Managing VLLW in German NPP Decommissioning Projects

An Overview and Insight from a Decommissioning Operator‘s Perspective

Inge Werthmann (PreussenElektra GmbH)

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PreussenElektra GmbH - Our sites

Pressurised water reactor, 1.480 MW
Start of commercial operation: 1986
Shutdown: 2021
Start of dismantling: 2024

Pressurised water reactor, 672 MW
Start of commercial operation: 1972
Shutdown: 2003
Start of dismantling: 2005

Pressurised water reactor, 1.410 MW
Start of commercial operation: 1979
Shutdown: 2011
Start of dismantling: 2018

Pressurised water reactor, 1.430 MW
Start of commercial operation: 1985
Shutdown: 2021
Start of dismantling: 2024

Boiling water reactor, 670 MW
Start of commercial operation: 1971
Shutdown: 1995
Start of dismantling: 1997

Pressurised water reactor, 1.345 MW
Start of commercial operation: 1982
Shutdown: 2015
Start of dismantling: 2018

Pressurised water reactor, 1.485 MW
Start of commercial operation: 1988
Shutdown: 2023
Start of dismantling: 2024

Boiling water reactor, 912 MW
Start of commercial operation: 1979
Shutdown: 2011
Start of dismantling: 2017

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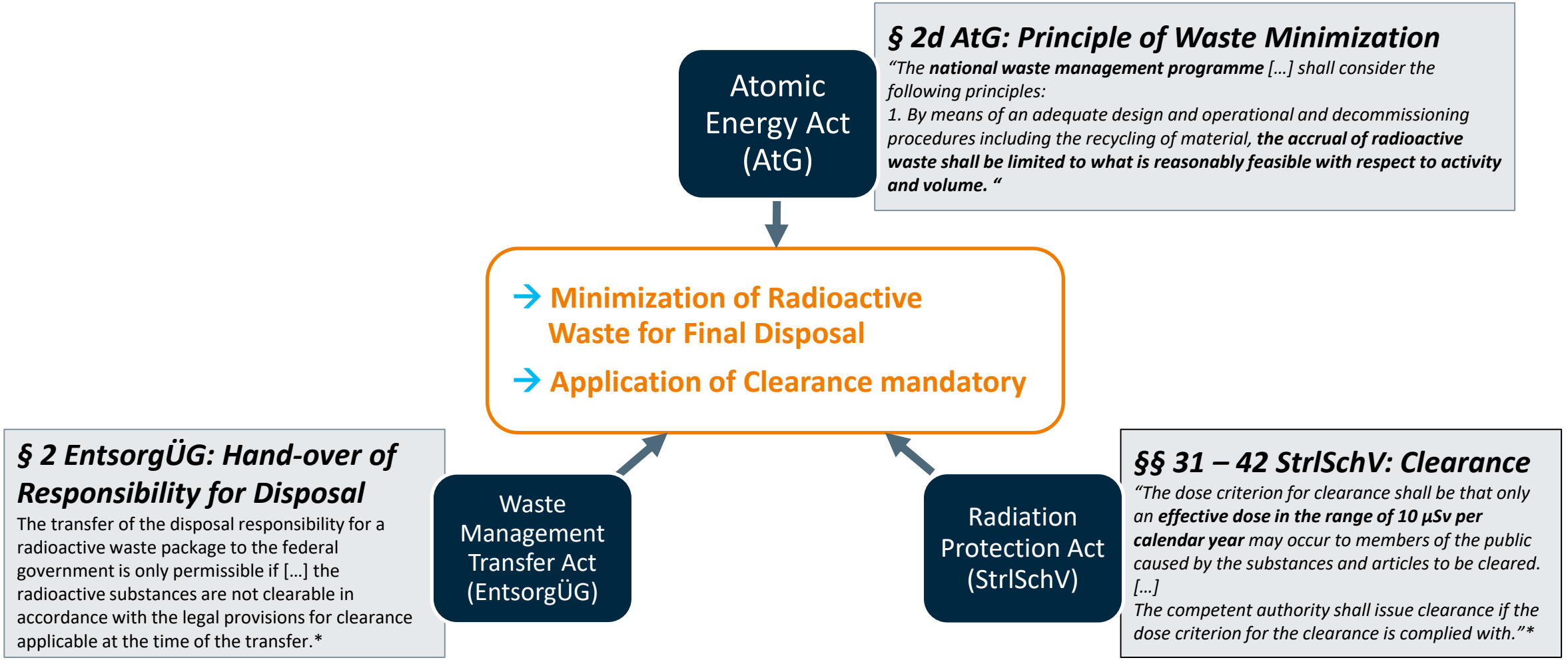
Waste Management in Germany

Legal Basis



* Non-official translations

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Waste Management in Germany

Achieving Waste Minimization through Clearance

The Radiation Protection Ordinance (StrlSchV) provides a complex system for clearance:

→ **Unrestricted (General) Clearance**

→ Specific Clearance

- Material for disposal at landfill
- Material for incineration
- Buildings for demolition or re-use
- **Metal scrap for recycling**

→ Clearance by case-by-case considerations

➔ **Basing on 10 µSv per year (De Minimis) Concept**

- All processes to be approved by supervisory authorities
- Implementation in practice to be accompanied by authorities and independent experts

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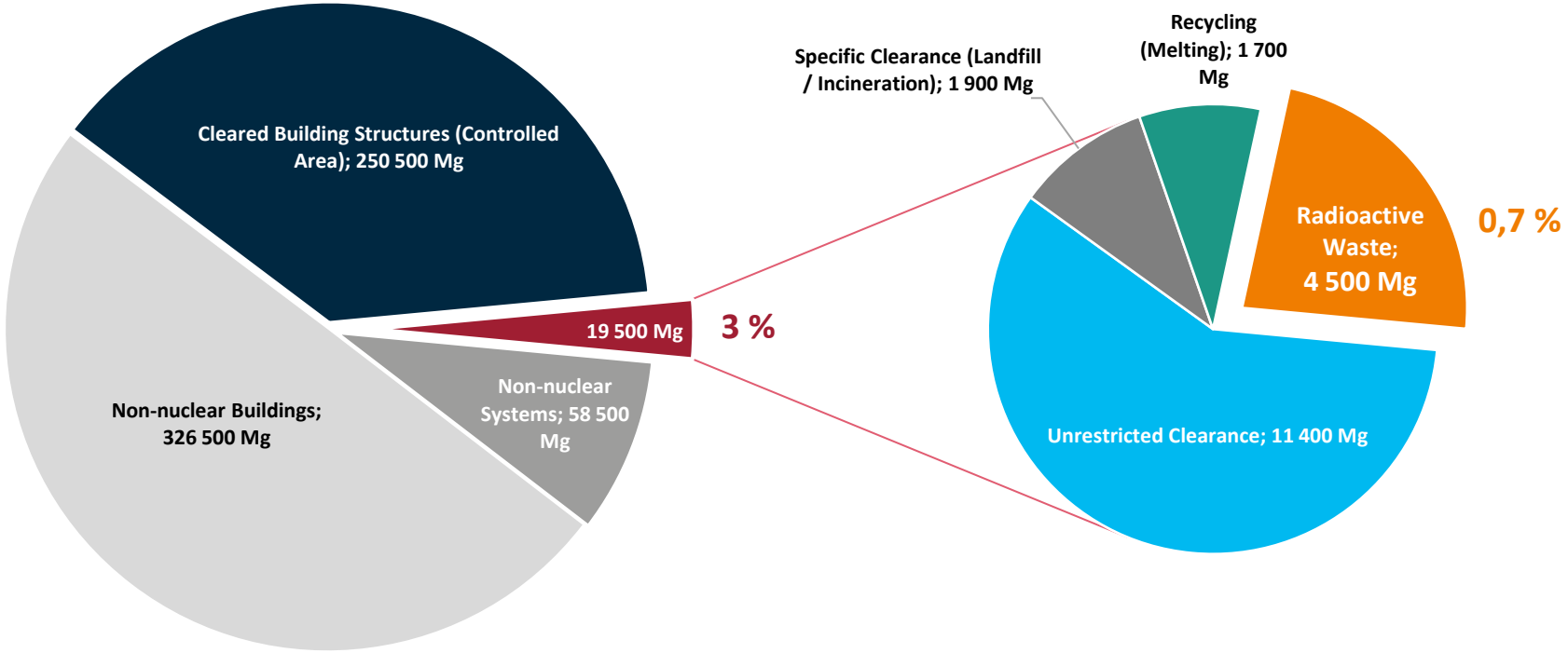
Implementation of Clearance during Decommissiong

Overview of Masses from Decommissioning of a Pressurized Water Reactor

Total Mass 655.000 Mg



→ **More than 98 % of the masses of the nuclear area are non or very low radiactive and can be recovered and recycled or disposed of as conventional waste after decontamination and clearance**

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Technical Concepts for Waste Management

Waste Treatment Centers (WTC)

- PEL's concept of WTC: On-site WTC at each NPP: integrated in existing buildings
- Facilities and treatment stations spread mainly over radiation-controlled area
- Available space depending on NPP design
- Alternative WTC concepts in Germany include on-site treatment in new buildings and centralized off-site treatment facilities
- **External specialized facilities vital for effective waste management in Germany: e.g. Melting facilities for metal recycling**

Waste Treatment Center in Turbine Hall of Würgassen NPP (Boiling Water Reactor)

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Germany in the International Context

- Minimization of radioactive waste for disposal is nowadays incorporated in most national waste management programmes.
- These days, unrestricted clearance of materials is introduced in most countries and constitutes the main option beside radioactive waste.
- Recycling and reuse of material (specific clearance)
  - is supported by the international guidelines and recommendations e.g. RP 89, RP 122
  - is welcomed and strived by the nuclear industry
  - plays a minor role due to lack of accepting facilities or sufficient capacities
- German system for clearance is comprehensive and the most elaborated worldwide. It offers reliable criteria for setting up a waste management and clearance processes for all material from decommissioning.

Conclusions

- Decommissioning and clearance in Germany is indispensable and complex but feasible. An early planning and discussion of processes with competent authorities is key for an effective decommissioning and waste management.
- A complete documentation of all material streams from their origin and continuous tracking of its whereabouts is a key aspect in the German system and in particular for clearance.
- Experience transfer is essential for optimizing waste management at PEL's decommissioning projects; individual site-specific considerations required.
- No waste management without external treatment and disposal facilities and contractors: stable and reliable partners and processes enabling long-term planning and successful decommissioning.

Thank you!

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