

Main outcomes from the German pilot project ReFus on the regulation of fusion facilities

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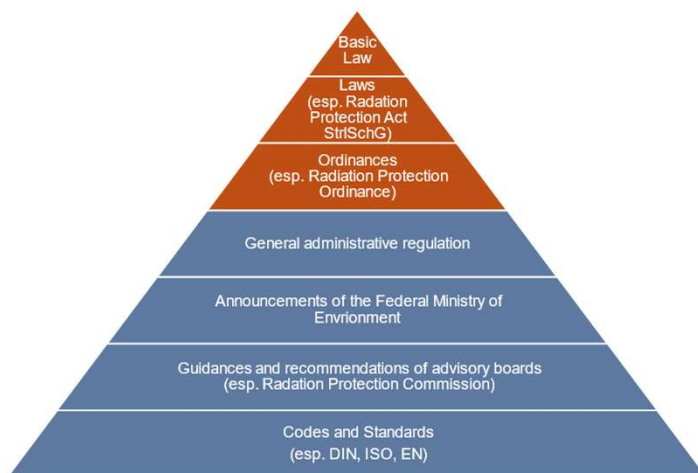
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ReFus project goals

- Analyze the status-quo of the legal and technical regulations of fusion facilities in Germany
- Develop a concept for integrating future fusion facilities or power plants into the existing legal framework, and to identify needs for further development.



Concept for technical regulation

- Build on the existing technical radiation protection regulatory framework
- Apply graded approach for safety requirements and safety assessment, based on the radiological hazard potential of the fusion facility
- Analyze possible criteria/values for thresholds between different grading steps as shown below

	Definition of intermediate steps possible		
		10 ^{xx} neutrons per second and/or YY MW _{thermal} and/or 10 ^{zz} x exemption level	
	Definition of intermediate steps possible		
§§ 104 (3), 106 (3) StrlSchV	10 ⁷ x exemption level (e.g. roughly equivalent to 28 g H-3)		
§ 10 StrlSchG	1 x 10 ¹² neutrons per second		

- Limitation of exposure due to incidents/accidents: Defense-in-depth level 3 has to be analyzed comprehensively
- Safety classification of SSC
- Preparational measures for incidents/accidents
- Defense-in-depth level 4 has to be analyzed
- Environmental impact assessment
- Limitation of exposure by design basis accidents: "Checklist for Licensing of Fusion Facilities"
- Preparational measures for incidents/accidents
- "Guidance for fusion facilities" with defined scope
- Preliminary environmental impact assessment
- Threshold for construction license
- ("Checklist for Licensing of Fusion Facilities")

Long-term goal: new safety requirements
Near-term goal: based on exiting regulation

Further topics within the project

- Regulatory needs of fusion industry/supply chain
- Waste disposal aspects of fusion facilities
- Non-proliferation and dual-use aspects of fusion facilities
- Simulation codes for safety assessments
- Needs for codes and standards
- Licensing implications of rededication of nuclear power plant sites for fusion facilities

Legal status-quo

The **Atomic Energy Act** regulates facilities handling fissile materials (uranium, plutonium)



Fusion facilities do not require a license under the Atomic Energy Act

The **Radiation Protection Act** regulates

- "installations for the generation of ionizing radiation" including plasma installations
- "handling of other radioactive substances"



Fusion facilities are already regulated under the Radiation Protection Act

Licenses

- License for construction
- License for operating a fusion facility
- License for handling radioactive substances (tritium and activated material)

Main licensing requirements

- Following safety and security principles
- Implementing the state of the art in science and technology
- Exposure limits for a person of the public:
 - Normal operation: 1 mSv p.a.
 - 0.3 mSv p.a. each for liquid and gaseous radioactive effluents
 - Accidents: 50 mSv
- As low as reasonably achievable (ALARA) principle

⇒ Once proven, legal right to obtain license

⇒ Existing goal orientated legal regulatory framework for fusion facilities

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