

**ENEA - Italian National Agency for New Technology,  
Energy and Sustainable Economic Development**

**Management of disused sealed sources and  
radioactive wastes from non-energy  
applications in Italy**

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**Management of spent fuel and radioactive waste  
arising from non-energy uses of nuclear and  
radiation technologies**

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# Integrated Service: the facts

ENEA plays a major role in the management of low and medium level radioactive waste and high-activity sealed radioactive sources originating from medical, industrial, and scientific activities.

The **“Integrated Service”** is a group of Operators which ensures all the stages of radioactive waste management cycle produced in the mentioned fields.

**ENEA** is the **public supervisor** of the Integrated Service by law, performing the function of direction and control of the entire management cycle.

ENEA assumes the ownership of the collected waste and takes charge of their final disposal, releasing the waste producer from any legal responsibility.

The Integrated Service **does not deal** with waste generated by nuclear installations regulated by Chapter VII of the Legislative Decree 17 March 1995 n. 230.

# Integrated Service: the law side

**Decree 52/2007** - Implementation of the Directive 2003/122/CE EURATOM on the control of the HASRS (High Activity Sealed Radioactive Sources) and orphan sources.

- **Art. 2 par. 1 letter m):** «Integrated Service» technical operative tool able to take charge of all the phases of the management cycle of the dismissed source.
- **Art. 17 par. 3:** The Integrated Service guarantees all the phases of the management cycle of the dismissed sources like the preparation for shipment, the transport, the possible conditioning, and the temporary storage. All the plants and operators which undertake collection activities and possible temporary storage of dismissed sources may ask to join the Service.

# Waste from the fuel cycle: the National Operator - 1

The **National Operator** has to:

- a) **ensure the long period safety** of disused radioactive sources for the purposes of their future disposal, ensuring safe storage for a period of at least fifty years;
- b) **comply** with the same **safety requirements** for the storage of radioactive waste from energy source;
- c) keep separate accounts for the activities referred to in subparagraph a).

The National Operator is the company currently managing the Italian dismissed nuclear facilities: **Sogin S.p.A.**

## Waste from the fuel cycle: the National Operator - 2

**Sogin** is a private company owned by the State which is responsible for the Italian nuclear sites decommissioning and the management of “**electro-nuclear**” radioactive waste.

Sogin has been assigned also the task of **siting, building, and operating the Technology Park and the National Repository** for radioactive waste.

The National Repository is a **surface environmental infrastructure** where radioactive waste can be safely disposed. Once built, the decommissioning of the former Italian NPPs will be completed and all the radioactive waste, including that from the Integrated Service, will be stored there.

# Integrated Service: organization

**ENEA** assumes **ownership** of the radioactive waste taking charge of their final disposal.

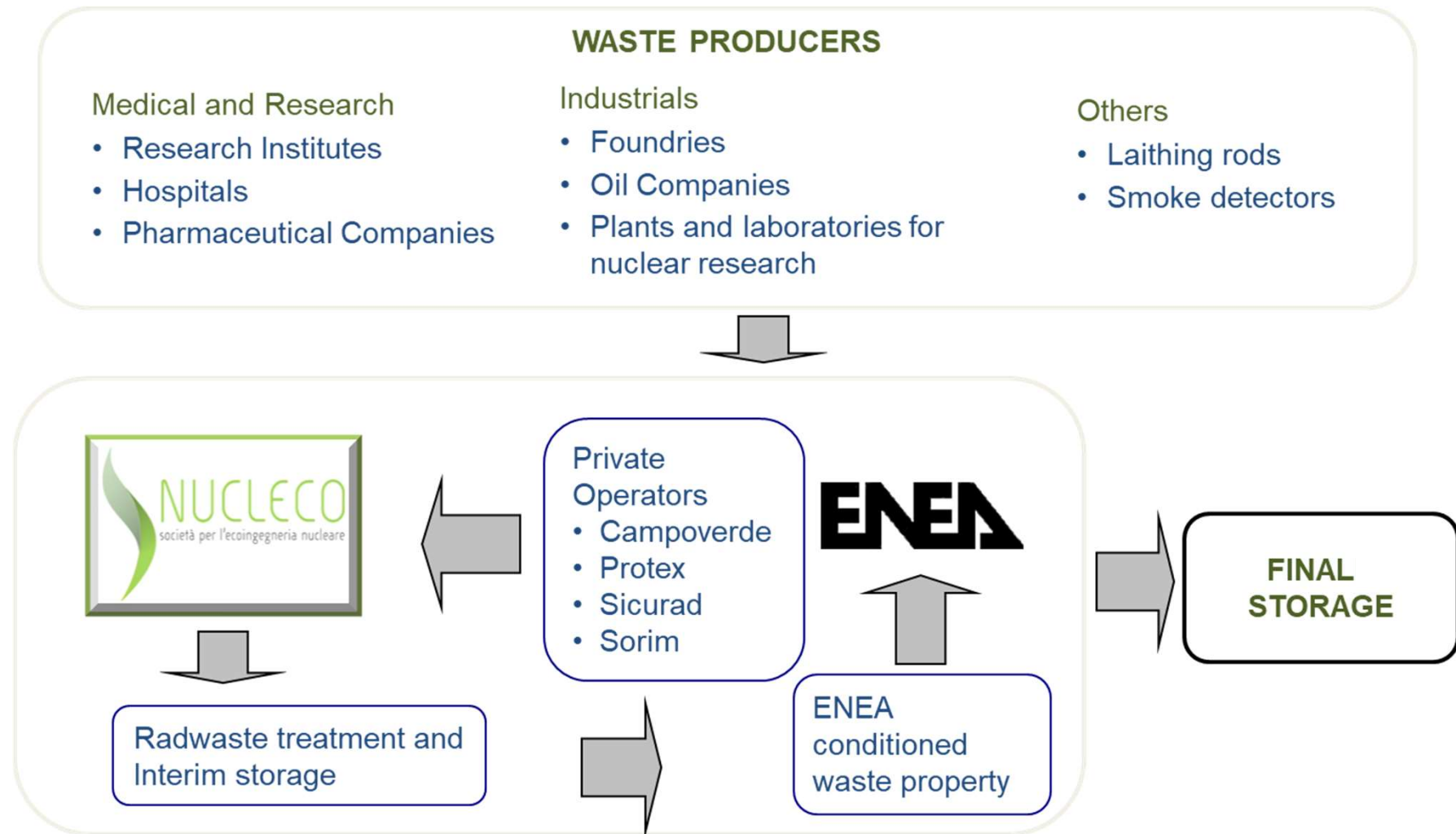
**NUCLECO** is a private company owned by ENEA (40%) and SOGIN (60%) which is in charge for the **conditioning and the temporary storage** of the Integrated Service waste. NUCLECO is located in the ENEA Casaccia Research Center.

**ENEA** and **NUCLECO** signed an **agreement** defining:

- rates;
- procedures for the management of the radioactive waste;
- ownership of the radioactive waste.

**NUCLECO** signs **contracts** for the conditioning of the waste collected throughout the country by the **private Operators**.

# Integrated Service: flow chart



## Integrated Service: some figures

In the NUCLECO plants are (temporary) stored, deriving from Integrated Service:

- about 4400 mc solid radioactive waste,
- about 500 mc liquid radioactive waste.

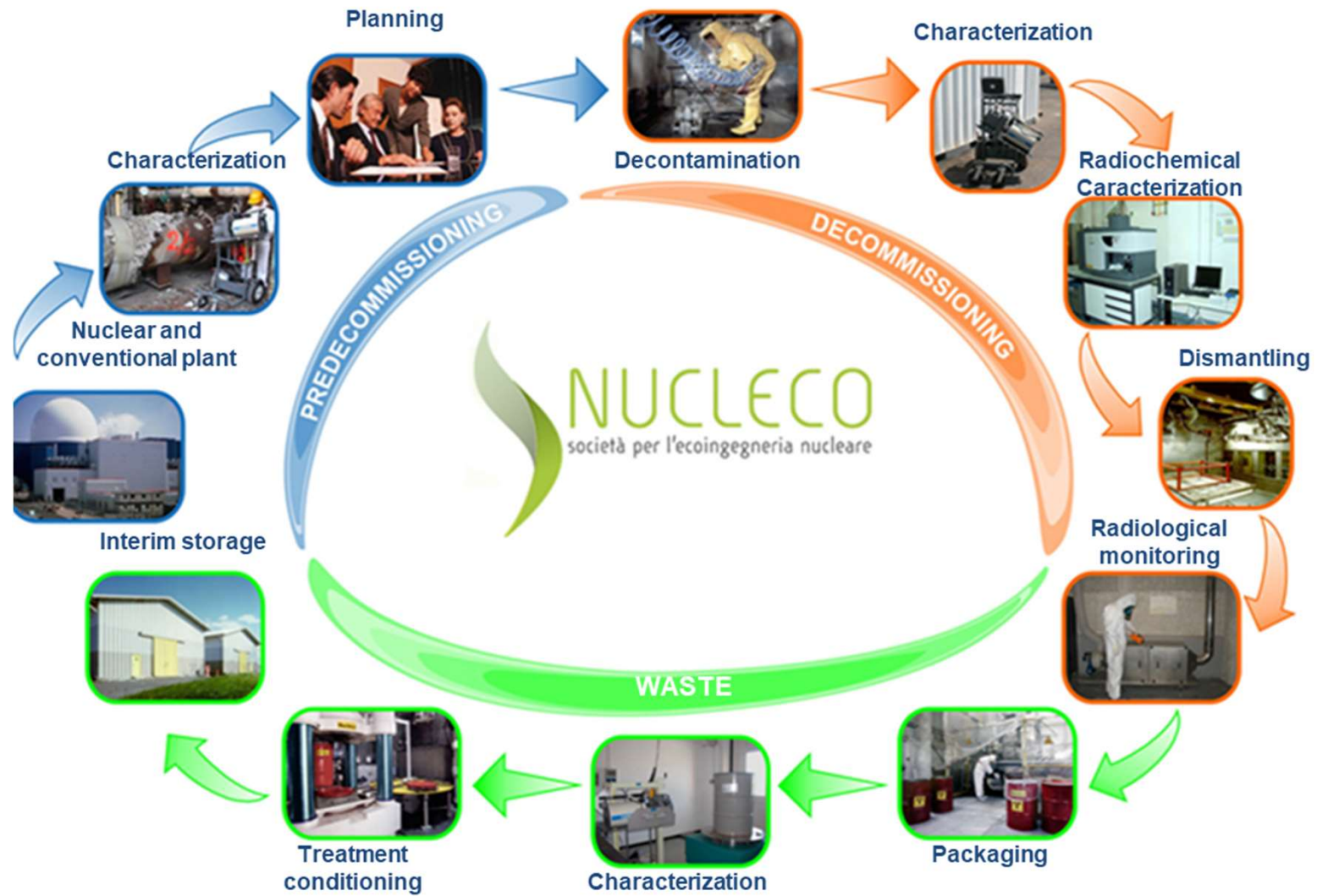
Generally >20 mc radioactive waste per year comes in the NUCLECO plants from the Integrated Service activities.

NUCLECO is also in charge of collecting the wastes produced by Casaccia Research Centre (about 10 mc per year).

NUCLECO manages the facilities for the treatment of the solid and the liquid wastes whose owner is ENEA.



# Nucleco activities

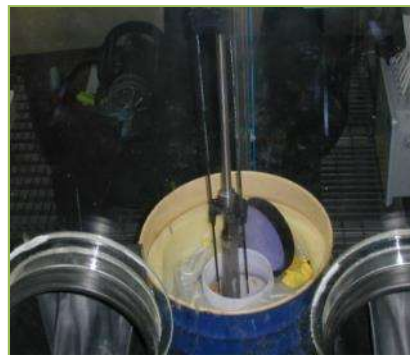


# LIQUID AND SOLID WASTE PRE-TREATMENT

Radioactive waste are pre-treated inside tight-cells for characterization, treatment and conditioning



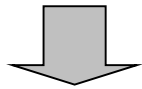
Large components are volume reduced inside tight cells, provided with heavy duty manipulators and cutting systems to allow the waste packing in 220 lt drums and the following supercompaction treatment.



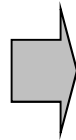
# SOLID WASTE TREATMENT



Reading of drum code and check out of the surface activity



Drum compaction



Compacted drum height measure and pellet positioning in overpack



Conditioned Overpack

# LIQUID WASTE TREATMENT

The «ITLD22» Liquid Treatment Plant implements biological, chemical and physical treatment process. Clarified liquid is released in compliance with specific licenses issued by Competent Authority. Sludges are cement conditioned inside qualified overpacks



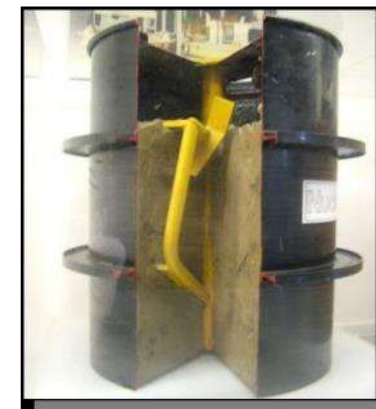
Chemical – Physical Treatment  
Flocculation section



Conditioning station



Liquid Treatment Plant  
Control Room



# RADIOACTIVE SOURCES TREATMENT

## Sealed sources

- Categorization based on their emission type, dimensions, dose rate
- Packaging in Overpacks
- Immobilization by cementation
- Storage of the Overpacks



Cs<sup>137</sup>  
source



Pu<sup>238</sup>  
source



Cement conditioned  
waste packages

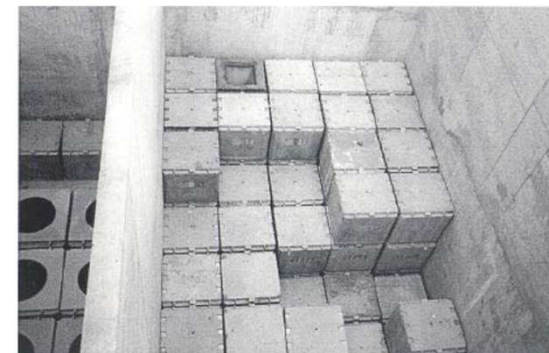
# RADIOACTIVE SOURCES TREATMENT

## High activity sources

- Storage in safe/secure conditions
- Removing of the sources from the original equipment
- Distinct treatments/destination of sources and original equipments



$Cs^{137}$  and  $Co^{60}$   
High Activity Sealed  
Source  
(and  $Ra^{226}$  needles)



Storage Concrete vault

**Preferable route: producers take back disused sources**

# STORAGE FACILITIES



Nucleco licensed areas for waste storage is about 4.000 mq in shelters and 1.000 mq in open space

Treated and Conditioned Radioactive Waste stored in Casaccia site are about 7.500 mc



Thanks for attention



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