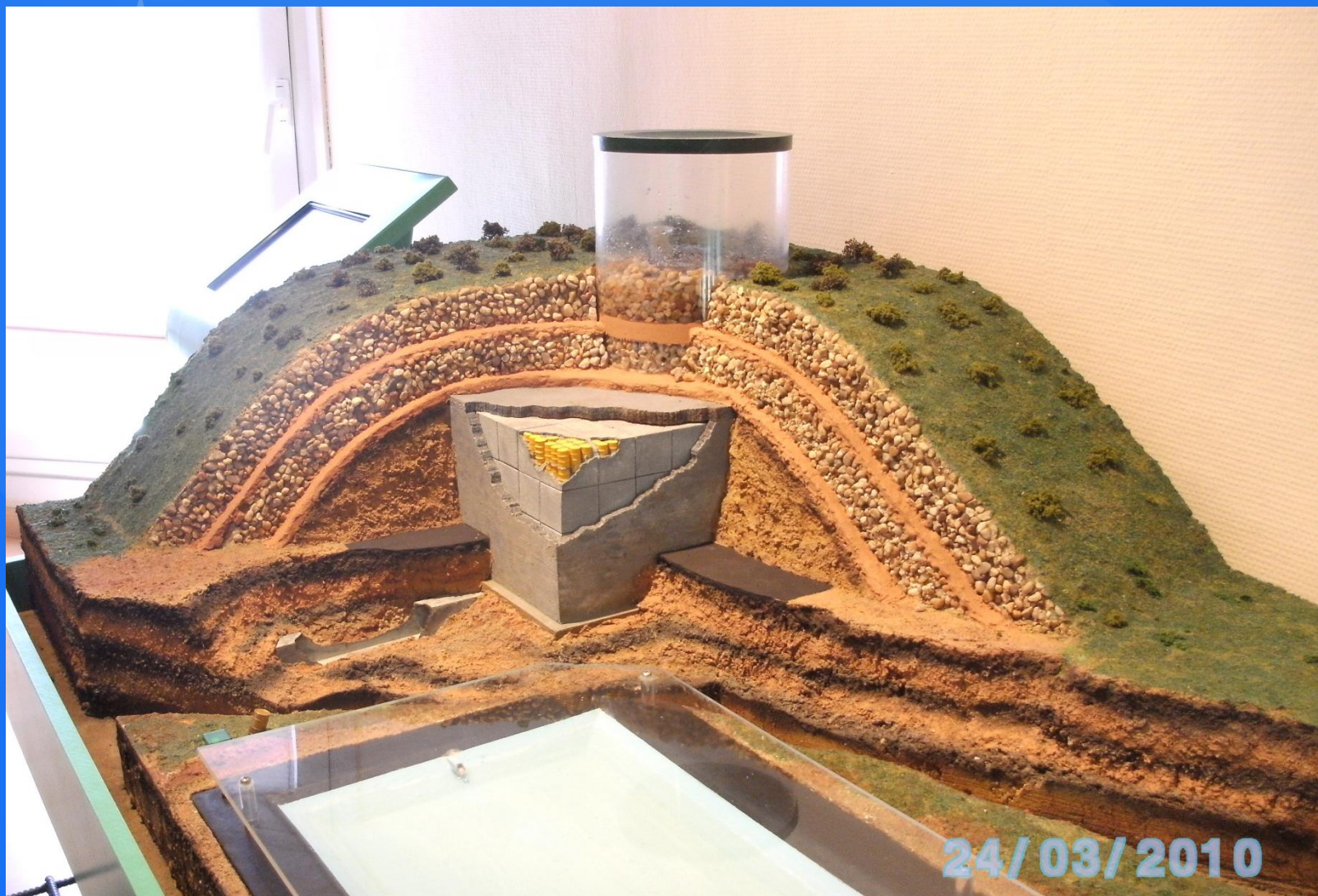
Abadia de Goiás



# REPOSITORY CONCEPT



# REPOSITORY CONCEPT



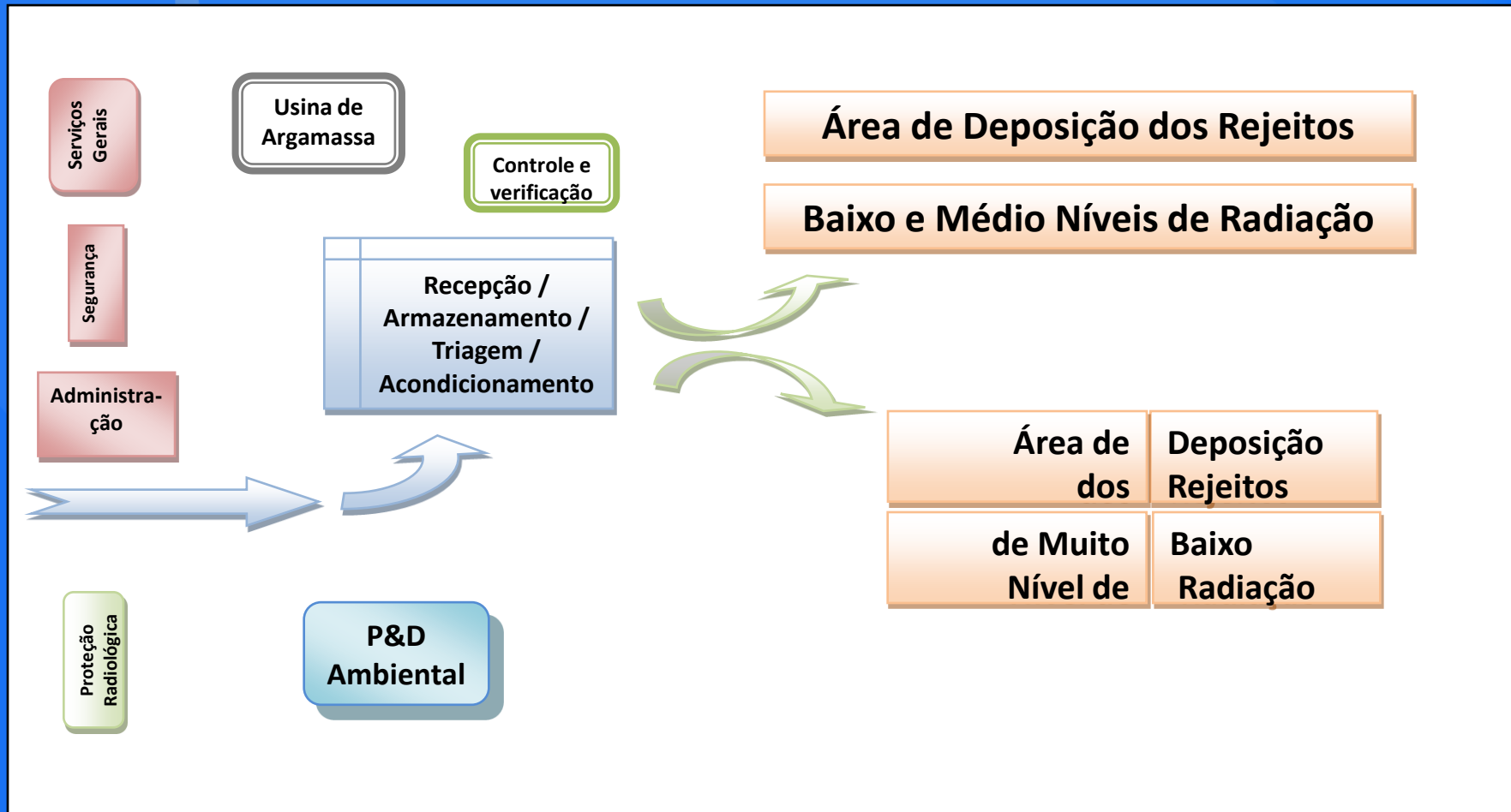
24/03/2010

# REPOSITORY FOR LOW- AND INTERMEDIATE- LEVEL WASTES

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- ✓ Passive installation
- ✓ Treated wastes according established criteria
- ✓ Multiple barriers
- ✓ Safety analysis for long-term
- ✓ Performance study for long-term
- ✓ Radiological control
- ✓ Environmental control
- ✓ Monitoring for 300 years (Institutional control)

# REPOSITORY - SCHEMA



# REPOSITORY: WBS

## RBMN PROJECT

Administrative  
Coordination

Technical  
Coordination

PROJECT  
MANAGEMENT

CONCEPTUAL  
DESIGN

LICENSING

EXECUTIVE  
DESIGN

COMMISSIONING

INITIATION

INVENTORY

SITE SELECTION

BASIC DESIGN

CONSTRUCTION

PROJECT  
CLOSURE

# SITE SELECTION PROCESS

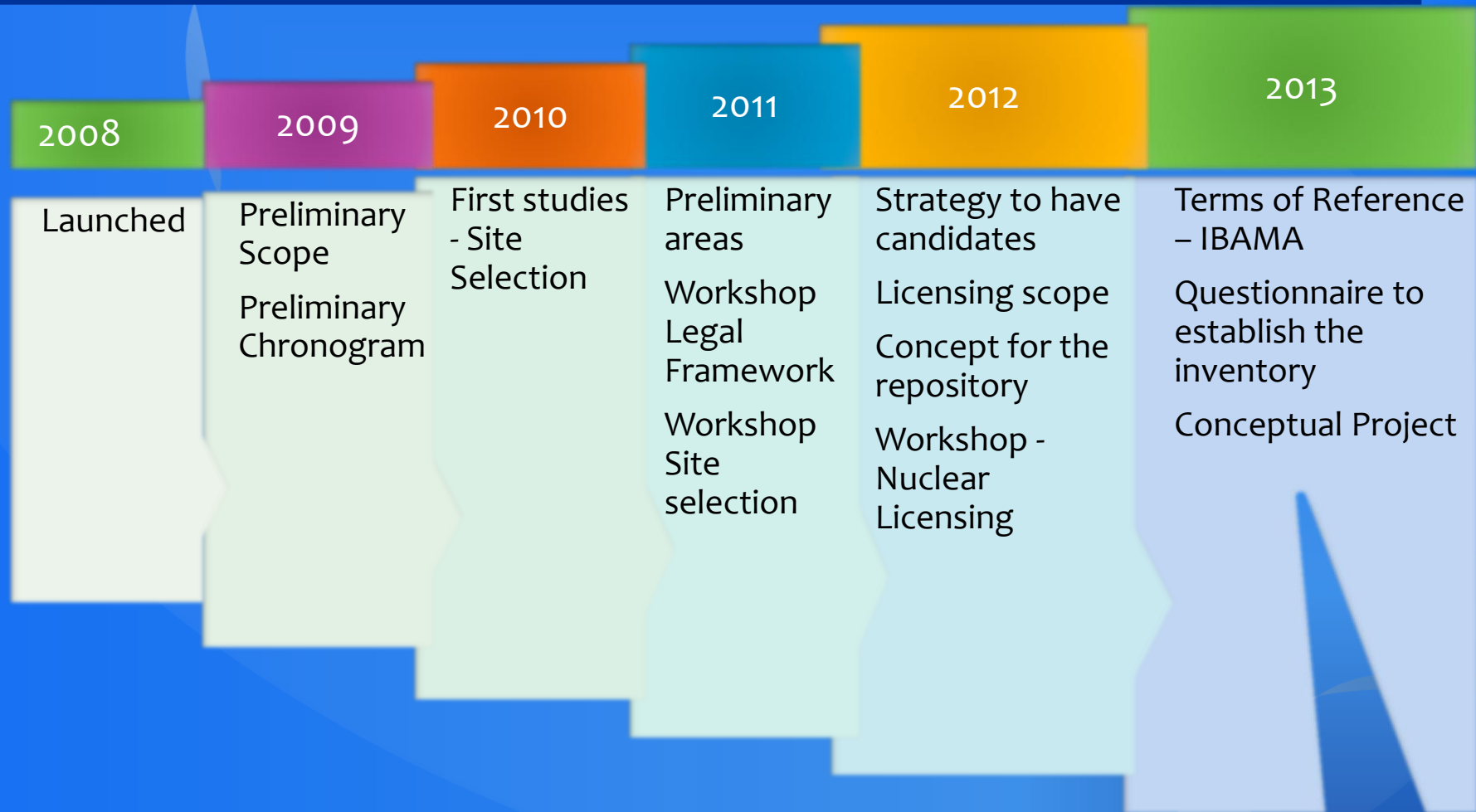
<b>PHASE</b>	<b>DECISION</b>	<b>POLITICAL TERRITORIAL SCOPE</b>	<b>SCALE</b>
<b>Interest area</b>	<b>Governmental</b>	<b>Brazilian states</b>	<b>---</b>
<b>Preliminary areas</b>	<b>Technical</b>	<b>Municípios (preliminary)</b>	<b>1: 1.000.000</b>
<b>Potential Areas</b>	<b>Public Acceptance</b>	<b>Municípios (Potential)</b>	<b>---</b>
<b>Candidates</b>	<b>Technical/Public Acceptance</b>	<b>Candidate Polygons</b>	<b>1: 10.000</b>
<b>Characterization of Local Candidates and final choice</b>	<b>Technical/Public Acceptance Governmental</b>	<b>Candidate Polygons</b>	<b>1: 10.000</b>

# ENVIRONMENTAL AND NUCLEAR LICENSING PROCESS

LICENSING		1ª PHASE	2ª PHASE	3ª PHASE
ENVIRONMENTAL	License	LP Previous License	LI Installation License	LO Operation License
	Demand	Approval of the Repository site	Repository Construction	Repository Operation
NUCLEAR	Approval Certificates	CARL Site Report	CARAS Safety Analysis Report	CARFAEL Final Report of the closure analysis
	Demand	Approval of the local	Construction and Operation	Closing



# MAIN ACTIVITIES



# ACTIVITIES FOR 2013

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- Inventory
- Local selected
- EIA
- Nuclear Licensing
- Conceptual Project

# PROJECT RBMN: CRITICAL PHASES

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## ➤ Conceptual Design

- ✓ Acceptance criteria for the waste packages (historical and future inventory)
- ✓ Procedures to bring safety and protection of human beings and environment, building public confidence.

## ➤ Site Selection - Find a place that reaches:

- ✓ Technical criteria: ecological, geological, physiographic and socio-economical factors
- ✓ Public acceptance

# PROJECT RBMN: CRITICAL PHASES

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## ➤ Licensing

- ✓ Environmental and nuclear
- ✓ Involving two different regulators

## ➤ Construction

- ✓ Quality control of materials and processes
- ✓ Documentation
- ✓ Safety analyses requirements

# CHALLENGES

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- Brazil`s history began in 1500 – 512 years.
- The Repository construction and release
  - ✓ about 360 years, i.e. longer than a half of Brazilian history
  - ✓ This aspect is very new for the Brazilian people, bringing a new dimension to public acceptance.
- The event occurred in Fukushima is still on people mind
  - ✓ the differences between a NPP and a repository are not clear.

# CHALLENGES

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- The first repository in Brazil to be licensed for several wastes and radionuclides
  - ✓ optimize the resources and the time, associated to the quality in order to give confidence to all stakeholders.
- The first repository in South America
  - ✓ real challenge for the continent.
  - ✓ very carefully managed, in order not to have problems, mainly with public acceptance.

# CONCLUSION

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- The RBMN Project is part of the national solution for the storage of radioactive waste generated by the use of radioisotopes and nuclear energy in Brazil.
- The Repository should meet the requirements of IBAMA and DRS, and also answer the questions raised by the stakeholders.

# CONCLUSION

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- It is necessary to work with transparency within the legal base, in the way that doesn't compromise the technical work.
- The whole system depends on the repository licensing, which will be held for the first time by Nuclear Regulatory Body and IBAMA.
- The discussion with the municipalities, where the repository will be installed, may require political negotiations, and certainly hearings, that will affect the schedule.



# RBMN SUCCESS

*RBMN Project success will be translated by obtaining the commissioning and full acceptance and satisfaction of all involved, meaning that all expected results and benefits were produced.*



<http://www.andra.fr/andra-aube/pages/fr/menu4/1-andra-dans-l-aube/les-centres-de-stockage-tfa-et-fma-1081.html>

# SUSTENTABILITY

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- ✓ *The waste management is a key component for achieving the sustainability in the nuclear area.*
- ✓ *Sustainable Community is the one “that can satisfy their own needs without reducing the opportunities of future generations.” (Lester Brown)*

CAPRA in TRIGUEIRO, 2005, 19

# ACKNOWLEDGMENTS

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- Work Groups and their leaders
- CDTN/IPEN/LAPOC
- CNEN
- Eletronuclear

# Thanks

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