



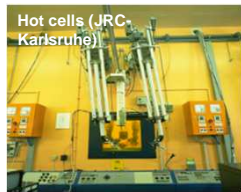
JRC International Summer School 2015 on Nuclear Decommissioning and Waste Management

Decommissioning Programme of the Joint Research Centre

Hans Günther Schneider
European Commission, Joint Research Centre, A.4



ESSOR
(JRC-Ispra)



Hot cells (JRC-
Karlsruhe)



High Flux Reactor
(JRC-Petten)



Accelerator
(JRC-Geel)

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Decommissioning Programme of JRC

Content

- JRC, history and structure
- Decommissioning Programme, liabilities, strategy, budget, timing,
- Governance
- Realisations, developments and status of the nuclear sites
- Constrains and uncertainties
- JRC's Decommissioning Programme in its wider context

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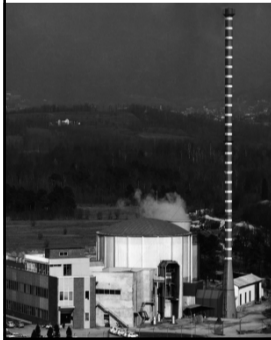
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JRC History

The **Euratom Treaty** (1957) empowered the **European Atomic Energy Community (Euratom)** to contribute to the establishment and growth of nuclear power related industries.

The R&D tasks were to be carried out by a “**Joint Research Centre**” within the European Commission (Art. 8 of the Treaty)



In the early 1960's, **site agreements** were signed between the Community and four Member States:

- ❖ Belgium (Geel),
- ❖ Germany (Karlsruhe),
- ❖ Italy (Ispra)
- ❖ Netherlands (Petten).

Nuclear regulations of the respective host country apply.

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JRC Structure: 7 Institutes in 5 Member States



IET - Petten The Netherlands
Institute for Energy and Transport



IRMM - Geel Belgium
Institute for Reference Materials and Measurements



ITU - Karlsruhe Germany
Institute for Transuranium Elements



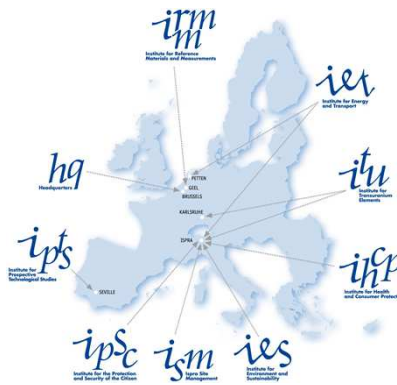
IPSC - Ispra Italy
Institute for the Protection and Security of the Citizen

IHCP - Ispra Italy
Institute for Health and Consumer Protection

IES - Ispra Italy
Institute for Environment and Sustainability



IPTS - Seville Spain
Institute for Prospective Technological Studies



Staff: # 3000

Annual budget:
320 M€ + 50 M€ competitive

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Decommissioning Programme of JRC

Since the 1980's, the JRC's evolving mission has progressively **reduced the need for nuclear R&D installations**, particularly at the Ispra Site, so that many are now shutdown and in state of safe conservation.

Legislation requires JRC to decommission these facilities, and manage all radioactive wastes and nuclear materials, activities which are known as "**Historical Liabilities**".

Likewise, JRC is obliged to decommission its active nuclear facilities, once they have reached the end of their lifetime. These constitute the JRC's "**Future Liabilities**".

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Decommissioning Programme of JRC

The Decommissioning and Waste Management Programme was launched in **1999** (COM(1999)114, Council and European Parliament).

The programme aims to eliminate both historical and future liabilities at all nuclear sites of the JRC.

Some key figures:

- Number of main nuclear installations: 11
- Overall budget: 1,5 billion euro (2012)
- Duration of the programme (for JRC-Ispra): 30 years
- JRC staff involved: approx. 70 persons
- Number of D&WM projects : ~ 25 (at the moment)

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Historical and Future liabilities at JRC-Ispra

The historical liabilities at JRC-Ispra include:

- 1) obsolete irradiated and non-irradiated nuclear materials
- 2) 7 main nuclear facilities, including two reactors (ESSOR & Ispra-1)
- 3) low and intermediate level waste of various sorts



Waste management Area 40



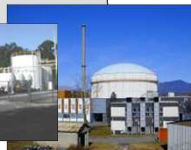
LCSR



Ispra-1



STRRL



ESSOR

On the site nuclear operations are still ongoing: cyclotron (until end of 2015) and nuclear safeguards and security laboratories

Given the scale of the nuclear operations in the past, the JRC-Ispra decommissioning programme is the **largest within the JRC**.

Historical and Future Liabilities at other JRC sites



JRC-Karlsruhe (D)

- Historical nuclear materials and waste
- Facilities for research for the nuclear fuel cycle (hot cells and glove boxes)



JRC-Geel (B)

- Two accelerators for neutron physics
- Laboratories for isotopic measurements & production of reference materials



JRC-Petten (NL)

- High Flux Reactor and related laboratories



JRC's global vision on DWMP

General Principles

National framework: the programme is performed with respect to National framework of the host countries of the different JRC sites and in compliance with applicable National regulations

Resources: Adequate financial and human resources are made available, allocation of resources is periodically reviewed

Communication and stakeholders: JRC informs its stakeholders on the progress made and on the planned technical and organisational measures.
JRC communicates periodically on the advancement of the programme to the JRC Board of Governors, to the European Council and European Parliament



JRC's global vision on D&WMP

1) Nuclear Facilities

FINAL OBJECTIVE: Final release of buildings and areas free of any radiological constraint, building demolition is the reference option, building re-use only if needed

APPROACH:

The decommissioning activities are pursued without delay to avoid unnecessary ageing of the shutdown infrastructure and to limit an unnecessary escalation of the costs arising due to the extended safe conservation and loss of know-how

Future decommissioning of the JRC installations that are still operational is anticipated by a provisional planning

This planning includes the foreseen de-fuelling, decontamination and dismantling activities, their schedule, the estimate of waste quantities and the preliminary calculations





JRC's global vision on the D&WMP

2) Nuclear Materials Management

FINAL OBJECTIVE: ownership transfer to third parties or ultimately transfer to the National repositories

APPROACH:

Non irradiated nuclear material

- sale or transfer of recyclable materials to third parties

Irradiated Nuclear material

- fuel retrieval and treatment if needed for storage or reprocessing



JRC's global vision on the D&WMP

3) Waste Management

GENERAL APPROACH: Waste reduction techniques are applied wherever possible and adequate

The radioactive waste generated by the operational activities and by the dismantling works is segregated and waste quantities are when possible minimised by:

- Clearance – removal from regulatory control
- Recycling in the nuclear industry
- Conditioning through volume reduction techniques



Overall management of the programme, governance

JRC D&WM **Steering Committee** (new concept since mid-2015)

- **High Level Steering Committee** (*Director General, Directors*) *strategic decisions*
- **Operational Level Steering Committee** (*representatives of the sites, projects, legal, budget, administration, ...*) *follow-up on projects and budget*
- normally 3 meetings per year of both levels



Overall management of the programme, governance

JRC D&WM **Expert Group**:
expert advice on technical and organisational issues (2 meetings/year)

JRC **Internal Audit Unit**:
topical reviews of organisational and financial aspects

Periodic review of the programme and Communication to European Council and European Parliament, *assessment by external experts (2003, 2008 and 2011)*



Main realisations at JRC-Ispra

Evacuation of nuclear materials

- Evacuation of > 90% of non-irradiated nuclear materials
- Construction of a temporary storage for the irradiated nuclear materials



Decommissioning

- Full decommissioning of a laboratory building (RCHL) to 'brown field' stage
- Clean-up of historical waste and dismantling obsolete equipment (FARO, STRRL, LCSR)
- Elaboration detailed Decommissioning Plans



Waste management

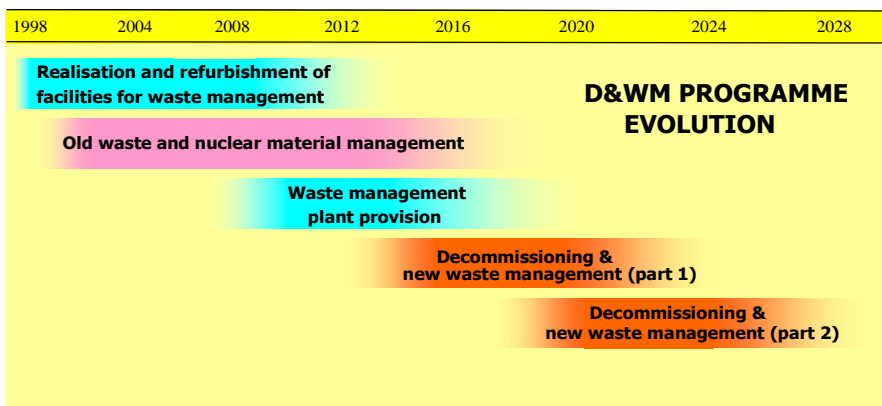
- Installation of waste characterisation and waste pre-treatment installations
- Construction of interim storage facility
- Sorting of historical waste stored on area 40, safe storage of liquid waste
- Evacuation of 1700 radiological sources
- Evacuation of 15 tons of Na and NaK from the site



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JRC-Ispra, Nuclear Decommissioning and Waste Management Programme



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Ispra Nuclear Facilities Safe Conservation and Decommissioning

FARO-ECO by 2019



STRRL old liquid waste facility by 2019



ISPRA 1 to be agreed with the Italian operator



LCSR Hot Cells complex by 2025



ESSOR Nuclear Area by 2025



Cyclotron by 2025



Waste Mgnt. Area (Area 40) by 2030

Main realisations at other JRC sites

JRC-Karlsruhe (D)

- Dismantling of obsolete glove boxes and clean-up of hot cells
- Preparation of facilities for the treatment of residues of irradiated nuclear materials
- *Accumulation rights in future German low level waste repository (KONRAD)*



JRC-Geel (B)

- Decommissioning of an accelerator and a laboratory building
- Clean-up of historical waste and obsolete equipment
- Evacuation of residual non irradiated nuclear materials to U.S.
- Elaboration Decommissioning Plan



JRC-Petten (NL)

- Evacuation of irradiated nuclear materials to U.S. and Dutch waste operator
- Elaboration of Decommissioning Plan for High Flux Reactor



Decommissioning Programme of JRC

JRC-Ispra, D&WMP should be finalised <2035

JRC-Petten, depends on HFR final shutdown that should follow the commissioning of the new reactor "Pallas" (planned for 2024)

JRC-Geel, replacement of a Van de Graaff accelerator (2016), no final plans for stop of activities and decommissioning

JRC-Karlsruhe, a new wing M is in conceptual and design phase, once operational wing M will host activities of other wings. These obsolete wings will be included in decommissioning (2024/26), the rest of the institute will remain operational, no final stop of activities defined

Main constraints and uncertainties

The current main constraints and uncertainties on the programme can be summarised as such:

- the implementation of the **multi annual financial framework** with reduced budget for 2014-2020
- Predictions of budget for years after 2020
- the necessity to find **qualified staff** for the management of the decommissioning projects
- the **national regulatory authorisation process** for JRC-Ispra, which is very rigid and creates unnecessary delays

Accumulated Experience on D&WM at JRC

- JRC staff acquired a large experience in operational D&WM issues.
- The JRC programme is:
 - relatively *small* (e.g. in comparison with NPP decommissioning)
 - but as Research Centre covers a *variety of issues* ("exotic" installations, materials & waste types)

The European Parliament, during its debates on the future Euratom research programme, requested that:

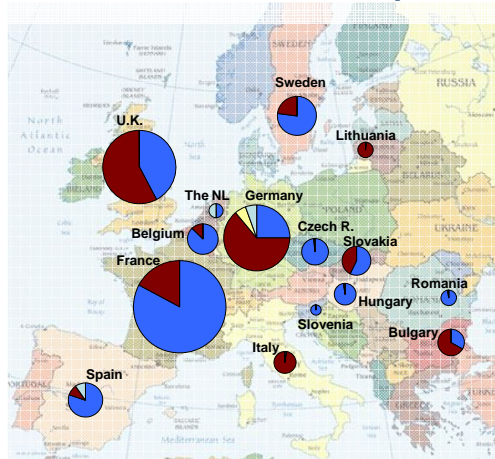
"JRC builds upon its experience with the decommissioning of JRC nuclear facilities and further reinforces its research to support safe decommissioning in Europe."

Support to Decommissioning in the EU Areas of competences of the JRC

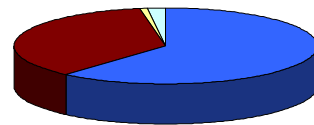
1. Development of **Innovative Technologies**: improvement measurement techniques, site characterisation techniques
2. **Standardisation**: creating a references for radiological measurements, validation of activation calculations, improvement of nuclear data
3. **Education and Training**: assessment of training needs and training opportunities in the EU, integration D&WM in European Safety and Security School (EN3S), initiative on integrated European Summer School concept
4. **Knowledge Management**: organisation of dedicated seminars, support to IAEA and OECD/NEA



Situation nuclear power plants in the EU



- Operational
- Shutdown - Dismantling
- Fully Dismantled
- Long Term Safe Enclosure

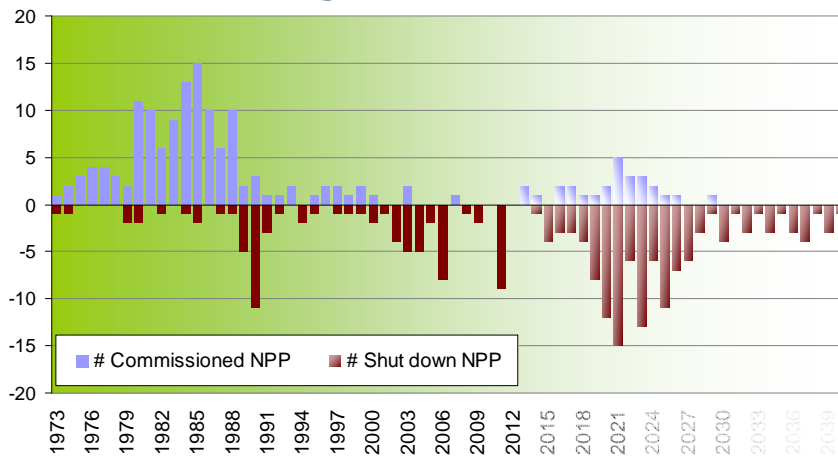


TOTAL
Power reactors in EU:
220
Operating reactors: **135**

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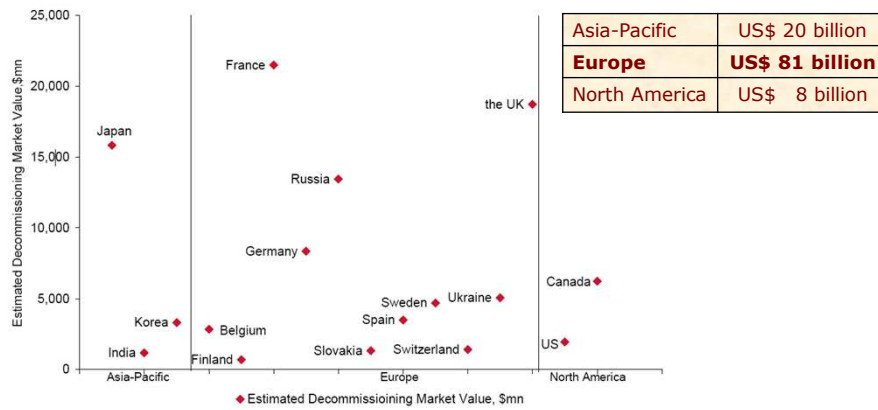
Commissioning and Shutdown & Forecast



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The decommissioning market up to 2030 shares as of January 2012



source: GlobalData, 2012



Decommissioning Programme of JRC Conclusions

JRC D&WMP will be ongoing for many years, with important realisations <2035

JRC D&WMP is facing challenges with the resources: specialised staff and budget

JRC D&WMP will not be finalised by the time the European Decommissioning Market will gain momentum. The market will absorb a big proportion of competences and workforce of the supply chain and JRC will face more competition





Decommissioning Programme of JRC Conclusions

Decommissioning is a growing market in Europe but also worldwide

The **Decommissioning Supply Chain** will offer many interesting positions in years to come

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Decommissioning Programme of JRC

Thank you very much for your attention

Questions?

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