



INTERNATIONAL SYMPOSIUM ON

FUSION ENERGY LAW



1 OCTOBER 2026



AUDIMAX, NEUE UNIVERSITÄT
Sanderring 2, 97070 Würzburg, Germany

organized in collaboration with

FELEX

INTERNATIONAL GROUP
OF LEGAL EXPERTS ON
FUSION ENERGY



The image features a background of a classical building facade, likely the main entrance of the University of Würzburg, with a statue on the roof and arched windows. A blue sky and some trees are visible in the upper left. A white rectangular logo is positioned on the left side, containing the university's name in German.

Julius-Maximilians-
**UNIVERSITÄT
WÜRZBURG**

Introduction

Dr. Philipp Sauter

Research Group Leader: Legal Questions of Fusion Energy

Fusion breakthroughs accelerate

The edge decides: How turbulence determines the success of fusion power plants

Two IPP papers in the journal *Physical Review Letters* explain for the first time, from first principles, what happens in the extremely thin edge layer of a fusion plasma. In doing so, they provide a foundation for the design of future reactors.

Harnessing the power of the stars

New research validates the physics of the ARC fusion power plant

The National Ignition Facility
Has Achieved Fusion Ignition

11 times

Setting a Record Fusion Yield of

8.6 MJ*

and a Target Gain

>4

*April 7, 2025

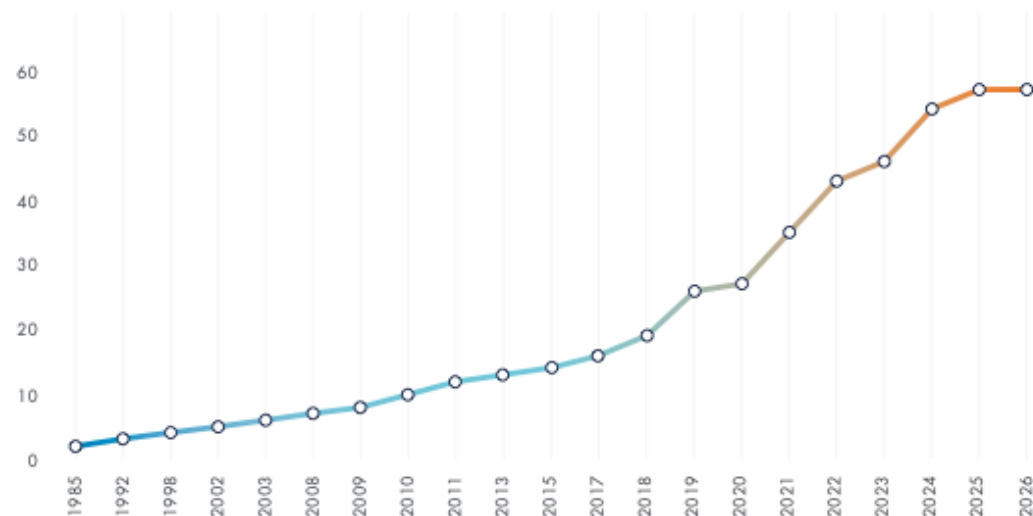
HOME / FUSION

Wendelstein 7-X sets new fusion performance records

Wednesday, 4 June 2025

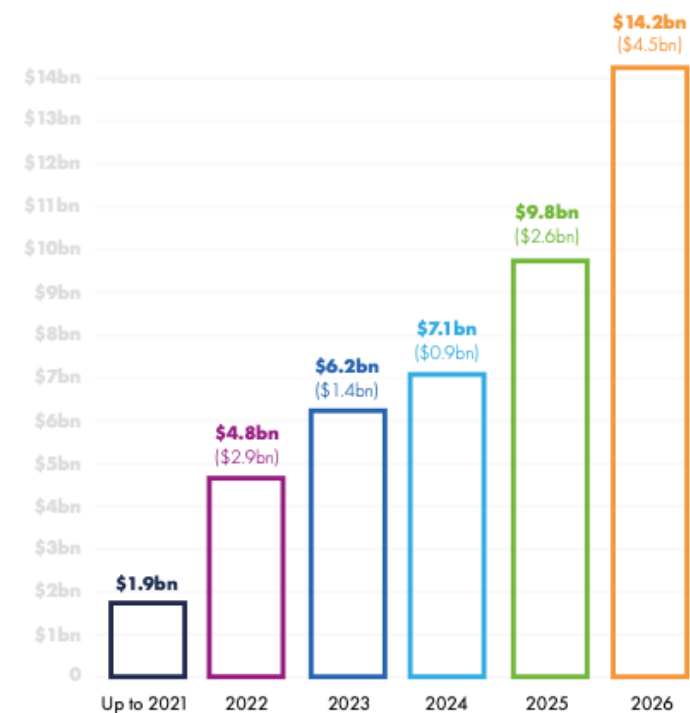
Fusion investment accelerates

Total number of private fusion companies by year



Total industry funding over the years

(annual total in brackets)



Government interest in fusion accelerates

Bayerische Staatsregierung



Bayerischer Masterplan
zur Förderung der Kernfusion und
neuartiger Kerntechnologien

MISSION
KERNFUSION



Junior Research Group: Legal Questions of Fusion Energy



Dr. Philipp Sauter
Research Group Leader

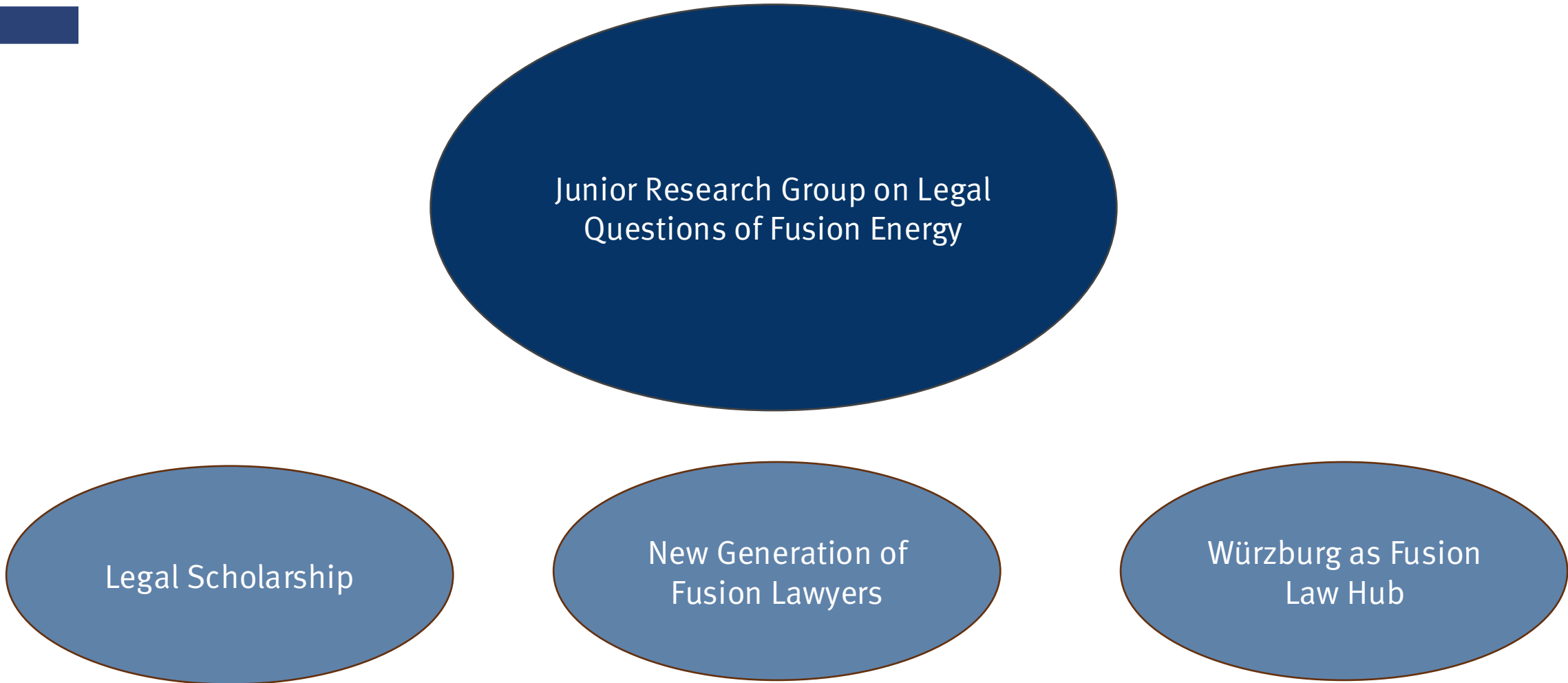


Kristin Weiß
Research Fellow



Franziska Hosp
Student Assistant

Aims of the Group



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graph TD; A([Junior Research Group on Legal Questions of Fusion Energy]) --- B([Legal Scholarship]); A --- C([New Generation of Fusion Lawyers]); A --- D([Würzburg as Fusion Law Hub]);
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Junior Research Group on Legal
Questions of Fusion Energy

Legal Scholarship

New Generation of
Fusion Lawyers

Würzburg as Fusion
Law Hub

Fusion Regulation as Key Issue

- Regulation as Enabler oder Inhibiter
- Regulation sets Playing Ground for Fusion Industry
- Regulation provides Legal Certainty
- Regulation creates Public Trust

Key Legal Questions

- What are different national approaches taken to fusion regulation?
- How to ensure that fusion technology is not misused in military applications?
- How can fusion regulation align with industry interests?
- How to deal with civil liability in case of an accident?
- How can fusion regulation be harmonised?

Session 1: National Experiences on Regulating Fusion Energy

INTERNATIONAL FUSION ENERGY LAW SYMPOSIUM — WÜRZBURG, 1 OCTOBER 2026

Lessons of ITER licensing and nuclear safety process

Joëlle Elbez-Uzan

Head of Department Technology, Design / Integration and Licensing



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The French Alternative Energies and Atomic Energy Commission (CEA) is a major research organisation working in the best interests of the French State, its economy and citizens. Thanks to its strong roots in fundamental research, it is able to provide tangible solutions to meet their needs in four key fields: Low-carbon energy (nuclear and renewable), Digital technology, Technology for medicine of the future & Defence and national security,

WHY FUSION REGULATION MATTERS NOW

An open international question: how will fusion power plants be licensed and regulated?

1

Safety for workers, the public and the environment

The international community is discussing how fusion power plants (FPPs) will be licensed and regulated to **ensure safety for both the workers and the public, together with the protection of the environment.**

2

Clear requirements that guide technology and build acceptance

A clear framework would also help to focus technological development according to **clear requirements and guidelines**, whilst promoting the **public acceptance** of fusion.

ITER — the first fusion facility licensed in Europe — is a working test case for this question.

IAEA SAFETY FUNDAMENTALS — THE GRADED APPROACH

Same fundamental safety objectives as any nuclear facility — implementation graded to the hazard

1

Fundamental safety objective

Protect people and the environment from harmful effects of ionizing radiation.

Well-established safety principles :

- Defence in depth
- As Low As Reasonably Achievable (ALARA)
- Passive safety principles

2

No new fundamental safety functions

Fusion power plants do not create the need for specific fundamental safety functions:

- Confinement of radioactive and hazardous materials
- Limitation of internal and external exposure
- Potentially, decay heat removal

3

Graded to the hazard potential

Differences in hazard potential and in the design protection / safety provisions

→ differences in how the safety methodologies and safety requirements are defined and implemented.

Fundamental Safety Principle SF-1 — graded approach

THE POLICY QUESTION FOR FUSION LAW —

Fusion is not fission — the safety case rests on confinement, not on reactivity control

1

Fusion is not fission

ITER's safety case rests on confining tritium and activated dusts and on ALARA — not on reactivity control.

WHAT ITER DEMONSTRATES



No criticality, no runaway

No chain reaction to control: the fusion reaction stops as soon as any plasma parameter drifts.



Bounded, tritium-dominated inventory

Total radioactive inventory stays below that of a 900 MWe PWR; tritium is the dominant radionuclide.



No high-level waste

Long-lived intermediate-level (MA-VL) waste is ~7% of the total; tritiated waste is the open question.



No protective measures for the public

Reference accident ≈ 3.4 mSv (ITER/O) / 4.6 mSv (IRSN); beyond-design cases need no sheltering or evacuation.

Sources: IRSN report DSU n°008 (Nov 2011), §3–§5; public-inquiry commission report, Conclusions §3

THE POLICY QUESTION FOR FUSION LAW —

A framework matched to the actual hazards — proportionality inside a nuclear-installation regime

2

A framework matched to the actual hazards

France licensed ITER as a nuclear installation (INB No. 174) — yet the goal-oriented framework let the requirements be graded to the real risk.

WHAT ITER DEMONSTRATES



Classified by inventory, not by technology

INB status follows from the radioactive inventory ($Q > 10^9$): ITER's ≈ 4 kg of tritium is $\sim 150\times$ the threshold.



Goal-oriented, not prescriptive

Safety objectives are set by the regulator and demonstrated by the operator, **so requirements scale with the risk.**



No mechanical import of fission rules

The demonstration focused on confining tritium and activated dusts and on ALARA, not on reactor-specific rules.



Consistent with IAEA SF-1

Same fundamental safety objectives and functions; the graded approach adapts their implementation to the hazard.

Basis: Code de l'environnement, art. R.593-2 & annex · IAEA SF-1 · IRSN report DSU n°008 (Nov 2011)

THE POLICY QUESTION FOR FUSION LAW —

France already has the building blocks — ITER was licensed without a bespoke fusion statute

3

France already has the building blocks

The creation decree (DAC) was delivered under the existing Code de l'environnement / INB regime. The instruments to license fusion already exist.

WHAT ITER DEMONSTRATES



Existing law delivered the decree

The DAC (décret n°2012-1248, Nov 2012) was granted under the INB regime of the Code de l'environnement.



Radiological and chemical hazards, together

The assessment coupled radiological impact with chemical hazards (beryllium, zinc) and the cumulative CEA/ITER impact.



EU instruments already in place

EU radiation-protection and waste law, conventional-hazard law and engineering codes already provide the basis for design activities.



A community that has done it once

Regulator, technical support, operator and industry have already carried a fusion facility through licensing.

Sources: décret n°2012-1248 (INB No. 174) · IRSN report DSU n°008 (Nov 2011), §6–§7

THE POLICY QUESTION FOR FUSION LAW —

The need is clarity, convergence and competence —

4

The need is clarity, convergence and competence

ITER shows the value of early regulator engagement, staged hold points and international cross-checking over new legislation.

WHAT ITER DEMONSTRATES



Early regulator engagement

From the 2006 national public debate to the 2010 DAC dossier and the 2011 review, dialogue preceded the 2012 decree.



Staged hold points

130+ IRSN recommendations, hold points (before pouring the basement, before commissioning) and phased entry H/He → D → T.



International cross-checking

IRSN cross-checked the impact and defence-in-depth assessment with Canada's CCSN.



Close the capability gap

The gap to close is regulatory capability and predictability — not the absence of a fusion law.

Sources: IRSN report DSU n°008 (Nov 2011), §7 · public-inquiry commission report (9 Sept 2011)

One framework, one regulator — and why ITER is a licensed nuclear installation (INB)

§

Safety & radiation protection, unified

- Safety (sûreté) and radiation protection are run as one integrated system, not two separate regimes.
- One legal backbone — the Code de l'environnement (INB regime) — whose “protected interests” span safety, health and the environment.
- One regulator since 1 Jan 2025: ASNR, the ASN–IRSN merger, covering both — as its name states.
- Classification thresholds use the Code de la santé publique exemption values (R.1333-27).

³H

Why ITER is classified as an INB

- INB status is triggered once the radioactive inventory passes a threshold, via the Q coefficient:

$$Q = \sum (A_i / A_{ref,i}) \text{ — INB if } Q > 10^9$$

- For tritium, $A_{ref} = 10^7 \text{ Bq} \rightarrow \text{threshold} \approx 10^{16} \text{ Bq} \approx 27 \text{ g}$ (activity $3.57 \times 10^{14} \text{ Bq/g}$).
- ITER's authorised inventory $\approx 4 \text{ kg} \approx 1.4 \times 10^{18} \text{ Bq} \rightarrow Q \approx 1.4 \times 10^{11}$, about 150 × the threshold.
- **ITER is therefore INB No. 174 (Cadarache).**

10^7 Bq

Tritium reference value A_{ref} in the
INB nomenclature

$\approx 27 \text{ g}$

³H inventory that triggers INB
classification

$\approx 4 \text{ kg}$

ITER authorised ³H inventory ($\sim 150 \times$
the threshold)

Basis: Code de l'environnement, art. R.593-2 & annex (ex-Décret 2007-830, codified) · reference values per Code de la santé publique R.1333-27 · regulator: ASNR (ASN–IRSN merger, 1 Jan 2025). ITER = INB No. 174, Cadarache.

ITER LICENSING — HOW THE CREATION AUTHORISATION (DAC) WAS BUILT

Two parallel tracks fed one decree: technical safety review and public inquiry

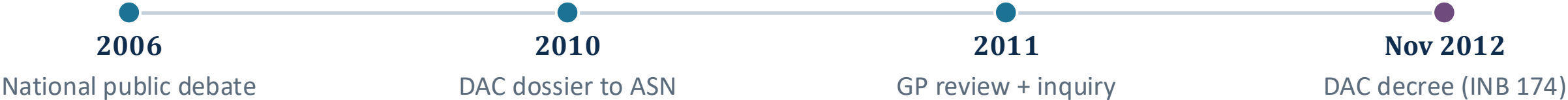
A Technical safety review

- IRSN assessed the safety and impact case; a standing expert group (GP) then examined the file.
- Verdict: “globally satisfactory” — conditional on operator commitments and IRSN recommendations.
- *Source: IRSN report DSU n ° 008 (Nov 2011).*

B Public inquiry (enquête publique)

- 15 June–4 Aug 2011 (extended 15 days); a five-member commission handled the public’s observations.
- A mandatory step within the wider INB authorisation procedure.
- *Source: commission report signed 9 Sept 2011.*

FROM PUBLIC DEBATE TO DECREE



Sources: IRSN report DSU n ° 008 (GP review, Nov 2011); public-inquiry commission report (9 Sept 2011).

TECHNICAL SAFETY REVIEW (1/2) — THE FACILITY

Inside the facility: a safety case built on confinement

§2 Operating domain: the licence envelope

500 MW for 300–500 s, plasma current and pulse count bound the licence; tritium ≤ 1 kg between major shutdowns.

Open items

- Activation calculations on a representative model
- Residual tritium at the end of the H/He phase

§3.1 Confinement and exposure limitation

Confinement and ALARA are the main safety functions; civil engineering is the second barrier.

Open items

- Robust design of the main raft and enclosure
- No simultaneous helium leak and release in galleries

§3.2 Keeping tritium and dusts inside

Static and dynamic barriers, detritiation and gloveboxes — the heart of the safety case.

Open items

- No untimely discharge-valve opening during plasma
- Limit permeation; confirm detritiation performance

§3.3 Plasma-driven hazards

Loss of plasma control, disruptions and dust dominate the accident scenarios.

Open items

- Margin between 16 MA shutdown and 17 MA design
- Quantify disruption dust; limit explosion effects

Source: GP report (IRSN DSU n°008, Nov 2011), §2–§3.3

TECHNICAL SAFETY REVIEW (2/2) — SITE, PUBLIC AND ENVIRONMENT

Very low impact — verdict: “globally satisfactory”, with open items defined

§3.4–3.5 Site-specific external hazards

Seismic, groundwater and flooding reviewed; aircraft crash led to no formal recommendation.

Open items

- Justify the absence of soil liquefaction
- Piezometric map; additional flooding sources

§4 Accidents and the public

Reference accident ≈ 3.4 mSv (ITER/O) / 4.6 mSv (IRSN); no sheltering or evacuation needed.

Open items

- Include the DF5 meteorological condition
- Confirm the second rupture-disk integrity

§5 Waste and dismantling

$\sim 1,200$ t operational, $\sim 36,000$ t decommissioning waste; €530 M fund; the host state dismantles.

Open items

- MA-VL in the deep-repository inventory
- Tritiated-waste packages fit interim storage

§6 Normal operation

Public dose ≈ 2.3 – 4.3 μ Sv/yr, assessed jointly with chemical hazards.

Open items

- More recent meteorological datasets
- Acute chemical exposure; zinc effluent

Source: GP report (IRSN DSU n°008, Nov 2011), §3.4–§6

RETURN OF EXPERIENCE — TECHNICAL SAFETY REVIEW (IRSN / GP)

What the safety examination revealed about licensing a first-of-a-kind fusion facility

1 A fusion-specific safety logic

The case was built on confining tritium and activated dusts and on ALARA — not on reactivity control: fusion has no criticality and no runaway, and the reaction stops when any parameter drifts.

2 Uneven design maturity at DAC stage

The tokamak building was detailed; the tritium, hot-cell and waste buildings were not. Many verifications were explicitly deferred to detailed design and commissioning.

3 A commitment-based, staged licence

The DAC rested on 130+ IRSN recommendations, with **hold points** (e.g. before pouring the basement, before commissioning) and phased entry of nuclear material: H/He → deuterium → tritium.

4 Cross-border review + dual hazard

IRSN cross-checked impact and defence-in-depth with Canada's CCSN. Assessment integrated radiological and chemical hazards (beryllium) and the cumulative CEA/ITER impact — computed public dose stayed at $\sim \mu\text{Sv}/\text{year}$ under penalising assumptions.

Source: IRSN report DSU n 008 (Nov 2011), § Conclusion and risk-analysis chapters

PUBLIC-INQUIRY REPORT — § 1 CONDUCT OF THE INQUIRY

Well organised, but low turnout dominated by organised opposition

The commission judged the inquiry properly run; participation was nonetheless thin and shaped by a mobilised anti-nuclear campaign.



High response count, low physical turnout

10,606 people expressed themselves, yet only 79 individuals or representatives actually came to the public sessions (permanences).



Overwhelmingly unfavourable

99.7% of the remarks opposed the project, most expressing a general anti-nuclear position rather than site-specific concerns.



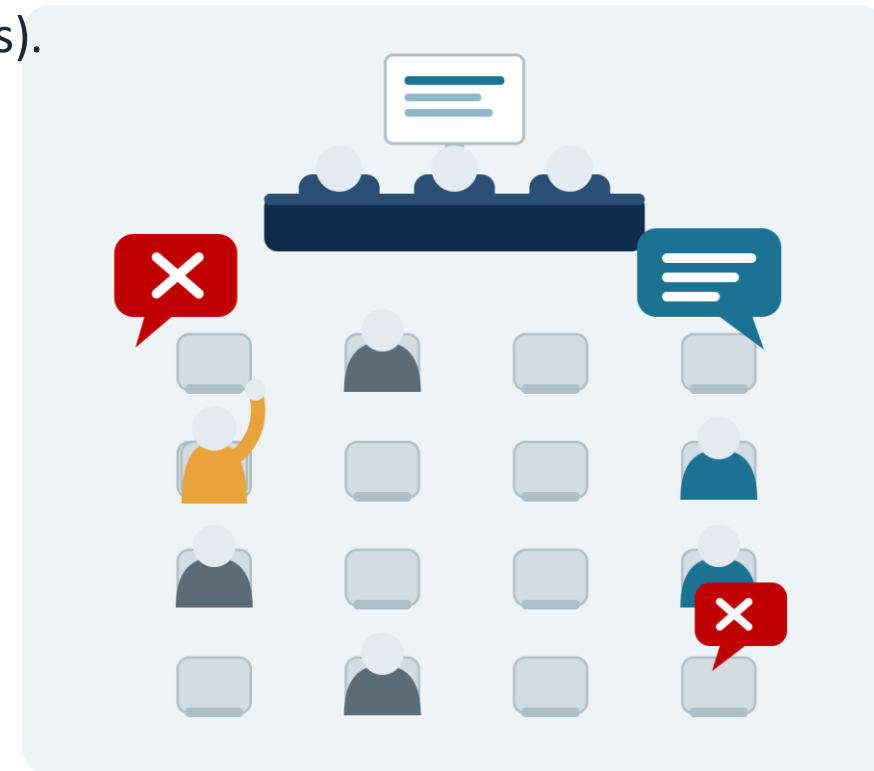
Driven by one petition

72% of the inquiry's respondents acted through the "STOP ITER" collective's petition — organised mobilisation more than individual deliberation.



Scope of the inquiry

Held across the five host municipalities from 15 June to 4 August 2011, extended by fifteen days.



Source: public-inquiry commission report, Conclusions § 1

The real weakness was legitimacy of the process, not the technical case

The commission's sharpest observations concerned how and when the public was consulted — the procedure, not the safety demonstration.



Fragmented into many inquiries

Thirteen successive public inquiries since the 2006 national debate diluted the public's sense of what each one was for.



A long gap after the 2006 debate

Roughly five years elapsed between the national public debate and this inquiry, loosening the link to genuine consultation.



Key choices already settled

The build decision, the Cadarache siting and the financing were fixed before the affected population was ever consulted.



Excavation done beforehand

The tokamak-building excavation was carried out before the inquiry — lawful, but it left the public seeing the exercise as a formality.

Source: public-inquiry commission report, Conclusions § 2

On substance: strong waste anticipation and a host-state decommissioning path

On the merits, the commission recorded a project that plans its waste decades ahead and a dismantling route clearly assigned to the host state.



Waste anticipated 30 years ahead

ITER is among the few industries that anticipate their waste three decades early; decommissioning yields on the order of 37,000 t.



Little long-lived waste, staged storage

Long-lived intermediate-level (MA-VL) waste is ~7% (~2,500 t); only ~10% needs over-50-year storage before the future ANDRA deep repository.



Dismantling falls to the host state

Dismantling and its financing are the host state's responsibility, consistent with the 28 June 2006 sustainable-waste-management law.



A staged shutdown-to-dismantling path

Final shutdown (tritium and mobilisable-dust recovery, coolant deactivation) → a radioactive-decay period → remote dismantling of the vacuum vessel.

Source: public-inquiry commission report, Conclusions §3



RETURN OF EXPERIENCE — PUBLIC INQUIRY (ENQUÊTE PUBLIQUE)

The technical case held up; public legitimacy was the harder problem

1 Mobilised opposition, thin deliberation

10,606 people responded but only 79 came in person; 99.7% of the remarks were unfavourable at the beginning of the process and 72% came through a single online petition (“STOP ITER”) — organised opposition rather than broad deliberation.

2 A legitimacy gap

The commission noted that the fundamentals — fusion as an energy path, D–T fuel, magnetic confinement, the Cadarache site and financing — had been decided before any public consultation, five years after the 2006 national debate.

3 Fragmentation undercut the process

The project was split into 13 successive inquiries, and the tokamak excavation was carried out before this one — legal, but it left the public seeing the inquiry as a formality.

4 Substance was not the sticking point

On the merits the commission recorded strong waste anticipation, a low computed impact and a project it did not fault technically — its concerns centred on the process, not on safety.

Source: public-inquiry commission report (INB-ITER, 15 Jun – 4 Aug 2011), Conclusions §1–3; signed 9 Sept 2011.

FUSION IS ALREADY BEING REGULATED OUTSIDE THE FISSION FRAMEWORK

Germany, the UK and the US keep fusion out of the fission framework — France's INB route stays proportionate too

1 Germany

A draft amendment to the Radiation Protection Act (Strahlenschutzgesetz) would place fusion facilities under radiation-protection law, not the Atomic Energy Act.

2 United Kingdom

The Energy Act 2023 keeps fusion outside nuclear-site licensing; oversight sits with the Environment Agency and the HSE.

3 United States

The NRC (2023), confirmed by the 2024 ADVANCE Act, regulates fusion under the byproduct-material framework (10 CFR Part 30), not the reactor framework; NUREG-1556 Vol. 22 guidance is being finalised.

4 France / ITER

ITER is licensed as an INB (No. 174) under the Code de l'environnement — yet requirements were graded to the actual hazard through the goal-oriented framework: a nuclear-installation regime applied proportionately.

WHAT THIS MEANS FOR EUROPEAN FUSION LAW

Four recommendations, grounded in the ITER experience and aligned with a proportionate European framework

1 Regulate proportionately — build on the INB experience

Apply a graded, radiation-protection- and ALARA-oriented reading, leaning on the absence of criticality and runaway. ITER shows proportionality is achievable without transposing fission-reactor requirements wholesale.

2 Use and adapt existing instruments, not a bespoke Directive

EU radiation-protection and waste law, conventional-hazard law and voluntary engineering codes already provide the basis. Prefer a Commission communication or guidance note over new fusion-specific legislation.

3 Keep the public process legitimate

Consult before siting and design become irreversible; keep the debate-to-inquiry gap short and avoid fragmenting into many inquiries. At ITER the weak point was legitimacy of the process, not the technical case.

4 Invest in regulatory capability and convergence

Build fusion competence through early, iterative engagement, international coordination (CCSN, NRC, IAEA) and a European Fusion Expert Group — convergence and competence, not new administrative layers.

CONCLUSIONS — A CLEAR AND POSITIVE PATH AHEAD

ITER proves a first-of-a-kind fusion facility can be licensed safely and proportionately — and Europe is well placed to lead

1 A favourable safety case — demonstrated, not assumed

Radioactive inventory well below a 900 MWe PWR, tritium-dominated, and no high-level waste. Worst-case scenarios need no protective measures for the public, and routine radiological impact is very low.

2 Proportionate regulation works in practice

The goal-oriented French framework graded requirements to the real hazard. As INB No. 174, ITER shows a nuclear-installation regime can be applied proportionately — no bespoke fusion statute was needed.

3 Europe already holds the building blocks

Existing radiation-protection, waste and conventional-hazard law, mature engineering codes — and, just as important, a regulatory and industrial community that has already licensed fusion once.

4 The opportunity for Europe to lead

With regulatory clarity, convergence and capability — built on the ITER precedent — Europe can license fusion predictably and proportionately, turning a first-of-a-kind achievement into an international benchmark.

The ITER licence is a working precedent — the foundation for a proportionate European fusion framework.

THANK YOU
FOR YOUR
ATTENTION!

FAIRNESS



Transparency
Collaboration
Loyalty

OPENNESS



Open doors
Open hearts
Open minds
Open ears

COMMITMENT



Ownership
Critical thinking
Determination
Respect

DIVERSITY



Cooperation
Equal opportunities
Inclusion



Regulating Fusion Energy in Germany

International Fusion Energy Law Symposium
1st October 2026, Würzburg

Dr. Natalie Schreyer, Unit S II 1 I, BMUKN



Contents

- Introduction
- Legislation
- Licensing under Radiation Protection Law
- Which other laws are relevant?
- Are there currently regulatory gaps?
- ENSREG Task Force on Fusion Energy



Nuclear fusion in Germany

- **A high political priority**
- Coalition agreement for 21st legislative period:
 - We want to promote research on fusion.
 - Our goal is for the first fusion reactor of the world to be in Germany.**
 - We aim to establish a regulatory framework for nuclear fusion power plants outside of Atomic Energy Act.
- July 2025: The **High-Tech Agenda Germany** is adopted by the Federal Cabinet. It focuses on six key technologies including fusion.
- October 2025: Germany paves the way for the first fusion power plant with its **Fusion Action Plan** adopted by the Federal Cabinet. Goal: **To increase funding for fusion research.** This includes eight measures that will help create a fusion ecosystem in Germany, which is necessary to build the world's first fusion power plant.

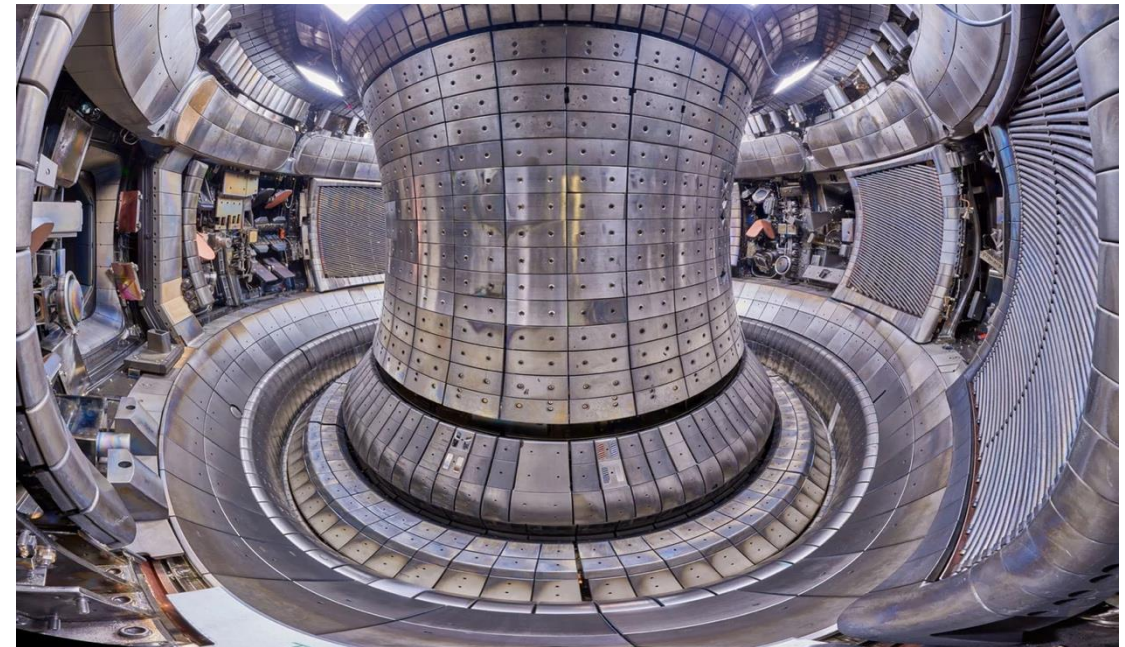




Fusion research facilities in Germany

- **ASDEX Upgrade** (Axially Symmetric Divertor Experiment)
- Location: Garching near Munich
- Commissioned in: 1991
- Type: Tokamak
- **Goal:** To establish the scientific basis to optimise the **tokamak** approach to fusion energy
- **License:** Radiation Protection Ordinance (Strahlenschutzverordnung, StrlSchV)

MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK

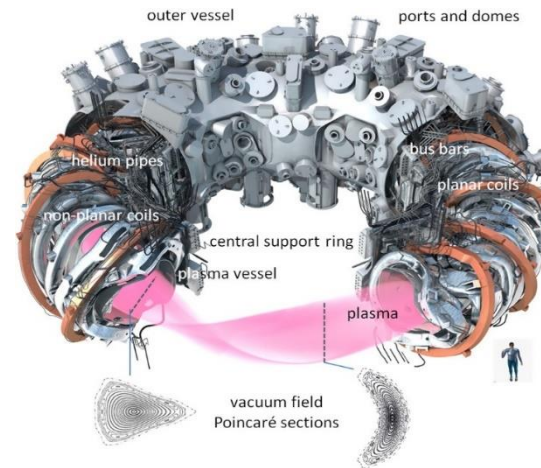


<https://www.mpg.de/16606538/30-jahre-asdex-upgrade>



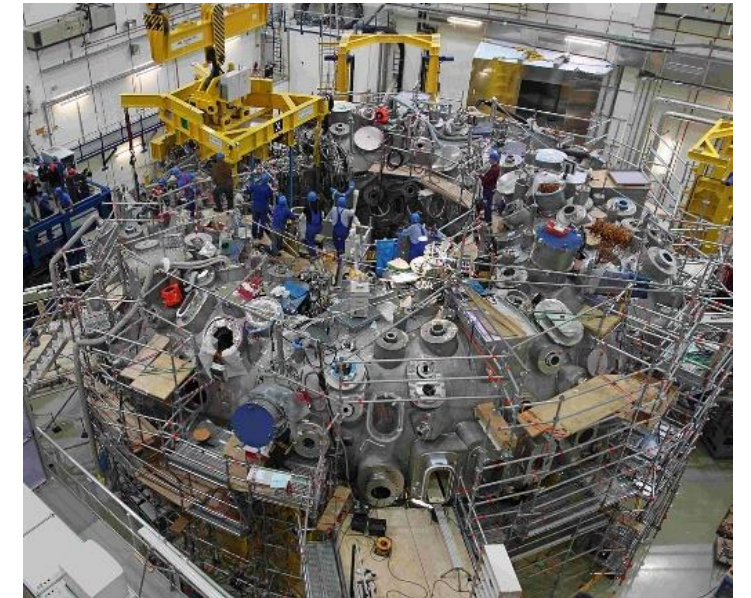
Fusion research facilities in Germany

- **Wendelstein 7-X (W7-X)**
- Location: Greifswald
- Commissioned in: December 2015
- World's largest and most powerful **stellarator**.
- **Goal:** To avoid the disadvantages of high current flow of plasma in a tokamak and the associated destabilising effects of the plasma.
- **License:** Radiation Protection Ordinance



Source:
https://de.wikipedia.org/wiki/Wendelstein_7-X

MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK



Quelle: https://de.wikipedia.org/wiki/Wendelstein_7-X



Legislation

The **Federal Government** has **exclusive legislative power** (Article 73 (1)(14) of the Basic Law) in the following areas:

- “the production and **utilisation of nuclear energy for peaceful purposes**” and “protection against hazards arising from the release of nuclear energy or from **ionising radiation**.”
- “Nuclear energy” covers fission as well as fusion energy.



pix4free.org/assets/library/20
21-07-
08/originals/legislation.jpg

Based on this competence, the following laws were enacted in Germany:

- **Atomic Energy Act** (regulates nuclear installations which use nuclear fuels)
- **Radiation Protection Act** (protection against the harmful effects of ionising radiation).



Legislation

Fusion falls into the scope of application of the Radiation Protection Act:

- Fusion research facilities are **installations for the generation of ionizing radiation** as defined in Section 5 (2) of the Radiation Protection Act:
“devices that are suitable for generating particle or photon radiation in particular electron accelerators, ion accelerators and plasma installations.”
- The radiological inventory in fusion research facilities consists of **other radioactive substances** as defined in Section 3 (1) sentence 1 of the Radiation Protection Act



www.ishn.com/articles/10385
7-what-you-need-to-know-
about-ionizing-radiation



Regulation under Radiation Protection Law

Fusion research facilities need:

- **Construction licence** pursuant to Section 10 (1) No. 1 Radiation Protection Act;
Conditions for granting a licence pursuant to Section 11
- **Operating licence** pursuant to Section 12 (1) No. 1 Radiation Protection Act;
conditions for granting a licence pursuant to Section 13 Radiation Protection Act
- **Licence for handling other radioactive substances** in
accordance with Section 12 (1) (3) of the Radiation Protection Act
→ may be part of the operating licence (Section 12 (3) Radiation
Protection Act)





Regulation under Radiation Protection Law

The Radiation Protection law, Section 13 Radiation Protection Act

- stipulates **several general conditions for granting a license**
- which have to be checked **in advance**
- by the **competent authority**.

Examples:

- the reliability of the applicant
- the necessary personnel is available for the safe execution of the practice.

If these conditions for a license are met, the applicant has a **right to be granted a license**.



[www.aforpd.education/
news/26-operational-
licence](http://www.aforpd.education/news/26-operational-licence)



Regulation under Radiation Protection Law



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- The usual **operational radiation protection requirements** have to be met, e.g.
 - Appointment of **radiation protection officers**
 - **Compliance with dose limits** for occupationally-exposed persons and for exposure of the general public (Sections 78, 80 Radiation Protection Act)
 - Further reduction in exposure and dose reduction, Section 8 Radiation Protection Act
 - Establishment of **radiation protection areas**
 - **Dosimetric monitoring** of occupationally-exposed persons
 - **Hazardous incidents planning** based on handling other radioactive substances (Section 104(3) in conjunction with (4) No. 3 Radiation Protection Ordinance), provided that the activity levels specified therein are exceeded.



Which other laws are relevant?



photomek - Fotolia

Although Fusion is regulated under Radiation Protection law, the **Atomic Energy Act** applies to:

- Verification of **reliability of the applicant** (reference to the Atomic Energy Act in the Radiation Protection Act)
- **Liability and financial security** (reference to the Atomic Energy Act in the Radiation Protection Act)
 - Section 26(2) of the Atomic Energy Act (“Damage caused by the effects of a nuclear fusion process”)
 - Financial security in accordance with Section 13 Nuclear Financial Security Ordinance (AtDeckV) (installation for the generation of ionising radiation)
- **Disposal** (Section 9a of the Atomic Energy Act)



Which other laws are relevant?



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- **Building permission** pursuant to Section 35 (1) No. 7 Federal Building Code
- Permission under **water protection law**
- Environmental law → currently **no Environmental Impact Assessment requirement** within the scope of the Radiation Protection Act licence for installations for the generation of ionising radiation (Annex 1 No. 11 Environmental Impact Assessment Act (UVPG) not relevant)
- Currently **no licence** requirement pursuant to **Federal Immission Control Act** (BImSchG)



Are there currently regulatory gaps?

- For fusion research facilities currently in operation: **None**
- **However:** To **create the necessary legal certainty and clarity** for research, development and commercial activities:
 - „Entwurf eines Gesetzes zum Bürokratierückbau, zur Digitalisierung und zur weiteren Modernisierung des Strahlenschutzrechts“ (Draft of an Act on the Reduction of Bureaucracy, Digitalization, and Further Modernization of Radiation Protection Law):
 - An explicit provision of fusion in the Radiation Protection Act:
 - „**Fusion facilities**“ **will be added** as a subcategory of installations for generating ionizing radiation in the legal definition.
 - The legislative process is due to be completed this year.
- In addition, there are still **many unknowns** when it comes to technology
 - New findings may require regulations to be gradually supplemented and adapted.



ENSREG Task Force on Fusion Energy

- The EU's first-ever Fusion Strategy is planned for publication in 2026.
- 2025: **EU Commission asked ENSREG** to establish a task force on fusion energy (2026–2031).
- Chair: Germany (BMUKN)
- Members: France, Italy, Spain, Finland, Ireland, Czech Republic and Sweden
- Observers: IAEA and the UK
- HERCA, WENRA and Article 31 expert group are invited as observers.



https://energy.ec.europa.eu/news/new-eu-task-force-fusion-energy-2026-05-27_en



ENSREG Task Force on Fusion Energy

- The objective of the Task Force on Fusion Energy is to **make proposals to the COM** on:
 - A **safety objective and a risk-proportionate approach for regulation, licensing and oversight of fusion facilities**, based on a technology-neutral perspective and taking account of the existing Euratom legislation and practices;
 - **Technical areas** requiring development of fusion-specific engineering **codes and standards**;
 - **Competence building and knowledge management within EU Member States' regulatory authorities**, focusing on common technical and organizational crosscutting themes on fusion energy.
- Afterwards the Task Force shall **support the Commission in implementing** its recommendations.



Thank you for your attention!

Ms Natalie Schreyer
Senior Adviser

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Germany

www.bundesumweltministerium.de/en



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ReFus

National Experiences on Regulating Fusion Energy

Joachim Herb for the ReFus-team

International Symposium on Fusion Energy Law, 1 October 2026



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AND INTERNATIONAL LAW



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Institut für angewandte Ökologie
Institute for Applied Ecology



Project Partners



**Proxima
Fusion**



MarvelFusion

framatome



BILFINGER

RWE



**FOCUSED
ENERGY**



**Commonwealth
Fusion Systems**

**SIEMENS
ENERGY**

Associated Partners

ReFus

■ Aims

- Driven by **scientific analysis**, supported by industry input
- **Analyze status quo** and **possible gaps** in the existing German legal framework and the technical regulation for fusion facilities and future fusion power plants
- Can/should some of the **existing legal framework** be **adopted** for fusion?
- Is a **separate fusion legal framework** necessary?
- Based on the specifics of fusion facilities, develop a concept for the **technical** regulation

} Develop concept for the legal regulation

■ Duration: 1 January 2025 – 31 March 2027

■ Main outcome:

- Status report: July 2026 (call for feedback until 31 October)
- Final report: March 2027



Fusion Regulation in Germany

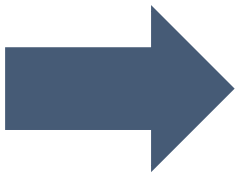
Nuclear Law in Germany

Radiation Protection Act

- Regulation of installations for the generation of ionizing radiation
- Regulation of radioactive material



‘Installations for the generation of ionising radiation’ means equipment or devices that are suitable for **generating particle** or photon **radiation** with a particle or photon cut-off **energy of at least five kiloelectron-volts**, either intentionally or unintentionally, in particular electron accelerators, ion accelerators and **plasma installations**.



Fusion facilities are licensed under Radiation Protection Law

Fusion licenses in Germany

- Licenses for Construction (Radiation Protection Law and Construction Law)
- License for Operating Fusion Facility
- License for Handling Radioactive Substances (Tritium and activated material)
- *No Environmental Impact Assessment (for Radiological Part)*

Fusion licenses in Germany

Key Licensing Requirements

- Following safety and security principles
- Implementing state of the art in science and technology
- Exposure Limits for a person of the public:
 - Regular Operation: 1 mSv p.a.
 - 0.3 mSv p.a. each for liquid and gaseous radioactive effluents
 - Accidents: 50 mSv
- Optimization: Implementing the ALARA principle
- Once proven, legal right to obtain license

Fusion licenses in Germany

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Technical Regulation for Fusion Facilities

Systematics for a regulation of fusion facilities

- One of the principles introduced in IAEA Safety Fundamentals SF-1: „Optimization of protection“
- Optimization aims at „the highest level of safety that can reasonably be achieved”
- Assessment shall use a graded approach, compare also Requirement 1 in IAEA GSR Part 4 (Rev. 1)
- Main factor to be considered is the magnitude of the possible radiation risks, but other factors to be taken into account
- Examples for graded approach for research reactors in IAEA SSR-3 and SSG-22 (Rev. 1)
- Questions with respect to future fusion facilities:
 - What are good criteria to judge possible radiation risks?
 - What are corresponding values of these criteria for the application of a graded approach?

Radioactive hazards of fusion facilities

☐ Inventory

- Tritium
- Activated structures
- Activated and tritiated dust
- Activated corrosion products

☐ Ionizing radiation

☐ Hazards/energies

Potentially

- mobilize inventories
- endanger confinement barriers
- lead to release of radioactive inventory into the environment

(depending on the specific fusion technology)

Example for hazard potentials in fusion facilities

Stored energies in EU-DEMO

Energy source	Energy	
Thermal energy of plasma	1.3 GJ	
Magnetic energy (toroidal field coils)	120 – 147 GJ	
Magnetic energy (poloidal field coils)	20 GJ	
Plasma current (Tokamak)	1 – 2 GJ	
Sum of thermal energy (depending on breeding blanket type/-coolant)	HCPB	WCLL
	95 GJ	791 GJ

Caruso et al., [DOI 10.1016/j.fusengdes.2022.113025](https://doi.org/10.1016/j.fusengdes.2022.113025), 2022; Wenninger et al., DOI [10.1088/1741-4326/aa4fb4](https://doi.org/10.1088/1741-4326/aa4fb4), 2017

Decay heat: immediately after stop of fusion reactions: ca. 1 – 2 % of the thermal reactor power

For comparison: 1 kg TNT $\triangleq$ 4.184 MJ, lightning bolt $\triangleq$ ~1 GJ

Comparison of radioactive inventories' hazards

- **High-Activity Sealed Radioactive Source (HASS)**
- **PWR** and other nuclear facilities
- **Literature values** of radioactive inventories of **fusion demonstration facilities/power plants**

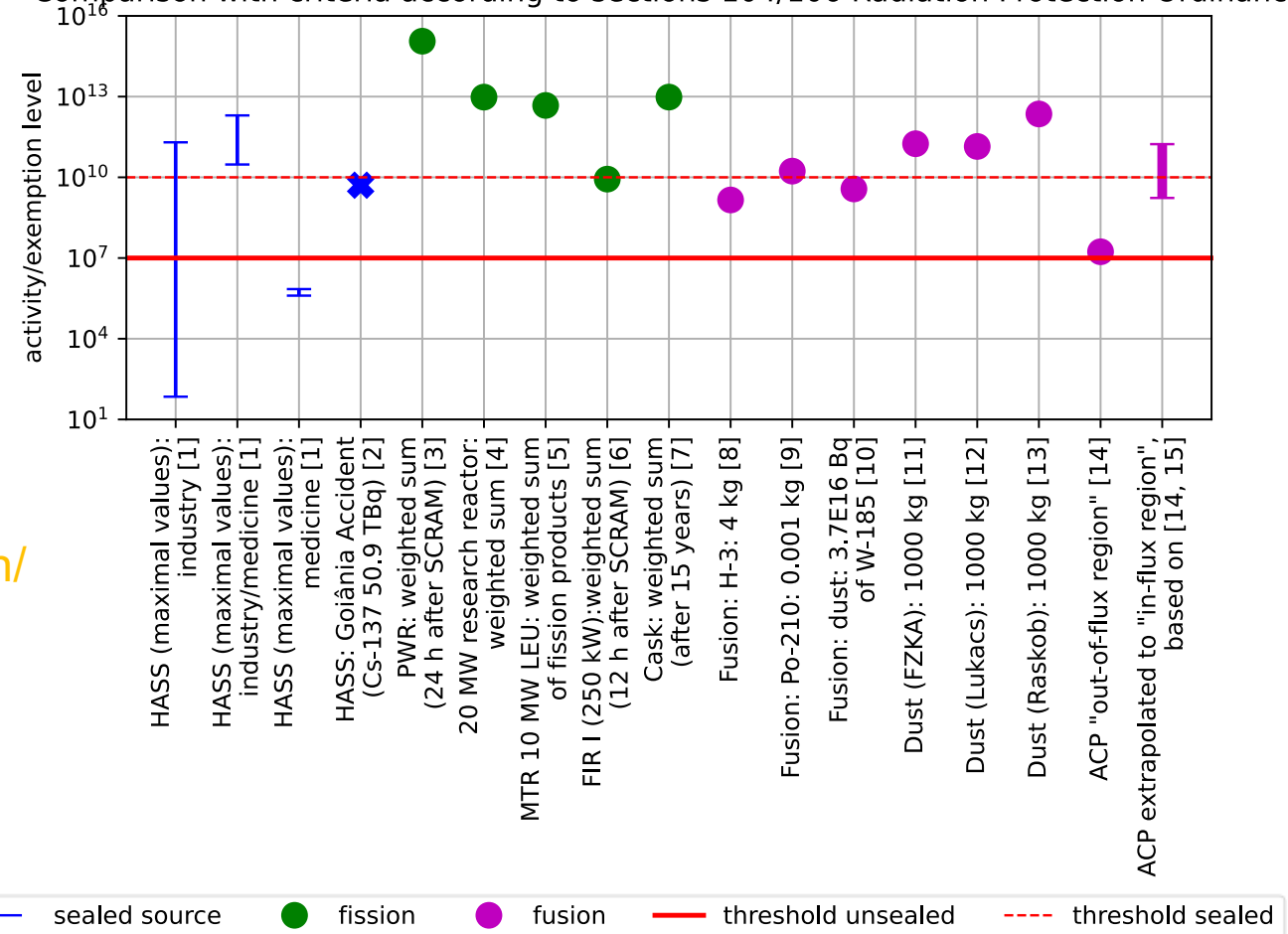
Note: All are Tokamaks

No data (among others) for:

- Installations for the generation of ionizing radiation/accelerators
- Structural materials in fusion facilities

⇒ **Fusion power plants are at the upper end or above facilities** licensed according to radiation protection regulation, might be **comparable to fission research reactors but well below fission power plants**

Comparison with criteria according to sections 104/106 Radiation Protection Ordinance



Radioactive residues, radioactive waste and disposal

- Literature: Significant amount of radioactive residues, low- and intermediate-level radioactive waste
- The Federal Government in Germany plans to dispose of all types of radioactive waste in deep geological repositories
- Currently, for low- and intermediate-level radioactive waste specific criteria for acceptance at “Konrad” repository and federal state collecting facilities
- Licensed volume of “Konrad” repository will not be enough for existing amount of low- and intermediate-level radioactive waste (even without considering future fusion facilities)
- Building an additional repository for low- and intermediate-level radioactive waste will be investigated at the location of the repository of high-level radioactive waste
- Nuclide composition of fusion radioactive waste will differ from existing waste

Suggestion for graded technical regulation

- ☐ Based on existing radiation protection regulation
 - New guidance documents for licensee and authorities
 - Defense-in-depth concept
 - Preparational measures for incidents/accidents
 - Limitation of exposure due to design basis accidents
 - Scope of analyses
- ☐ Consider different measures for grading based on inventory, power output, ...
- ☐ Timeline for the development of the technical regulatory framework

Suggestion for graded technical regulation

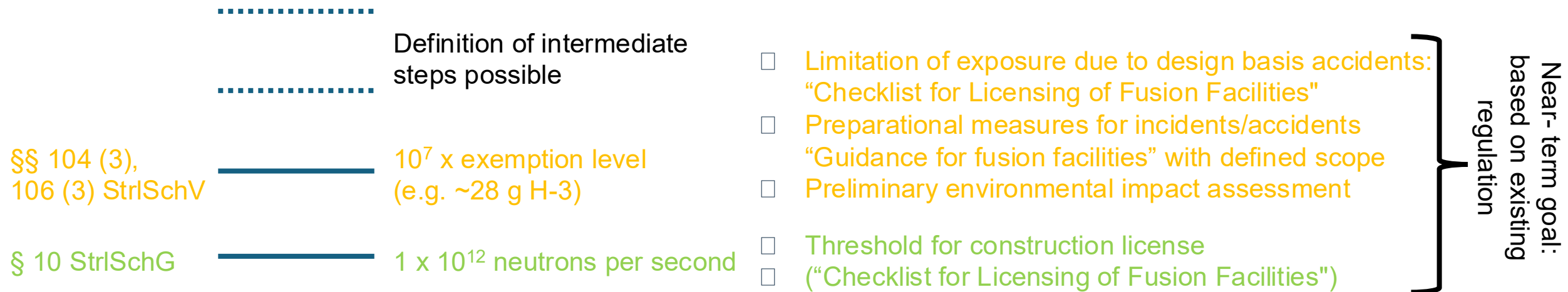
StrlSchG...German Radiation Protection Act
StrlSchV...German Radiation Protection Ordinance

§ 10 StrlSchG ————— 1×10^{12} neutrons per second

- ☐ Threshold for construction license
- ☐ (“Checklist for Licensing of Fusion Facilities”)

Suggestion for graded technical regulation

StrlSchG...German Radiation Protection Act
StrlSchV...German Radiation Protection Ordinance



Suggestion for graded technical regulation

StrlSchG...German Radiation Protection Act
StrlSchV...German Radiation Protection Ordinance

		Definition of intermediate steps possible	☐	Limitation of exposure due to incidents/accidents: Defense-in-depth level 3 has to be analyzed comprehensively	Long-term goal: new safety requirements
				Safety classification of SSC	
				Preparational measures for incidents/accidents	
	————	10^{XX} neutrons per second and/or $YY \text{ MW}_{\text{thermal}}$ and/or 10^{ZZ} x exemption level	☐	Defense-in-depth level 4 has to be analyzed	Near-term goal: based on existing regulation
			☐	Environmental impact assessment	
		Definition of intermediate steps possible	☐	Limitation of exposure due to design basis accidents: "Checklist for Licensing of Fusion Facilities"	
§§ 104 (3), 106 (3) StrlSchV	————	10^7 x exemption level (e.g. ~28 g H-3)	☐	Preparational measures for incidents/accidents	
			☐	"Guidance for fusion facilities" with defined scope	
			☐	Preliminary environmental impact assessment	
§ 10 StrlSchG	————	1×10^{12} neutrons per second	☐	Threshold for construction license	
			☐	("Checklist for Licensing of Fusion Facilities")	

Planned work before the end of the project

Legal regulation

- ☐ Impact of European regulations on the need to do an environment impact assessment for fusion facilities/fusion power plants
- ☐ Re-use of nuclear power plant sites for fusion

Technical regulation

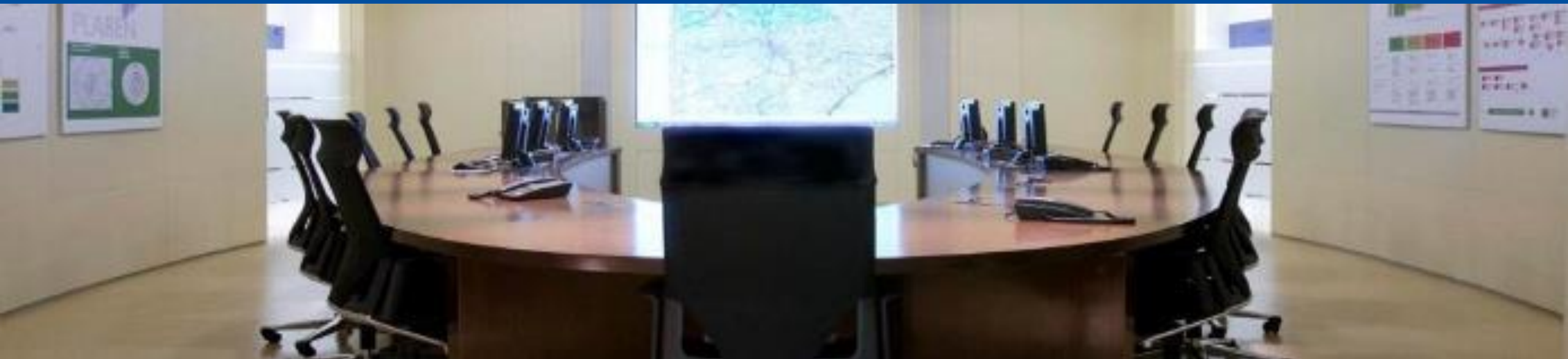
- ☐ Draft of a checklist for licensing of fusion facilities
- ☐ Codes and standards
- ☐ Investigation of thresholds for grading

Fusion Regulation in Spain (at CSN)

Francisco Castejón

Commissioner of CSN (Nuclear Safety Council)

francisco.castejon@csn.es



1 The Spanish Framework: The National Fusion Strategy

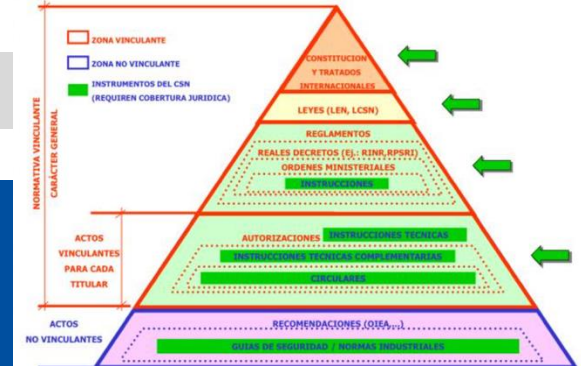
- High level political agreement has been reached to work on this initiative.
- 12 working groups **created** to identify gaps and to make a plan: fusion materials, tokamak, stellarator, plasma heating,...
- One of the groups is devoted to “**Licensing and Safety of Fusion Reactors**”.

The goal of THE LICENSING GROUP is to create the necessary regulation to license and oversee the future fusion reactors in Spain.

The group is chaired by F. Castejón, as **the official representative of CSN, the Spanish regulator.**

The group includes the **regulatory body**, universities and research centers. On top of that, private and public enterprises, as well as citizen non-profit associations are included **as observers.**

Pyramid Regulation: Spain as a case example

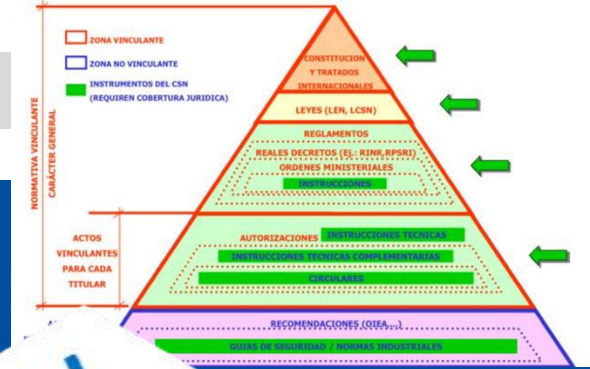


Issued by
Parliament and
Government

Issued by
Regulatory body
(CSN)

- Spanish Regulation well established for CURRENT installations (nuclear and radioactive)
 - Laws (Nuclear Energy Law, CSN Law, Dangerous Materials Transport Law),
 - Royal Decrees and Decrees** (CSN statute, RINR, RPSRI, Nuclear Safety) → Distincting between nuclear and radioactive installations.
- CSN Safety Instructions (48)**. Mandatory & Topical: Fire Protection, Rn measurements, Design Modifications, Security of Installations,....
- CTIs**. Mandatory to solve particular problems. (e. g. seismic CTI)
- Safety Guides**. Non-Mandatory, Indicative. Topical (usually linked to a SI).
- Communications**. Indications for particular problems.
- Codes and standards: ISO, ASME,.. (mandatory if they appear in Decrees or **CSN instructions**)

Pyramid Regulation: Spain as a case example



Issued by
Parliament and
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Issued by
Regulatory body
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- Spanish Regulation well established for CURRENT installations (nuclear and radioactive)
 - Laws (Nuclear Energy Law, CSN Law, Dangerous Materials Transport Law, ...)
 - Royal Decrees and Decrees** (CSN statute, RINR, RPSRI, Nuclear Safety Law, ...)
- Distinction between nuclear and radioactive installations
 - CSN Safety Instructions (48).** Mandatory. Fire Protection, Rn measurements, Design Modifications, Security of Installation, ...
 - CTIs.** Mandatory to solve specific problems. (e. g. seismic CTI)
 - Safety Guides.** Normative, Indicative. Topical (usually linked to a SI).
 - Communications.** Recommendations for particular problems.

- Codes and standards: ISO, ASME, ... (mandatory if they appear in Decrees or **CSN instructions**)

Pyramid Regulation modified for Fusion



TWO big
regulatory
sets (and
directorates
at CSN):

- **Nuclear** Installations (NPP-related). Paying attention to safe stop and heat removal.
- **Radioactive** Installations
 - 1st Category.
 - 2nd Category.
 - 3rd Category.
 - X-Ray.

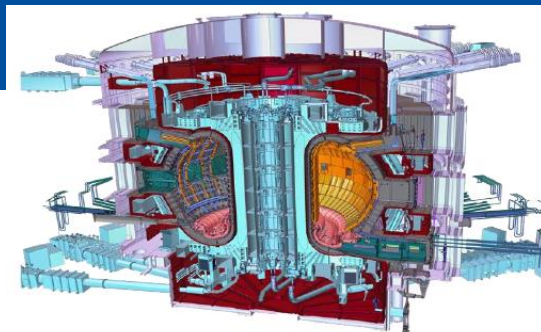
DISCUSSION: Does Fusion belong to nuclear regulation or to radioactive one? Of course Fusion is nuclear, but most of regulators and people consider **nuclear = fission**. Fusion Reactor risks are much lower than fission ones.

PROPOSAL: Fusion needs a specific Third Regulatory Set.

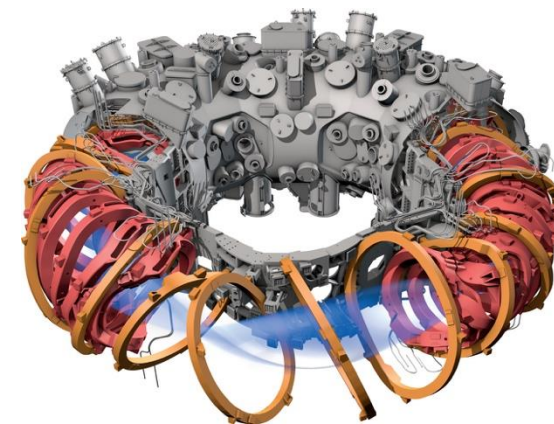
**FUSION FACILITY LICENSED AS A
“PROPORTIONATED RADIOACTIVE FACILITY”
Rather than a “downgraded nuclear”**

Technology Inclusive. Disparate possible designs and concepts. Too soon to establish a detailed regulation

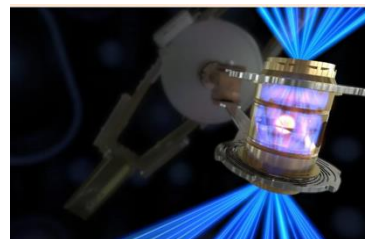
- TOKAMAKS** → Pulsed
→ Dealing with plasma instabilities
→ Good plasma performance demonstrated.



- STELLARATORS** → Steady State (Much longer plasma pulses).
→ Stable Plasmas
→ More precise building and complex geometry.



- INERTIAL FUSION** → Pulsed
→ Plasma-Wall interaction
→ Target factory needed.

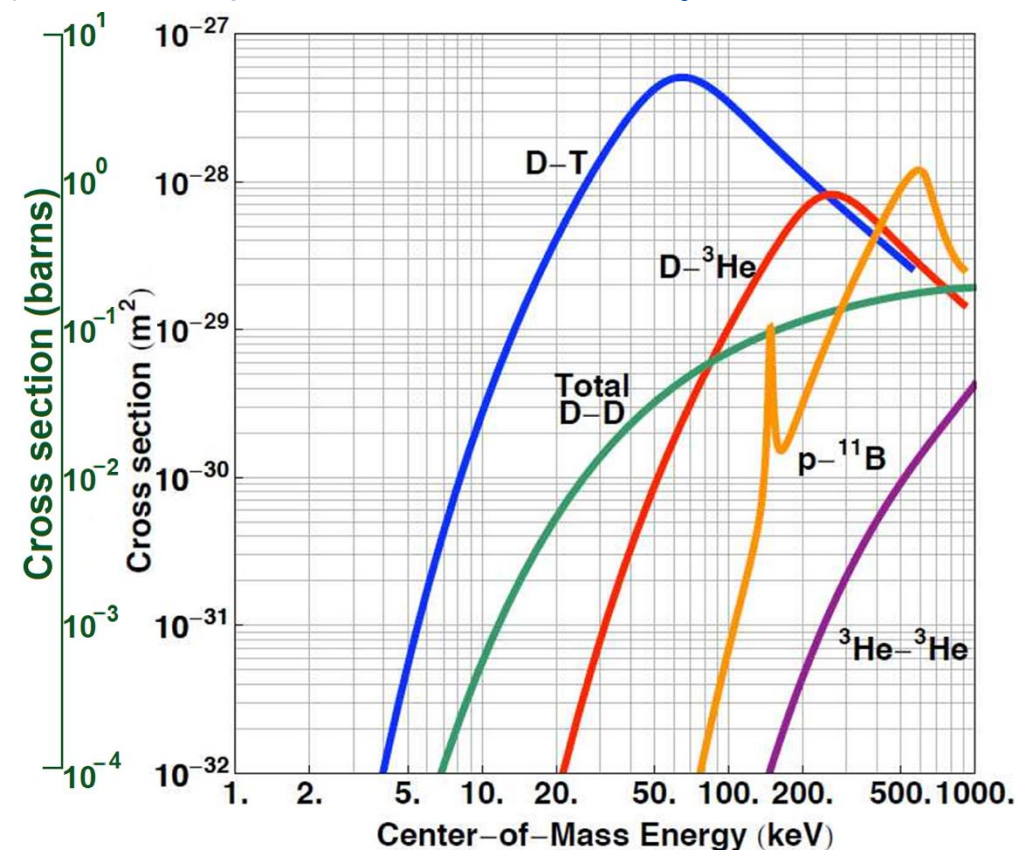
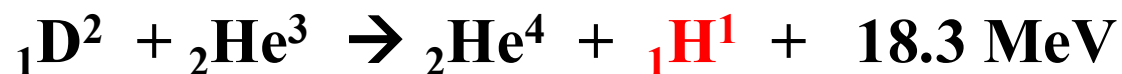
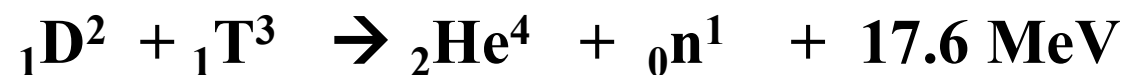
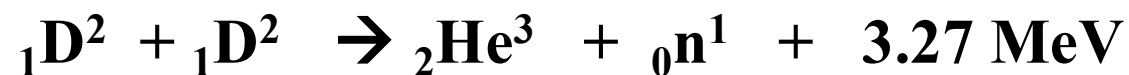
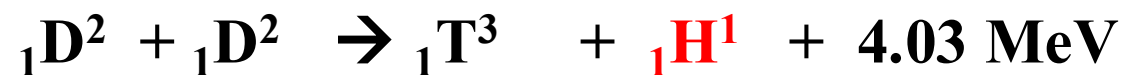


- DEMO** → The first power plant?
→ All the learned lessons applied

Technology Inclusive. Beyond D-T reaction. Different Possible fuels in the **FUTURE**.

BEYOND D-T REACTION

- Technological Advances Needed (higher plasma temperature).
- Interest on protons production (in red) → Direct production of electricity.
- Possibility of not using T as fuel.
- p-B: Non radioactive reaction.



~T (10 million °K)

Establishing a Regulatory Framework: Applying Current Regulation Concepts to Fusion

Graded Approach.

- Appropriated Evaluation of Risks → We need to adapt our regulation to fusion installations

Defence in Depth.

- Define the independent safety barriers in a fusion reactor → Strong dependence on the concept and design.

Design Basis Accident and Beyond Design Basis Accident.

- In a defined installation, explore the possible operating accidents, including outside normal operation regimes

Establishing a Regulatory Framework: Applying Current Regulation Concepts to Fusion (ctd)

Radiation Protection (workers, public & environment)

- Operation (workers protection).
- Dismantling & Decommissioning → Specific strategy (Strongly depends on reactor design and concept).
- Radioactive Waste Management: **Reduction**. Treatment, Repositories (**CHECK YOUR MEDIUM LEVEL REPOSITORY**), Recycling, **HOT CELLS**...

Safety in Design (Design of concepts to improve safety)

- Dialogue of regulator with licensees (a kind of EVEDA). R&D using models and experiments.
→ TOOLS: Joint Committees, Regulatory Guides, Partial Licensing (**stepwise licensing process**),...

5 Application of Regulatory Pyramid to Fusion: Develop requirements

- **Define the risks of the installations: We can use for fusion the same approach as for other complex installations. Reinforce the regulation if needed.**
 - Siting
 - T-control
 - New activated materials
 - Explosions?
 - Radioactive protection of workers
 - Radioactive Waste management
 - ...

- **Develop a dedicated regulatory framework based on knowledge.**

9 R&D for Fusion Regulation: knowledge for CSN Instructions

- Simulations with validated codes: Dose rate, Neutronics, Activation, Thermohidraulics,...
- Engineering assessment for safety. Previous Experience: fission, JET, ITER, IFMIF-DONES,...
- Material Research (IFMIF-DONES).
- Tritium Management.
- Siting: Geological & atmospheric studies.
- Explosions.
- Radioactive waste management.

(Low and medium activity expected).

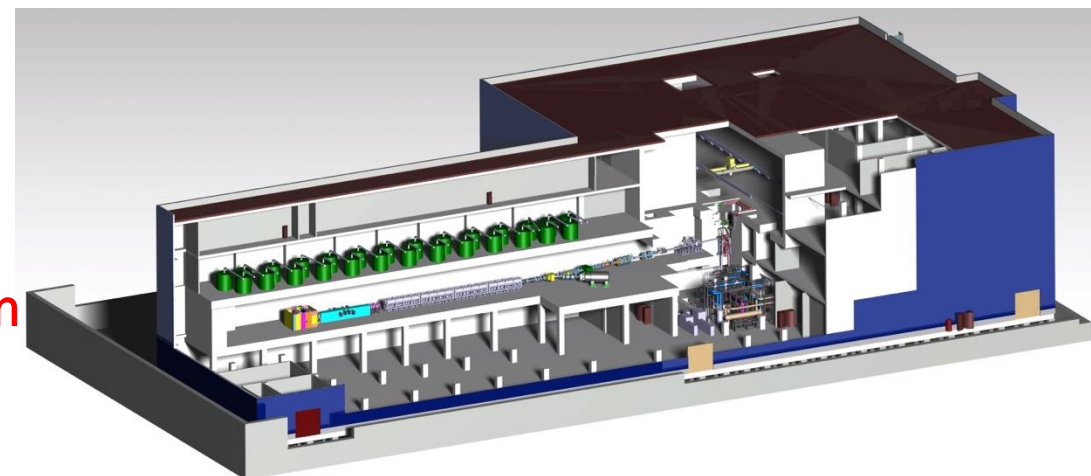
**CHECK ACCEPTANCE CRITERIA OF YOUR COUNTRY
WASTE REPOSITORY (EL CABRIL IN SPAIN).**

...



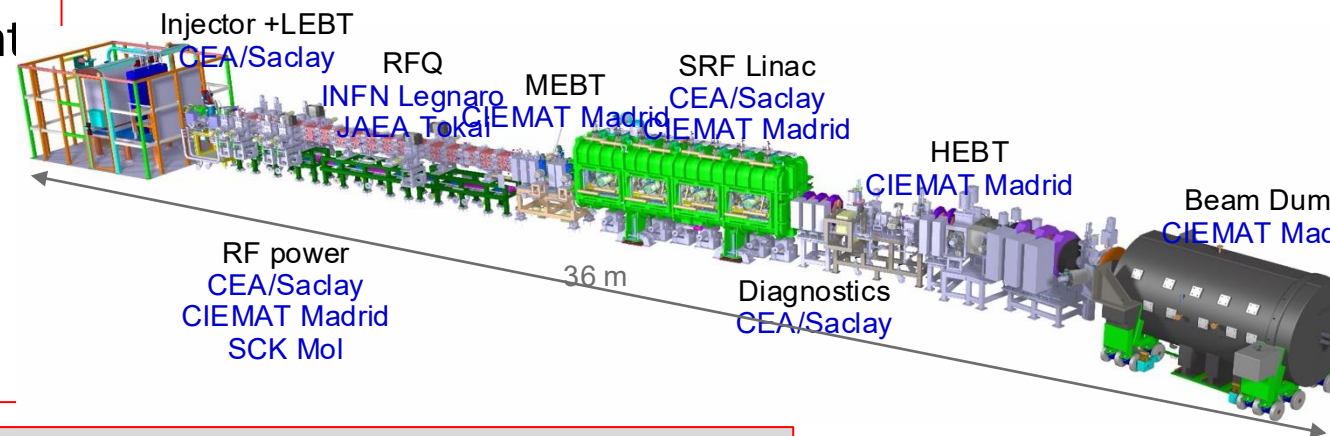
Licensing of IFMIF-DONES: gaining experience for fusion regulation

- **IFMIF-DONES** Material Fusion Technology. Useful for material qualification for future fusión reactors.
 - Large facility (100 x 100 m) with new technical developments.
 - **STRUCTURED DIALOGUE WITH LICENSEE.**
 - Created a **high-level joint committee to define licensing strategy** (CSN / IFMIF-DONES)
 - Created a mixed technical group to advance on Safety and Radiological Protection.
- **NO EXTERIOR EMERGENCY PLAN NEEDED (NO evacuation in any case)**
- **Licensing STRATEGY. THREE STEPS:**
 - 1) 2nd Category Installation. Injector.
 - 2) Modification of 2nd Category Installation. Accelerator.
 - 3) 1st Category. Li-loop target and bunker for samples.
- **Step-wise: Design and construction of the 2nd Cat. Installation without jeopardizing the 1st Category Licensing.**



Lessons learnt

- Research on different topics for Safety Assessment
 - Siting (external hazards)
 - Operational risks: T control, Fire Protection, ...
 - Radioactive effluents
 - Dismantling & Decommissioning
 - Use of licenced codes for simulations.



LESSONS LEART FOR FUSION REACTOR LICENSING:

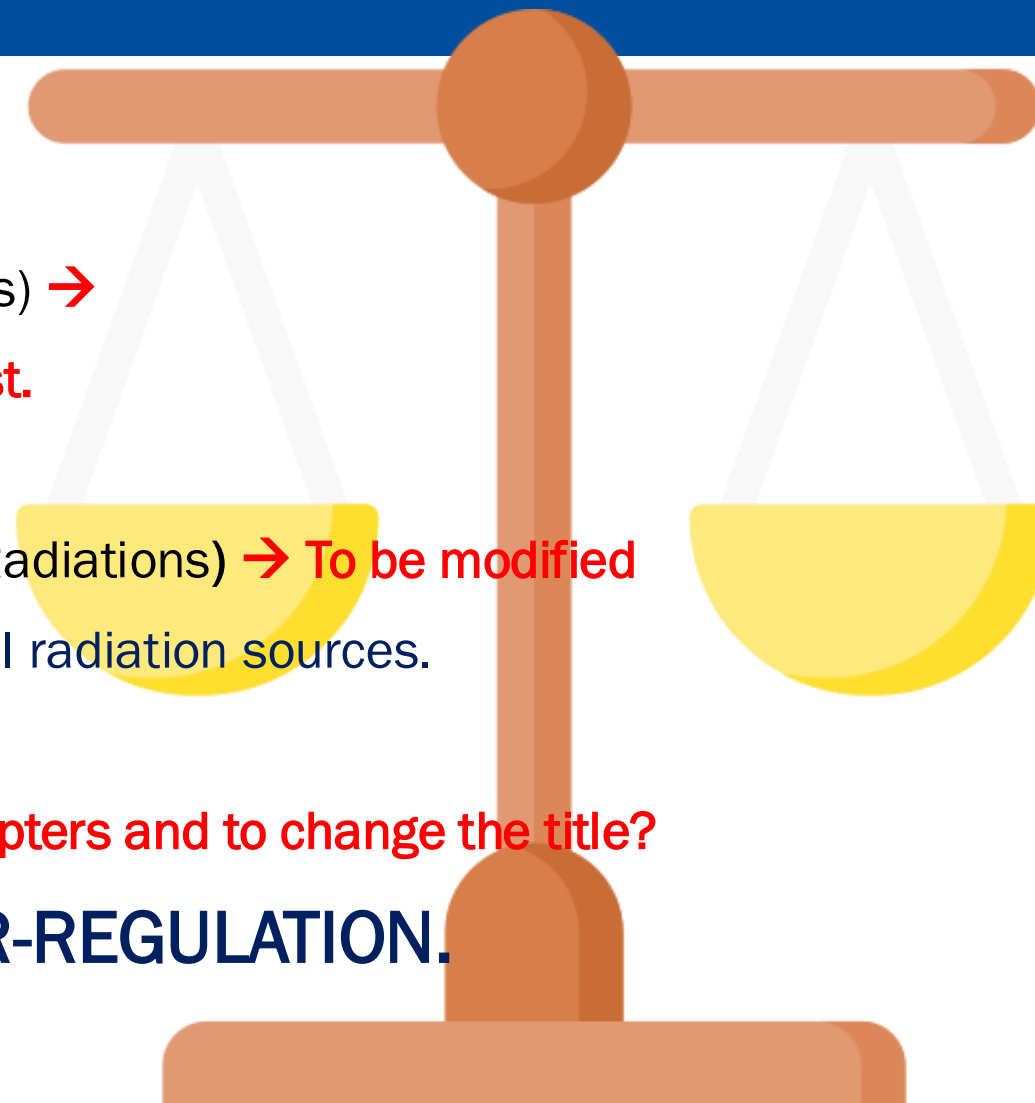
- Structured Dialogue with the titular of the Installation:
 - Research: Learning together
 - Safety in design
- Stepwise licensing.
- Standardize the process.



7 High level Regulation for Fusion: Laws and Rules. Roadmap for other Institutions

- Laws and Rules (Government and Parliament)
 - RINR (Regulation for Nuclear and Radioactive Installations) → **To be modified to remove fusion from nuclear installations list.**
Specific chapters for fusion to be included.
 - RPSRI (Regulation for Health Protection Against Ionizing Radiations) → **To be modified**
Attention is paid presently to existing instalations plus natural radiation sources.
Include fusion (at least workers' RP and T control).
 - RSN (Regulation for Nuclear Safety) → **To add Fusion Chapters and to change the title?**

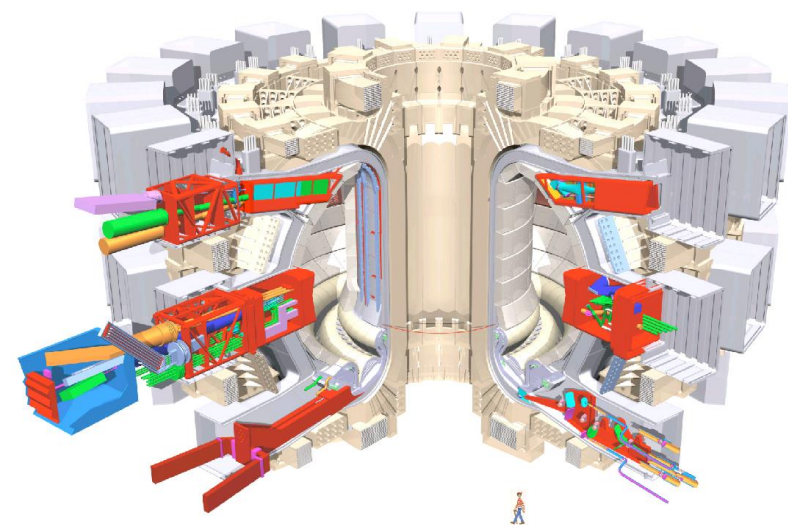
Consider Specific Fusion Risks: AVOID OVER-REGULATION.



10 Harmonization

To have similar requirements in every country:

- Exchange of knowledge for drawing a common regulatio approach
- Codes and Standards.
- Data Base for Materials.
- **Gain in safety**



The roles of

IAEA: TECDOCS, SAFETY REPORT → TOWARDS A SAFETY STANDARD

ENSREG and EURATOM: Harmonization in EU. European Directive



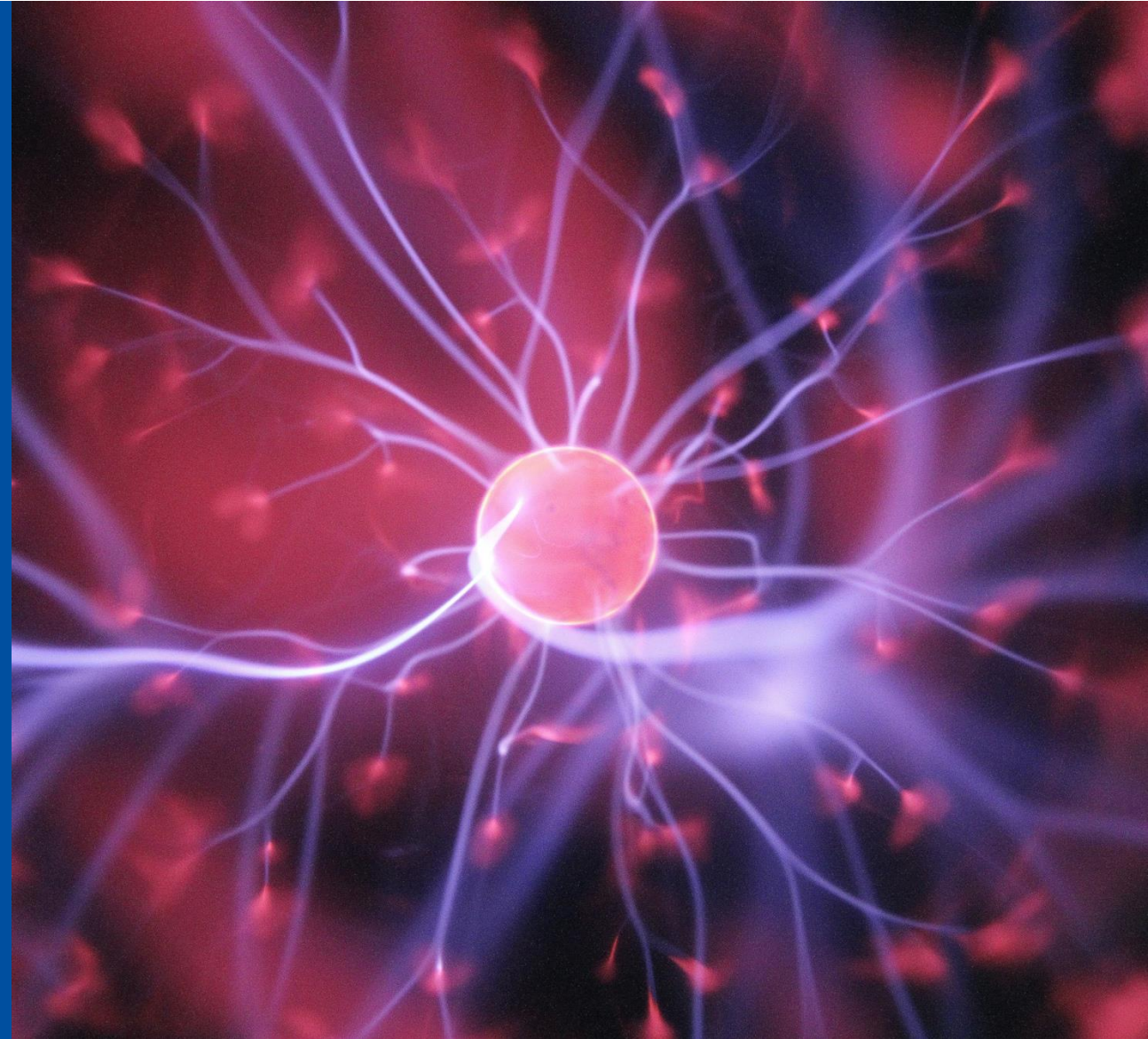
Reasons to work on Fusion Regulation TODAY

- Licensing installations today (e. g., ITER, IFMIF-DONES, BEST,...)
- Learning of licensing of first installations (e. g., T control, Fire Protection)
- Siting needs definition
- Safety in Design: dialogue with licensees
- Be ready for Next Step in Europe (DEMO?, Volumetric Neutron Source?).

- **HARMONIZATION:** reach a common approach among the regulators.
- We have time to build a harmonized regulation in the world (before fusion reactors are here) →
- Licensing reactors with common requirements (the value of international technical meetings)

Thank you!

We keep working.



Canada's Approach to Fusion Regulation

International Fusion Energy Law Symposium
University of Würzburg
1 October 2026

Lisa Thiele
lisamthiele@outlook.com



Outline

- Fusion Governance in Canada
- Existing legal framework for fusion regulation
- Regulatory framework updates
- Regulatory considerations
- Fusion industry in Canada
- What's next

Fusion Governance in Canada



- The [Nuclear Safety and Control Act \(NSCA\)](#), Canada's enabling statute for the regulation of the nuclear industry, explicitly includes fusion facilities
- The Canadian Nuclear Safety Commission (CNSC), Canada's independent nuclear regulatory body, is active respecting its readiness to regulate fusion: see its [Fusion energy technology](#) webpage
- CNSC licenses and regulates existing and new research and development fusion activities across Canada as it prepares for future regulation of commercial fusion facilities – existing regime is fit for purpose for current fusion projects
- The [Nuclear Liability and Compensation Act \(NLCA\)](#) governs civil liability and compensation for damage in case of a nuclear incident – it is not certain whether a future commercial fusion facility might be designated as a “nuclear installation” for the purposes of this special liability regime

Existing Legal Framework - legislation

Nuclear Safety and Control Act (NSCA) definitions:

nuclear facility means any of the following facilities, namely,

- (a) a nuclear fission or fusion reactor or subcritical nuclear assembly,
- (b) a particle accelerator,
- (c) a uranium or thorium mine or mill,
- (d) a plant for the processing, reprocessing or separation of an isotope of uranium, thorium or plutonium,
- (e) a plant for the manufacture of a product from uranium, thorium or plutonium,
- (f) a plant for the processing or use, in a quantity greater than 10^{15} Bq per calendar year, of nuclear substances other than uranium, thorium or plutonium,
- (g) a facility for the disposal of a nuclear substance generated at another nuclear facility,
- (h) a vehicle that is equipped with a nuclear reactor, and
- (i) any other facility that is prescribed for the development, production or use of nuclear energy or the production, possession or use of a nuclear substance, prescribed equipment or prescribed information,

and includes, where applicable, the land on which the facility is located, a building that forms part of, or equipment used in conjunction with, the facility and any system for the management, storage or disposal of a nuclear substance

prescribed means prescribed by regulation of the Commission



Existing Legal Framework

- NSCA defines a fusion facility as a “nuclear facility” subject to regulation by the CNSC
- NSCA confers on the Commission a broad authority (section 44) to make regulations “as the Commission considers necessary for carrying out the purposes of this Act and to assist the Commission in attaining its objects”
- Purpose of the Act (section 3) is “to provide for
 - (a) the limitation, to a reasonable level and in a manner that is consistent with Canada’s international obligations, of the risks to national security, the health and safety of persons and the environment that are associated with the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information; and
 - (b) the implementation in Canada of measures to which Canada has agreed respecting international control of the development, production and use of nuclear energy, including the non-proliferation of nuclear weapons and nuclear explosive devices”
- Objects of the Commission (section 9) include:
 - “(a) to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to
 - (i) prevent unreasonable risk, to the environment and to the health and safety of persons, associated with that development, production, possession or use,
 - (ii) prevent unreasonable risk to national security associated with that development, production, possession or use, and
 - (iii) achieve conformity with measures of control and international obligations to which Canada has agreed”
- In addition to making regulations, the Commission issues regulatory documents that provide regulatory guidance

Existing Legal Framework - regulations

- The Commission has made 13 sets of regulations under its regulation-making authority – mix of prescriptive and performance-based, all technology-neutral
- The appropriate regulatory approach is to address and manage the actual risks that are posed by the activity being regulated – purpose of regulating
- Regulating nuclear energy production has been in the context of the current industry: fission power production, mines, fuel facilities, accelerators etc.
- The Commission has no fusion facility-specific regulations
- Importance of performance-based regulatory requirements:
 - to ensure that safety requirements are commensurate with risk – graded approach
 - to provide for innovation in design, potential for harmonization

Existing Legal Framework – current regulations

Class I Nuclear Facilities Regulations, SOR/2000-204:

Class IA nuclear facility means any of the following nuclear facilities:

- (a) a nuclear fission or fusion reactor or subcritical nuclear assembly; and
- (b) a vehicle that is equipped with a nuclear reactor

Class IB nuclear facility means any of the following nuclear facilities:

- (a) a facility that includes a particle accelerator, other than a particle accelerator described in paragraphs (d) and (e) of the definition **Class II prescribed equipment** in section 1 of the [Class II Nuclear Facilities and Prescribed Equipment Regulations](#);
- (b) a plant for the processing, reprocessing or separation of an isotope of uranium, thorium or plutonium;
- (c) a plant for the manufacture of a product from uranium, thorium or plutonium;
- (d) a plant, other than a Class II nuclear facility as defined in section 1 of the [Class II Nuclear Facilities and Prescribed Equipment Regulations](#), for the processing or use, in a quantity greater than 10^{15} Bq per calendar year, of nuclear substances other than uranium, thorium or plutonium;
- (e) a facility for the disposal of a nuclear substance generated at another nuclear facility; and
- (f) a facility prescribed by paragraph 19(a) or (b) of the [General Nuclear Safety and Control Regulations](#)

Existing Legal Framework – current regulations

Class II Nuclear Facilities and Prescribed Equipment Regulations, SOR/2000-205:

Class II nuclear facility means a facility that includes Class II prescribed equipment

Class II prescribed equipment means

- (a) an irradiator that uses more than 10^{15} Bq of a nuclear substance;
- (b) an irradiator that requires shielding which is not part of the irradiator and that is designed to deliver a dose of radiation at a rate exceeding 1 cGy/min at a distance of 1 m;
- (c) a radioactive source teletherapy machine;
- (d) a particle accelerator that is capable of producing nuclear energy and has a beam energy of less than 50 MeV for beams of particles with a mass equal to or less than 4 atomic mass units;
- (e) a particle accelerator that is capable of producing nuclear energy and has a beam energy of no more than 15 MeV per atomic mass unit for beams of particles with a mass greater than 4 atomic mass units; or
- (f) a brachytherapy remote afterloader

Regulatory Framework Updates

In 2024, CNSC published Regulating fusion energy technology: Position paper

- Noting that existing fusion R&D facilities are appropriately licensed as Class II nuclear facilities, the CNSC made it clear that fusion power production would not be regulated like fission facilities (Class IA nuclear facilities), and CNSC would be making regulatory changes to this end:

“To modernize the CNSC’s approach to regulating fusion, it is essential to consider the level of risk for fusion facilities, and to compare risk characteristics of fission and fusion facilities. In many respects, the hazards associated with fusion are lower than the ones from fission. For example:

- Fusion does not use materials that undergo fission reactions
- Criticality is not a concern for fusion facilities
- Fusion does not produce spent radioactive fuel requiring long-term management
- Radiological hazards from potential accidents are low risk

Moving forward, the CNSC will enhance its regulatory framework for fusion energy commensurate with the risks associated with fusion activities.”

Regulatory Framework Updates

- 2025 CNSC Discussion Paper DIS-25-01, Regulatory Readiness for Fusion ([discussion_paper_regulatory_readiness_for_fusion.pdf](#))
 - Discussion of radiological risks/hazards for fusion facilities
 - Discussion of non-proliferation considerations, particularly respecting tritium
 - Discussion of different technological characteristics of potential fusion facilities
- Discussion Paper identified several potential approaches for regulating future fusion facilities, and invited comments on these and any other approaches
 - preferred suggested approach: two categories for fusion facilities: either Class IB or Class II – criteria to be established (tritium inventory, neutron production and activation, for example)
 - Pros and Cons of options were suggested, with comments/input invited
- [Regulatory consultation comments for DIS-25-01, Regulatory Readiness for Fusion](#)

Some Regulatory Considerations

- Context: overall goal is to have performance-based, technology-neutral regulations – criteria must relate to actual risks and must be measurable
- Performance-based requirements allow for innovation
 - “meet or beat” regulatory requirements
 - See *A perspective on key legal considerations for performance-based regulating*, [Nuclear Law Bulletin No. 103 \(oecd-nea.org\)](https://www.oecd-nea.org/publications/nuclear-law-bulletin-no-103/)
 - Regulatory “sandboxing” – authority to exempt from certain requirements under certain conditions: e.g. *Nuclear Safety and Control Act* section 7
- Importance of stakeholder engagement, transparent processes – all draft regulations, draft regulatory documents are subject to consultation and input
 - Commission also has a mandate to disseminate objective information to the public
- Importance of early and robust engagement by industry with the regulator
 - Innovative design work/safety analysis must be verifiable, important to be ready
 - Diversity of global fusion designs

Some Regulatory Considerations for fusion

- Tritium:
 - Significant demand for tritium for fusion, CANDU reactors are a main supply source
 - Canada has specific *Guidelines for the Export of Tritium*, AECB Notice 86-5, March 14, 1986
- Commission or Designated Officer licensing:
 - Section 37 of the NSCA allows Commission to authorize qualified designated officers to, *inter alia*, make licensing decisions over certain classes of licences – should DOs or the Commission do fusion licensing?
 - Process differences
- What stages should require a licence?
 - Section 26 of the NSCA requires each of: site preparation, construction, operation, decommissioning, abandonment of a nuclear facility to require a licence, “subject to the regulations”
- Some thresholds (tritium inventory, maximum power, neutron yield) are simple yet imperfect indicators of risk, others (potential public dose in accident scenarios) may have practical challenges (assumptions, incomplete design info etc) – yet thresholds may provide for appropriate differentiation between kinds of facilities and their risk profiles
- Importance of collaborative efforts – de-risking shared technical challenges, reducing duplication, sharing lessons: G7 Working Group, IAEA, regulatory cooperation, transparency

Fusion Industry in Canada

- November 2025 – creation of Centre for Fusion Energy (CFE)
- Canada's [Nuclear Energy Strategy](#) Pillar 4 “Developing new Canadian nuclear innovations” key objective #2:

***Fusion energy initiative.** Leveraging Canada's extensive tritium expertise, the Government will implement a coordinated federal approach to anchor Canada's global leadership across the fusion fuel cycle. This coordinated effort will accelerate priority investments — including with the UK and G7 allies — building on UNITY-2 (the world's first fully integrated deuterium-tritium fusion fuel cycle test facility at Chalk River) and working with Ontario and other partners through the Centre for Fusion Energy*

What to Anticipate

- Amendment by the Commission of its regulations, including possibly:
 - *Class I Nuclear Facilities Regulations*
 - (a) to not treat fusion the same as fission (currently both are Class IA)
 - (b) Other potential changes if some fusion facilities might be Class IB
 - *Class II Nuclear Facilities and Prescribed Equipment Regulations*
 - (a) Generally more performance-based requirements for all Class II facilities
 - (b) Potential for criteria to delineate fusion facilities
- CNSC has indicated it will issue regulatory documents to accompany/provide guidance on whatever regulations will apply to regulate fusion power production facilities
- Any draft regulations would be pre-published in the ***Canada Gazette, Part I*** for public comment before regulation-making by the Commission

Thank you Questions?

Lisa Thiele

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Panel Discussion



Coffee Break

Session 2: Non- Proliferation and Export Control

Fusion in the IAEA's Safeguards System

Laura Rockwood

Senior Fellow, Vienna Center for Disarmament and Non-Proliferation

Possible Proliferation Risks of Fusion?

Lower, but non-zero, risks as compared with fission activities:

- The use of neutrons to breed special fissionable material from source material
- The diversion of tritium or lithium inventories to use in nuclear weapons
- The acquisition of knowledge relevant to the design of thermonuclear weapons

Types of IAEA Safeguards Agreements

- **Comprehensive Safeguards Agreements (CSAs):** all but 1 of the 186 non-nuclear-weapon States (NNWSs) party to the NPT; *IAEA right and obligation to ensure SG are applied on **all** nuclear material*
- **Voluntary Offer Safeguards Agreements (VOAs):** the 5 nuclear-weapon States (NWSs) party to the NPT (China, France, Russia, UK, US); *SG apply only to facilities or parts of facilities voluntarily offered by the NWS and accepted by the IAEA for the application of SG*
- **Item-Specific Safeguards Agreements:** India, Israel, Pakistan; *SG only apply to facilities, equipment and materials specified in the agreement*

CSAs: Basics

- All CSAs are based on **INFCIRC/153 (Corr)**, most of which are concluded on the basis of the NPT
- IAEA has the right & obligation to verify non-diversion of declared nuclear material **and** absence of undeclared nuclear material and activities
- State obliged to provide IAEA with information about all **nuclear material** subject to safeguards & **facilities** and **other locations** relevant to safeguarding such material
- IAEA access to carry out **inspections & design information verification**

CSAs: Definitions

Nuclear material: Any source or special fissionable material as defined in the Article XX of the IAEA Statute

- **Source material** – natural U, depleted U, thorium; ... “and such other material as the Board of Governors shall from time to time determine”
- **Special fissionable material** – plutonium, U-233, U enriched in U-235 or U-233; ... “and such other material as the Board of Governors shall from time to time determine”

Does not include deuterium, tritium, lithium or helium-3

CSAs: Definitions

Facility: by virtue of function or by quantity of nuclear material

- (a) A reactor, critical facility, conversion plant, fabrication plant, isotope separation plant, separate storage facility; **OR**
- (b) Any location where nuclear material in amounts greater than 1 effective kilogram (ekg) is customarily used [153, para. 104: 1 ekg Pu=1 kg Pu]

Location Outside Facilities (LOF):

Any installation or location, which is not a facility, where nuclear material is customarily used in amounts of 1 kg or less.

Examples include: hospitals; universities; parts of CERN

CSAs: fusion activities

A fusion installation may be subject to SG as a facility or LOF:

- If the fusion system processes, uses or produces nuclear material, or is capable of sustaining nuclear chain reactions, safeguards measures would apply even if the production of nuclear material were incidental to the process; **there is no de minimis quantity**
- If the amount of nuclear material at a location is less than 1 ekg, and the location *is not otherwise considered a facility* based on its function (e.g. as a reactor), it would be treated as a LOF
- E.g. incidental production of Pu-239 in blanket materials would trigger reporting requirement; if in excess of 1 kg of Pu, it would be treated as a facility
- Is a fusion installation a reactor? A question for consideration ...

Additional Protocols: Basics

- Based on the Model Additional Protocol (**INFCIRC/540 (Corr)**)
- Additional to a safeguards agreement; not a stand-alone document
- Voluntary, but CSA State's AP must include **all** of the measures
- VOA States (and India) each have an AP, but much more limited in scope
- To date, **140 NNWSs** have brought into force an AP

Additional Protocols: Basics

- **Additional information** on all parts of a State's nuclear fuel cycle, including:
 - Nuclear fuel cycle-related activities not involving nuclear material
 - The manufacture (Annex I) and export/import (Annex II) of certain nuclear and nuclear-related equipment and non-nuclear material
- **Complementary access (CA)**
 - Any place on a site; any other location declared by the State as containing nuclear material (Art. 2.a.(v)-(viii)); decommissioned facilities & LOFs
 - Other locations declared by the State (Art. 2.a.(i), (iv); Art. 2.a.(ix)(b) & 2.b)
 - Any other location specified by the IAEA

Additional Protocols: Information

Article 2.a.(iv) and Annex I, para. (ix):

- Manufacture or upgrading of **heavy water or deuterium**: description of scale of operations for each location engaged in the activities (annual)

Article 2.a.(ix) and Annex II:

- Export: identity, quantity, location of intended end use in receiving State and date or expected date of export (quarterly)
- Import: upon specific request by the IAEA, confirm information provided by another State concerning export of such material or equipment
- Annex II based on NSG Part I list from mid-1990s; includes **deuterium and heavy water** “for use in a nuclear reactor”

Neither Annex includes tritium or lithium, but could be amended¹¹

Additional Protocols: Access

Any place on a site of a facility or LOF (as defined in Art. 18.b.) & other locations declared by the State with nuclear material:

- To assure the absence of undeclared nuclear material & activities

Decommissioned facilities and LOFs

- To confirm the decommissioned status for purposes of SG

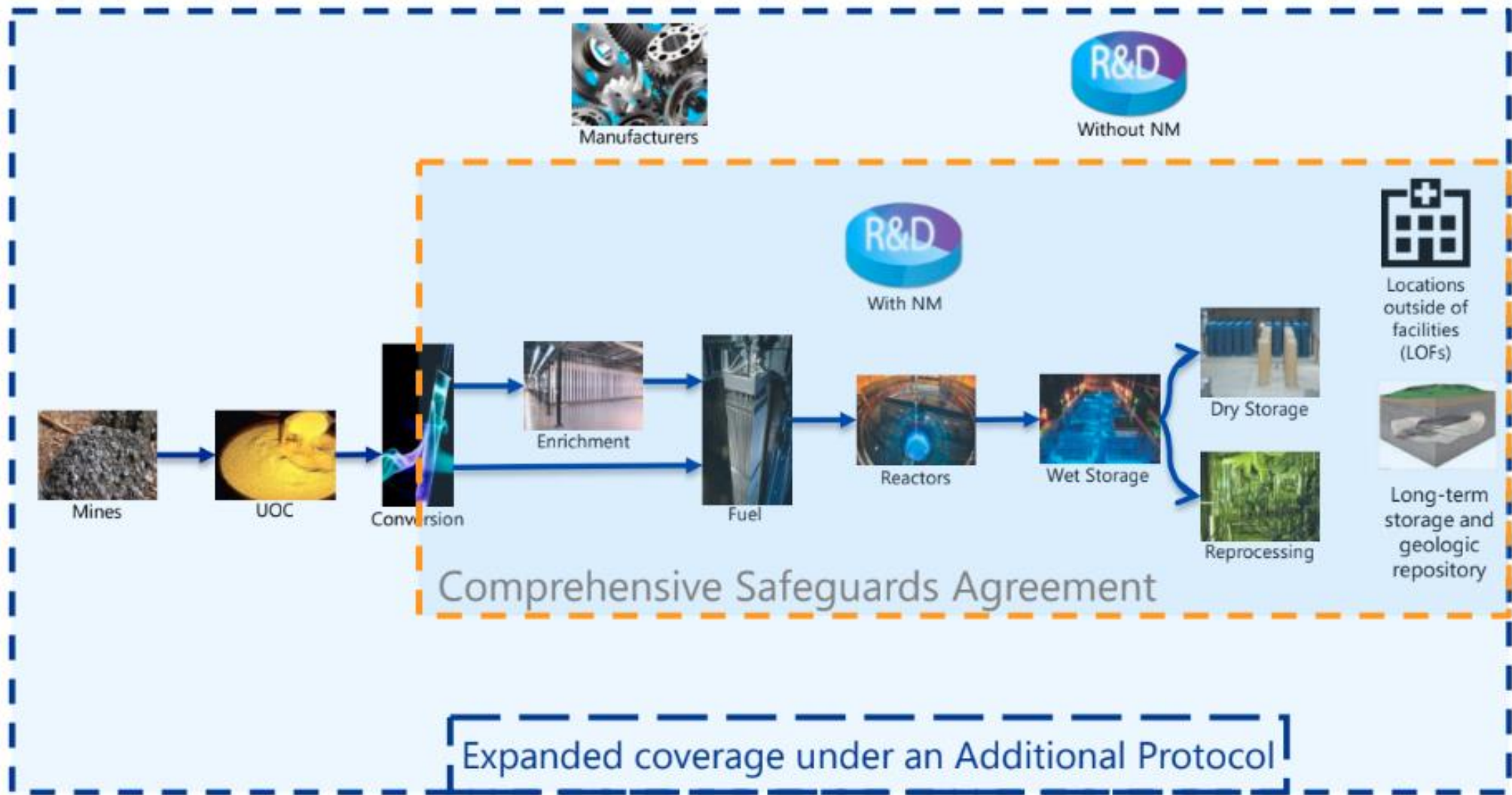
Other locations declared by the State (e.g. under Art. 2.a.(iv)) and any other location specified by the IAEA:

- To resolve a question or inconsistency regarding correctness & completeness of information provided under Art. 2 or to resolve an inconsistency

Additional Protocols: example

IAEA may seek access to a location declared by the State under Art. 2.a.(iv) and Annex I to be engaged in the **manufacture or upgrading of deuterium**:

- In order to resolve a question relating to the correctness and consistency of the State's declaration or an inconsistency related thereto
- Activities: carry out, e.g., visual observation, collect environmental samples, use radiation detection and measurement devices
- If the State is unable to provide access, it must make every reasonable effort to meet the IAEA's requirements through other means



Routine access to information and locations under CSAs and APs

General Considerations

- **Gaps in safeguards?**
 - Not all CSA States have an AP (**key outliers** include Argentina, Brazil, DPRK, Egypt, Iran, Saudi Arabia); CAs not to be carried out “mechanistically or systematically”
 - VOA and other SG agreements: no measures currently applicable to fusion installations; APs are generally limited to activities in conjunction with NNWSs
- **Are fusion systems “reactors”** within the definition of INFCIRC/153, para. 106(a)?
- **Safeguards by design:** the value of getting ahead of the game; don't wait till all hell breaks loose

Parallels with Particle Accelerators?

IAEA's acquisition path analysis (APA)

- IAEA carries out assessment to determine whether an SQ of material could be generated within a sufficiently short period (~a few years)
- If neutron flux & cycle is high enough, IAEA performs additional assessment to determine what it would take to adapt the facility for Pu production, which is then factored into the APA
- If accelerator is included, those timeframes, along with relevant State-specific factors inform frequency & intensity of SG activities
- Accelerators not considered facilities or LOFs unless they utilize nuclear material (e.g. DU for shielding) and applicable measures are limited, particularly in a State without an AP.

Ensuring these issues are credibly addressed and discussed with foresight can facilitate industry growth, government support and public acceptability of fusion technology



Nuclear Fusion and Export Controls: Is a New Regulatory Framework Needed?

October 1 2026

Prof. dr. Quentin MICHEL
qmichel@uliege.be

Trade Control Essential Elements

- A transfer of goods, software or technology
- The item is controlled (listed or catch-all)
- The transfer presents a proliferation or security risk

To assess whether nuclear fusion falls within export control regimes, three questions must be examined:

- Is fusion explicitly controlled?
- Are fusion-relevant items controlled?
- Can catch-all provisions apply?

The items are either listed or
subject to a catch-all provision

Nuclear **Fission** Has Always Been Covered by Trade Control Rules

COCOM

- Atomic Energy List

Nuclear materials, reactors, fuel-cycle equipment and technologies relevant to nuclear weapons development.

- International Industrial List

Strategic dual-use items (including advanced machine tools, electronics, computers, telecommunications equipment, sensors, materials, semiconductors, cryptography and other high-technology items).

NPT 1978

- Source or special fissionable material, equipment or material especially designed or prepared for the processing, use or production of special fissionable material

Nuclear **Fission** Has Always Been Covered by Trade Control Rules

Zangger Committee

- Source or special fissionable material, equipment or material especially designed or prepared for the processing, use or production of special fissionable material

NSG

- Items that are especially designed or prepared for nuclear use
- equipment, materials, software, and related technology that could make a major contribution to a “nuclear explosive activity,” an “unsafeguarded nuclear fuel-cycle activity” or acts of nuclear terrorism

Nuclear **Fission** Has Always Been Covered by Trade Control Rules

Wassenaar Arrangement

- Category 1 – special materials and related equipment
- Some items are included in the munition list (nuclear reactor)
- But the ground for controlling is not nuclear but rather potential use for conventional arms and weapons of mass destruction

Nuclear **Fusion** Is Generally Outside the Scope of Current Control Lists

NPT and Zangger Committee

- Neither explicitly mentioned nor explicitly excluded.

NSG

- The control entry covering "Nuclear reactors and especially designed or prepared equipment and components therefor" contains an introductory note clarifying that fusion reactors are not subject to the controls provided under the guidelines.

Wassenaar Arrangement

- Neither explicitly mentioned nor explicitly excluded

But Some Items Listed Might be Relevant for Nuclear Fusion

NPT and Zangger Committee

- Deuterium and heavy water, Tritium-related production facilities

NSG

- Lithium-6 and tritium-related technologies, heavy water and deuterium, superconductors and magnet technologies, vacuum equipment, advanced materials resistant to neutron flux, high-power electronics and controls, lasers (for inertial fusion concepts), high-performance computing and simulation technologies.

Wassenaar Arrangement

- High-field superconductors, cryogenic equipment, high-vacuum pumps and vacuum technology, beryllium products, advanced nickel and titanium alloys, precision CNC manufacturing equipment, scientific imaging systems, neutron detectors, high-power pulsed lasers, high-performance computing equipment, advanced electronics and control systems.

Wassenaar Arrangement could be the most appropriate regime for controlling nuclear fusion-related items, but **any additions** should be limited to items that constitute “major or key elements for the indigenous development, production, use, or enhancement of military capabilities.”

Can a non-listed item be subject to a transfer authorization: NSG

*Suppliers should ensure that their national legislation requires an authorisation for the transfer of items not listed in the Annex if the items in question are or may be intended, in their entirety or in part, for use in connection with a “**nuclear explosive activity**”.*



includes research on or development, design, manufacture, construction, testing or maintenance of any nuclear explosive device or components or subsystems of such a device.

Nuclear fusion-related items could fall under NSG catch-all provisions if they are potentially intended for activities associated with the development, manufacture or testing of thermonuclear weapons, insofar as such activities qualify as "nuclear explosive activities".

Can a non-listed item be subject to a transfer authorization: Wassenaar Arrangement

*Participating States will take appropriate measures to ensure that their regulations require authorisation for the transfer of non-listed dual-use items ..., when the authorities of the exporting country inform the exporter that the items in question are or may be intended, entirely or in part, for a **military end-use***



*In this context the sentence **military end-use** refers to use in conjunction with an item controlled on the military list of the respective Participating State.*

Nuclear fusion-related items could fall under the scope of the WA if they are included in national control lists

To be controlled items should
present a potential risk of
misuse as defined by Regimes

Criteria: not to transfer and not to assist a State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

- Formally stated for Nuclear weapons States
- No definition of what is a nuclear weapons or an explosives devices

Conditions: “source or special fissionable material shall be subject to the safeguards required by this Article”. Understood by NPT Review Conference as CSA

Nuclear Fusion: criteria relevant, conditions maybe not (depending on the notion of safeguards and material)

Criteria: not explicitly identified, but its objectives are the implementation NPT commitment and specifically article 3.2

- *preventing diversion of the safeguarded nuclear **material** from peaceful purposes to nuclear weapons or other nuclear explosive devices* (paragraph 3)

Conditions: *material will be subject to a safeguards agreement with the Agency as soon as the recipient State takes over responsibility for the material, but no later than the time the material reaches its destination.*

Nuclear Fusion like the NPT: criteria and conditions potentially relevant depending on the notion of safeguards and material

Criteria:

- **Trigger list:** *Notwithstanding other provisions of these Guidelines, suppliers should authorise transfer of items or related technology identified in the trigger list only when they **are satisfied** that the transfers would not contribute to the proliferation of nuclear weapons or other nuclear explosive devices or be diverted to acts of nuclear terrorism. (paragraph 10)*
- **Dual use list:** potential use in a **nuclear explosive activity** or an **unsafeguarded** nuclear fuel-cycle activity, or an **unacceptable risk of diversion** to such an activity, or when the transfers are **contrary to the objective** of averting the proliferation of nuclear weapons, or when there is an unacceptable risk of diversion to acts of **nuclear terrorism** (paragraph 2 basic principle)

Considerations to assess for dual use:

- ...
- Whether the items to be transferred is appropriate for the stated end-use and whether that stated end-use is appropriate for the end-user;
- Whether governmental actions, statements, and policies of the recipient state are supportive of nuclear non-proliferation and whether the recipient state is in compliance with its international obligations in the field of non-proliferation;
- Whether the recipients have been engaged in clandestine or illegal procurement activities;
- Whether a transfer has not been authorised to the end-user or whether the end-user has diverted any transfer previously authorised;
- Whether there is reason to believe that there is a risk of diversion to acts of nuclear terrorism;
- Whether there is a risk of retransfers of items , or related technology or of transfers of any replica thereof contrary to the Basic Principle, as a result of a failure by the recipient State to develop and maintain appropriate, effective national export control system

Conditions:

Trigger list:

- formal governmental assurances from recipients explicitly excluding uses which would result in any nuclear explosive device.
- agreement with the IAEA requiring the application of safeguards on all source and special fissionable material in its current and future peaceful activities.

dual use:

- statement from the end-user specifying the uses and end-use locations of the proposed transfers;
- an assurance explicitly stating that the proposed transfer or any replica thereof will not be used in any “nuclear explosive activity” or “unsafeguarded nuclear fuel-cycle activity”

Nuclear Fusion:

Trigger list criteria: relevant depending on the definition of nuclear weapons or other nuclear explosive devices

Trigger list conditions: relevant depending on the notion of safeguards and nuclear explosive activities

Dual use criteria: mostly relevant but link to the notion of nuclear explosive activity or an unsafeguarded nuclear fuel-cycle activity and nuclear terrorism

Dual use conditions: mostly relevant but link to the notion of nuclear explosive activity or an unsafeguarded nuclear fuel-cycle activity

- Didn't defined criteria or conditions
- Principle: **each participating state retains full national discretion** over export licensing decisions.

General objectives

- Contribute to regional and international security.
- Prevent destabilising accumulations of arms.
- Prevent transfers that would enhance military capabilities contrary to those objectives.
- Prevent diversion to undesirable end-users or end-uses.
- Prevent acquisition by terrorists

Nuclear Fusion: objectives could be relevant, criteria and conditions could be defined in consideration of those objectives

Fusion is not explicitly covered by current multilateral export control regimes.

Some fusion-relevant technologies are nevertheless controlled because of their potential contribution to:

- nuclear explosive activities;
- unsafeguarded nuclear fuel-cycle activities;
- acts of nuclear terrorism; or
- military capabilities.

Controls are triggered by the potential for sensitive end use or diversion, not by the nuclear fission or fusion application itself.

Additional fusion-relevant technologies could be brought under control where they are assessed as making a significant contribution to such end uses.

Panel Discussion



Lunch Break

Session 3: Industry Considerations

An industry perspective on Regulatory Frameworks

Sara Castegini
Global Policy Lead

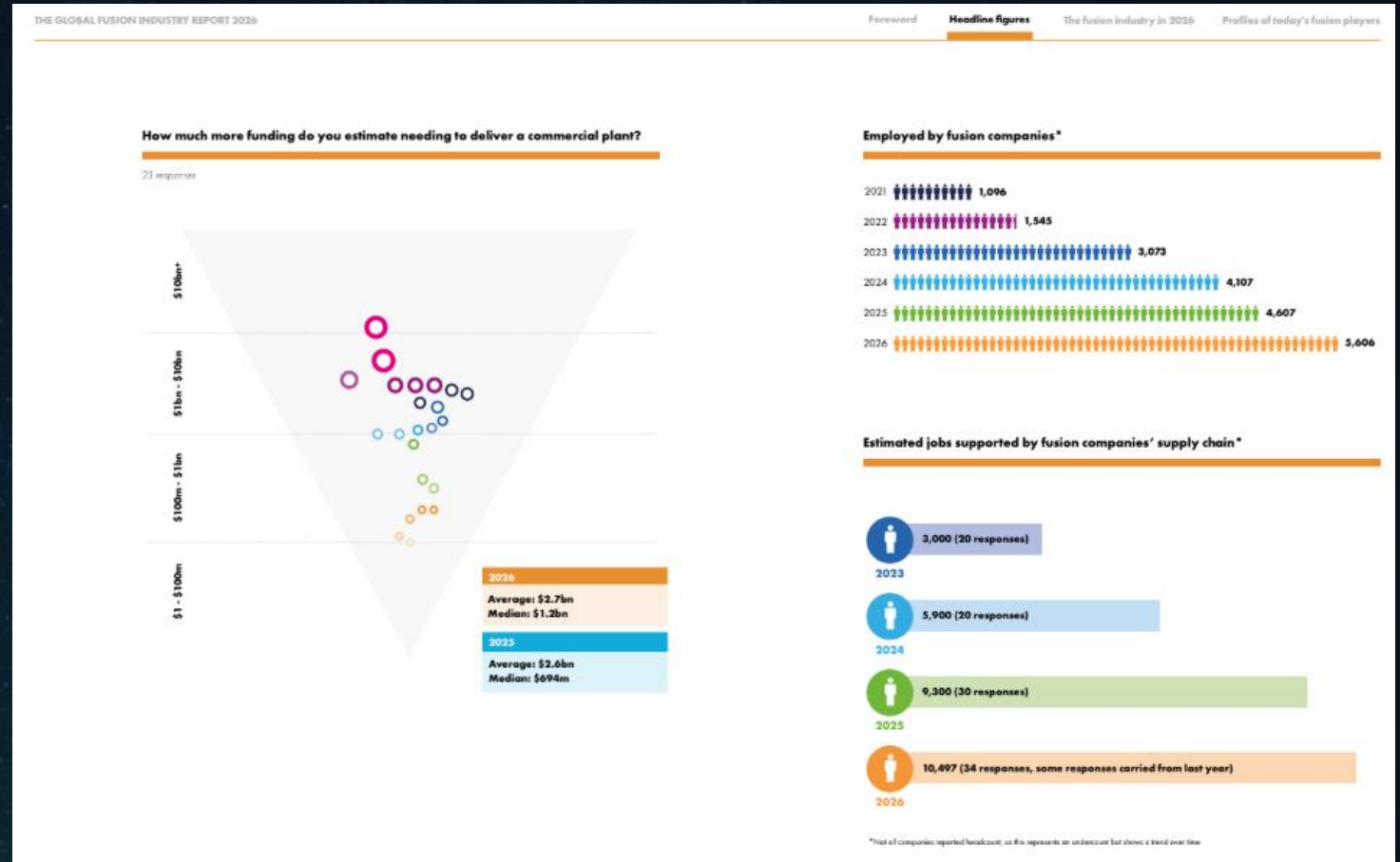


Commonwealth
Fusion Systems

The global private fusion industry



- 56 fusion companies located across 13 countries with the goal of commercializing fusion
- Growing quickly, with \$14.2 billion in private investment
- 16,000+ jobs supported by the industry and supply chain
- Majority of companies expect commercial fusion energy in the 2030s



CFS on a path to deliver commercial fusion energy



- CFS founded in 2018, spun out of MIT
- Raised ~\$4 billion
- Built a high caliber, diverse team
- Over 1000 employees



CFS is advancing toward fusion with concrete milestones



R&D

Commercial demo

Commercial powerplant



Plasma Physics
DEMONSTRATED

Magnet tech
COMPLETED

SPARC
UNDER CONSTRUCTION

ARC
EARLY 2030s

Industry needs for radiological regulatory frameworks



Fusion power plants, like other industrial and energy facilities, will be developed and deployed in regulated environments. If we don't start working on needed frameworks now, regulations will slow down deployment when technology is ready

- **Early priority for industry:** Radiological licensing was identified early as the highest priority regulatory issue for CFS and the whole fusion industry
- **Certainty needed:** Regulatory certainty on the radiological treatment of fusion was recognized as crucial to a) the fusion industry's credibility with investors and b) for confidence in deployment timelines
- **Separating from fission:** The different radiological hazards between fusion and fission require distinct policies and thus different radiological licensing processes



Fusion's radiological hazards

- The main radiological hazards from a fusion machine are:
 - Tritium
 - Neutrons and x-rays – the “direct dose”
 - Activated materials
- No fissile material are used in fusion power plants, so a runaway chain reaction (i.e., criticality, meltdown) is not possible and there is no spent fuel or high-level radioactive waste
 - Fusion reactions are driven reactions: very specific conditions are required to form a plasma and make fusion happen. Any anomalies will cause the fusion reaction to stop

Guiding principles for radiological frameworks



Regulators working to identify an appropriate framework for fusion should keep 6 guiding principles in mind for radiological licensing

1. Risk-appropriate and different from fission
2. Technology neutral
3. Goal oriented
4. Predictable
5. Public participation
6. Internationally aligned

Guiding principles for radiological frameworks



1. Radiologically risk appropriate regulations that are different from fission

- Fusion machines are not nuclear installations, they are radiation sources
- Jurisdictions have been licensing fusion research machines and radiation facilities for decades – the novelty relates to how radiological licensing frameworks apply to power plants
- Need to focus on actual vs hypothetical risks

Guiding principles for radiological frameworks



2. Technological neutrality: Ensure applicable set of regulations do not become too prescriptive to allow for the different commercial approaches to be regulated under the same framework.

3. Goal-based safety standards: Focus on establishing the safety goals and objectives that developers need to meet, instead of prescribing specific design requirements for different fusion power plants to not compromise flexibility and innovation in designs



Guiding principles for radiological frameworks

4. Predictability: Refer back to radiation protection principles; do not re-create the wheel. Rely on precedent from existing fusion research machines or particle accelerators to develop the body of guidance needed for developers

5. Transparency and public participation: Educational efforts for both regulators and the general public are key; Allowing for public comments to ongoing regulatory efforts is encouraged

6. Internationally aligned: Ensure frameworks enable rapid scale of fusion deployment globally and seek international alignment at outset



Where are most countries starting?

- Emerging global consensus that fusion should be treated differently than fission – most countries taking active steps towards regulations for commercial fusion power plants are considering a separate framework for fusion
- Jurisdictions are starting fusion specific processes and consultations to evaluate the best radiological frameworks for fusion. Dialogue is key
- Governments are relying on existing radiation protection frameworks for appropriate oversight, and augmenting as needed. Indeed, fusion machines produce ionizing radiation and as such they usually already fit legal definitions of “particle accelerator” or radiation generators”
- Radiological regulations focus on use, production and possession of radioactive materials, and on the operations of the fusion machine

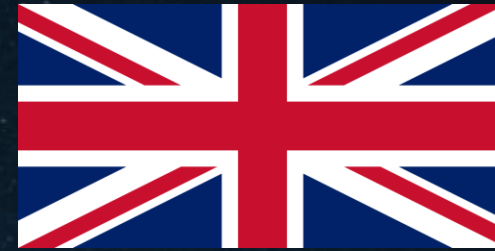
US and UK have frameworks in regulation and in law



In 2023, the US NRC unanimously voted to regulate fusion under byproduct materials framework. In 2026, NRC published its proposed rule and fusion guidance

In July 2024, the ADVANCE Act became law and codified fusion's regulatory treatment in US law

ADVANCE Act defined **fusion machines** as “a machine that is capable of (1) transforming atomic nuclei, through fusion processes, into different elements, isotopes, or other particles; and (2) **directly capturing and using the resultant products, including particles, heat, or other electromagnetic radiation.**”



In 2022, the UK announced that fusion would be regulated under the Environment Agency (EA) and Health & Safety Executive (HSE)

UK Energy Act of 2023 codified into law different regulatory treatment between fusion and fission

UK Energy Act of 2023 defined **fusion energy facilities** as “a site used for the purpose of installing or operating any plant designed or adapted for the production of electrical energy or heat by fusion, and not also used for the purpose of installing or operating a nuclear reactor”

The US' fusion regulatory policy process



In 2019, Congress directed NRC and DOE to work together to develop a “technology-inclusive regulatory framework” by 2027 for fusion machines

- Started multi-year public consultation process run by NRC’s nuclear materials team involving federal agencies, national labs, fusion developers, and members of public
- All fusion machines to be regulated under the same framework

NRC Commission unanimously decided to regulate fusion differently from fission in 2023

- Integrating fusion into its existing framework for byproduct materials (10 CFR 30)
- Directed agency staff to formalize this finding in regulation and issue fusion-specific regulatory guidance

In 2024, the ADVANCE Act became law and codified NRC’s decision in US law

- Legally defined fusion machines as a type of particle accelerator

In 2026, NRC published its proposed rulemaking package targeting a final rule by 2027



US rulemaking package considerations

NRC published their proposed rule describing intended changes to NRCs regulations

- Comment period ended in May 2026

What does the proposed rule do?

- Adding a definition of fusion machine to NRC regulations
- Clarifies “waste” (byproduct material) disposal pathways
- Opines on the appropriateness of existing regulations on emergency preparedness, radiation protection, export control, physical security
- Published a new fusion specific “NUREG” guidance

NRC will review public comments and finalize the rule

- Targeting a final rule in 2027 – by the deadline set by Congress
- Usually a final rule does not depart materially from the draft rule

Once the rule is finalized by NRC, Agreement States will have 3 years to formally update their own regulations

- Some states have already started to update their regulations

Implications for materials approach in the US



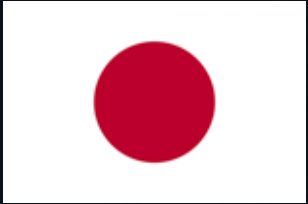
Consistent with precedent established by fusion research machines

- Allows Agreement States to be the lead regulators
- Lets fusion licensees build on the practice established by particle accelerators and other similar materials licensees (including the precedent we are setting with CFS' SPARC)
- Fusion power plants developers will have to:
 - obtain a radiological materials license based on 10 CFR Part 30 and
 - register their fusion machine as a particle accelerator

Regulated under byproduct material framework, radiation protection principles

- Part-30 radiological materials license is focused on **radiological materials** (i.e., tritium fuel, activated material, small sources for testing and calibration of instruments) and **compliance with radiation protection principles** (dose considerations)

Regulatory Frameworks for Fusion in G7 Countries



Japan: Signed onto 2023 Agile Nations Joint Statement on ideal fusion regulatory frameworks. Established separate fusion regulations task force. Released 2025 draft paper on regulatory approach, separating fusion from fission



Canada: Announced in 2024 that fusion power plants should be regulated differently from fission and based on actual risk. Discussion paper from regulator issued in June 2025 for public comments. Organized public meeting in 2026 to discuss public feedback



Germany: Established working group “ReFus” on fusion regulatory frameworks. Administration is committed to separating fusion from fission regulations. Legislation introduced to include fusion within German radiation protection Act



Italy: Passed legislation in 2026 tasking the Government with drafting new regulations for both fusion and fission. Legislation recognizes the need for a different framework for fusion



Key considerations

- Fusion-specific technical advisory committees can be helpful to assess how to fit fusion within existing radiation protection frameworks
- When there is ambiguity on whether fusion power plants could legally be treated as nuclear facilities, it is helpful to clarify treatment in legislation
- Regulatory “certainty” doesn’t mean every detail must be figured out at the outset. We should refrain from overly prescriptive approaches and allow for proper sequencing of issues
- Regulations should be based on machines that are currently being contemplated, not theoretical future machines
- Avoiding arbitrary distinctions between large and small machines, and avoiding thresholds around quantities of radiation or neutrons at this stage of the industry

Session 4: Civil Liability

Paris Convention and Fusion

Ms Elena de Boissieu
Deputy Head, Division of Nuclear Law



Paris / Brussels Regime

1960 Paris Convention PC – in force 1968

Third Party Liability in the Field of Nuclear Energy

Basic liability convention

16 Contracting Parties

mostly Western Europe



www.oecd-nea.org/law/paris-convention.html

1963 Brussels Convention BSC – in force 1974

Supplementary to the Paris Convention

Supplementary compensation scheme

13 Contracting Parties

all parties to the PC



www.oecd-nea.org/law/brussels-supplementary-convention.html



NUCLEAR LIABILITY CONVENTIONS – STATUS OF PARTIES



EUROPE

(as of May 2026)



www.oecd-nea.org/liability-map

Paris / Brussels Regime: Membership

Paris Convention + Brussels Supplementary Convention	Paris Convention Only	Paris Convention + Brussels Supplementary Convention + Convention on Supplementary Compensation
 Belgium*  Denmark*  Finland*  France*  Germany*  Italy*  Netherlands*  Norway*  Slovenia*  Spain*  Sweden*  Switzerland* 12 countries	 Greece*  Portugal  Türkiye* 3 countries	 United Kingdom 1 country

NOTE: Adherence to the Joint Protocol is indicated with an *.

What Does the Paris/Brussels Regime Cover?

An exceptional regime

This is an **exceptional regime** that covers risks of an **exceptional character** for which common law rules and practice are not suitable.

What stays outside the scope

Whenever risks associated with nuclear activities can properly be dealt with through existing legal processes, they are left outside the scope of the regime.

Exclusions are based, among others, on radiation protection and insurance considerations.

What the regime applies to

The special regime applies only to damage caused by a **nuclear incident** occurring at a **nuclear installation**, or in the course of transport of **nuclear substances**. Damage must arise out of, or result from, **ionising radiation**, whether it arises from the radioactive properties of such material, or from a combination of radioactive properties with toxic, explosive or other hazardous properties of material.

States keep their freedom to act

States remain free to take additional measures outside the scope of the Paris / Brussels regime.

Paris Convention and Fusion

01

The Paris Convention does not include fusion

- All nuclear liability conventions have similar scopes of application which do not include fusion installations.
- Definition of **nuclear fuel** provided in the Paris Convention is only applicable to **fission**.

02

Although establishing an exceptional regime to cover risks of an exceptional character, the Paris Convention is not limited to catastrophic accidents

- The Paris Convention applies to **nuclear incidents** whether or not they have **transboundary effects**.
- Risks expected to be associated with commercial fusion reactors may be as great as the risks associated with certain activities already covered by the conventions, such as **low risk activities** (e.g. low risk installations, transport, low-level radioactive waste).

Paris Convention: Definitions

Nuclear fuel Article 1(a)(iii)

“Nuclear fuel” means fissionable material in the form of uranium metal, alloy, or chemical compound (including natural uranium), plutonium metal, alloy, or chemical compound, and such other fissionable material as the Steering Committee shall from time to time determine.

Radioactive products or waste Article 1(a)(iv)

“Radioactive products or waste” means any radioactive material produced in or made radioactive by exposure to the radiation incidental to the process of producing or utilizing nuclear fuel, but does not include (1) nuclear fuel, or (2) radioisotopes outside a nuclear installation which have reached the final stage of fabrication so as to be usable for any industrial, commercial, agricultural, medical, scientific or educational purpose.

Nuclear substances Article 1(a)(v)

“Nuclear substances” means nuclear fuel (other than natural uranium and other than depleted uranium) and radioactive products or waste.

Nuclear installation Article 1(a)(ii)

“Nuclear installation” means reactors other than those comprised in any means of transport; factories for the manufacture or processing of nuclear substances; factories for the separation of isotopes of nuclear fuel; factories for the reprocessing of irradiated nuclear fuel; facilities for the storage of nuclear substances other than storage incidental to the carriage of such substances; installations for the disposal of nuclear substances; any such reactor, factory, facility or installation that is in the course of being decommissioned; and such other installations in which there are nuclear fuel or radioactive products or waste as the Steering Committee for Nuclear Energy of the Organisation (hereinafter referred to as the “Steering Committee”) shall from time to time determine; any Contracting Party may determine that two or more nuclear installations of one operator which are located on the same site shall, together with any other premises on that site where nuclear fuel or radioactive products or waste are held, be treated as a single nuclear installation.

No definition of “reactor”

Paris Convention: Explanatory Text

Paragraph 18(e) of the *Exposé des motifs* of the Paris Convention



Neither does the Paris Convention make any reference to its application to nuclear installations that produce energy by nuclear fusion. Based upon available technical information concerning the development of such installations, the application of the Convention's special nuclear liability regime to such installations does not seem to be warranted for the time being. However, **in view of the evolution of research in this field, the Steering Committee for Nuclear Energy could extend the scope of application of the Convention to such installations in accordance with the provisions of Articles 1(a)(ii) and 16.**

Paris Convention and Fusion: Shifting Discussion at NEA (1)

Discussions on the need to include fusion within the scope of the Paris Convention have been going on for decades

1991 – 1992

1st Phase: Revision of the Vienna Convention

NEA Group of Governmental Experts on Third Party Liability in the Field of Nuclear Energy: discussion on the opportunity to include fusion in the context of then existing small fusion research installations.

Conclusion: too early to make a decision on the inclusion of fusion in the PC

2003 – 2006 /
2011 – 2013

2nd Phase: ITER project

NEA Nuclear Law Committee and **Restricted Group on ITER (2011):** discussions focused on ITER, classified under French law as basic nuclear installation not covered by the PC.

Conclusion: lack of consensus and no common aim to continue discussing the inclusion of fusion within the PC

Paris Convention and Fusion: Shifting Discussion at NEA (2)

2016 – to date

3rd Phase: Approval of the *Exposé des motifs* of the Paris Convention, as amended by the 2004 Protocol [Paragraph 18(e)]

NEA Nuclear Law Committee (2018): no common approach among the NEA member countries on liability regime to govern fusion.

Working Group on Fusion and the Possibility of its Inclusion within the Scope of the Paris Convention

Established under the auspices of the Contracting Parties to the Paris Convention (CPPC) in 2020.

Ongoing activities.

The Working Group on Fusion

Working Group on Fusion and the Possibility of its Inclusion within the Scope of the Paris Convention

Established under the auspices of the Contracting Parties to the Paris Convention on 22 April 2020.

Goal: To examine whether and, if applicable, under which conditions, an inclusion of nuclear fusion installations, or certain nuclear fusion installations, within the scope of application the Paris Convention may be warranted, taking into consideration, among others, potential transboundary nuclear damage that such installations may cause.

01 Legal

Provide a general overview of the national liability regimes currently applicable to fusion installations.

02 Insurance

Invite representatives of the nuclear insurance sector to provide input on the coverage available for fusion installations and related activities (such as transport), and the challenges involved.

03 Technical

Invite nuclear technology and radiation protection experts to evaluate and assess current technological developments and the radiological risks of fusion installations.

The Working Group: Activities

- 
- A vertical timeline with a light blue line and circular markers. The markers are blue for specific dates and grey for a range of years. The text for each event is to the right of the marker.
- Nov 2018** ● Nuclear Law Committee (NLC) topical session on fusion reveals a variety of national approaches regarding the liability regimes for fusion.
 - Apr 2020** ● The Working Group is established by the Contracting Parties to the Paris Convention.
 - Oct 2020** ● First meeting of the Working Group.
 - 2020-2021** ● NLC Survey on liability regimes applicable to fusion.
 - Since 2020** ● Several meetings of the Working Group, including a topical session on the fusion industry's perspective.
 - Oct 2026** ● Completion of the assessment of the technical risks of fusion.
 - Dec 2026** ● Report on Fusion and the Possibility of its Inclusion within the Scope of the Paris Convention to be submitted to the Contracting Parties to the Paris Convention for review and comment.

Working Group Preliminary Findings: Technical

What the Working Group found

- **Hazard characteristics:** Future fusion power plants may involve larger inventories of radioactive material than current experimental facilities.
- **Differences from fission:** Fusion produces far less high-activity radioactive waste and uses no fissile material; there is therefore no criticality risk or runaway reaction, as fusion is not a chain reaction.
- **Potential off-site and cross-border effects:** Tritium's high diffusivity and rapid atmospheric dilution limit significant radiological effects a few kilometres from a release; significant cross-border effects would not reasonably be expected unless a plant is located close to a border.
- **Differentiation of fusion installations:** A future liability regime could take into account the characteristics of different fusion installations, including thermal power, the type of fusion reaction used and the tritium inventory.
- **Threshold-based approach:** Thresholds based on the hazard potential or radiological characteristics of an installation could be considered to differentiate fusion facilities and determine the applicability of the nuclear third-party liability regime, drawing on approaches used in other sectors, including nuclear.

For further consideration

- 1 Most published safety studies are based on tokamak technology; other designs remain less well characterised.
- 2 There is no operational experience of commercial fusion power plants to draw on.
- 3 Analysis covered only short-term public doses after postulated accidents; longer-term environmental impact is not addressed and requires further work for liability purposes.
- 4 There is no specific, internationally agreed definition of a fusion installation.

ITER: As the first large-scale facility designed to use tritium as fuel, ITER is subject to the French nuclear safety framework. Its safety approach considers accident scenarios and likelihoods in a manner comparable to that applied to other French basic nuclear installations. Available assessments indicate that a hypothetical release of tritium could result in significant radiological consequences under certain conditions, although the likelihood of such an event is considered very low. The potential impact would also depend on site-specific factors, including the distance from populated areas and meteorological conditions.

Preliminary Assessment. Ongoing work, not yet approved by the Working Group nor the Contracting Parties to the Paris Convention

Working Group Preliminary Findings: Insurance

What the Working Group found

- **Each facility presents specific risk exposures**, which need to be assessed individually before insurers can form a clear view of the overall exposure.
- **Fusion is not immune from radiological risks, but differs fundamentally from fission.** It does not involve fissile or fertile materials, fission products or criticality risk, and the potential radiological consequences of a major event are expected to be more limited than those associated with severe fission accidents.
- **The main risk categories are operations, accident scenarios and transport:** storage and handling of tritium, activation of components, waste handling and maintenance, potential tritium releases or migration of activated materials, and transport of tritium and radioactive waste, for which relevant risks are already well understood.
- **The main radiological exposures identified to date are on site, particularly for workers and visitors.** Potential off-site exposure appears more limited, with available assessments of severe accident scenarios indicating relatively limited radiological consequences for the public.
- **The legal and insurance context varies across facilities and countries.** The liability and financial security arrangements applicable to operators differ, and these differences shape the coverage that can be offered for fusion installations and related activities.

For further consideration

- 1 Greater clarity on the applicable liability framework would facilitate the assessment and allocation of radiological risks and provide greater certainty for the insurance market.
- 2 The position of suppliers warrants consideration, particularly in relation to channelling and potential liability for radiological damage to the facility, workers and third parties.
- 3 The evolution towards commercial fusion should be monitored, including changes in the scale and characteristics of risks and in the regulatory approaches adopted by countries developing the technology.

“Insurers cannot take a position on this debate, but a clear and unanimous decision (rule by tort law or not) would be welcome. An unclear decision may lead to possible diverse positions from the insurance market.”

Working Group Preliminary Findings: Legal

What the Working Group found

- **Fusion falls outside the scope of the nuclear liability conventions**, whose definitions refer, explicitly or implicitly, to fission.
- **Although the conventions establish an exceptional regime for exceptional risks, their scope is not limited to catastrophic accidents.** The risks associated with commercial fusion reactors may be comparable to some already covered, such as the transport and handling of medium-level radioactive waste.
- **There are several options to bring fusion within the scope of the Paris Convention**, including by adopting a specific protocol, amending the Convention or adopting a decision by the Steering Committee for Nuclear Energy. Any such inclusion would require consideration of fusion-specific characteristics, including the treatment and transport of fusion fuels (in particular deuterium and tritium), activated components and radioactive waste, and any consequential amendments needed to ensure the coherent operation of the liability and compensation regime.
- **National approaches among NEA member countries diverge.** General tort law appears to remain the most common approach for radiation damage caused by an accident at a fusion installation, while only a limited number of countries would apply the same nuclear liability regime as for fission installations. Others rely on specific or radiation-protection-based frameworks, or on liability regimes whose application depends on the classification of the installation, the material involved or the activity concerned.
- **Approaches to financial security also vary.** The overall trend is towards no compulsory financial security for fusion operators and no specific financial security requirements for the transport of fusion material, with several countries relying on general tort law.

For further consideration

- 1 With fusion projects developing across CPPCs, it is becoming increasingly important to consider whether the inclusion of fusion within the scope of the Paris Convention may be warranted, or whether general tort law or other legal frameworks may provide an appropriate basis for addressing the radiological risks associated with fusion installations.
- 2 Diverging national approaches may lead to different treatment of operators, suppliers, insurers and victims, particularly as regards channelling, limitation of liability, compulsory financial security, applicable law and jurisdiction. ITER example shows that the choice of regime also shapes contractual arrangements, the availability of insurance and the allocation of risks across international supply chains.
- 3 Any future consideration by the CPPCs should weigh national approaches, the diversity of fusion technologies and their move towards commercial deployment, the radiological risks and the treatment of tritium, waste and transport, the availability of insurance, and the protection of victims without burdening research and investment.

The report recommends no preferred option: it invites the CPPCs to examine the question further on the basis of the legal, technical and insurance considerations, and to determine the most appropriate way forward.



Thank you for your attention

Please contact elena.deboissieu@oecd-nea.org if you have any questions or comments.

Fusion and Liability in the case of Radiation Damage

Ximena Vásquez-Maignan

Special Advisor & Nuclear Practice Lead, White & Case LLP

Chair of FELEX TWG 1 “Third-party liability arising from fusion facilities”

1 October 2026



A FELEX paper

The paper entitled “**Fusion and Liability in the case of Radiation Damage**” was published in January 2026 and prepared by the members of the FELEX Technical Working Group 1 (*Third-party liability arising from the operation of fusion facilities*):

- Castegini, Sara
- de Boissieu, Elena
- Desai, Sachin
- Hokugo, Taro
- Laguna, Maria
- Olajos, Karoly Tamas (Secretary)
- Vásquez-Maignan, Ximena (TWG Chair)

The paper was approved by FELEX before publication, reflecting the consensus and expertise of the Group. The opinions in this paper are those of FELEX Members acting in their personal capacity and do not necessarily reflect the views of their respective organizations.

If you want to receive the paper, contact ximena.vasquez-maignan@whitecase.com.

Taking into consideration the radiological risks

- Whether the special nuclear liability regime should apply to fusion has been debated since 1960, with details discussion when the nuclear liability conventions were being reviewed after the 1986 Chernobyl accident. The issue has regained prominence as fusion has moved from primarily public research toward privately funded commercial development.
- Fusion and fission operate differently
 - As fusion does not use fissionable material as fuel, and does not work via chain reactions, fusion power plants will have very different risks than fission power plants.
 - Fusion combines light elements in a non-self-sustaining reaction, while fission splits heavy elements through a neutron chain reaction.
 - Fusion facilities will have radioactive material onsite, such as (i) fusion fuels, e.g. tritium, and (ii) materials that become radioactive by neutron exposure, but they do not present the runaway meltdown scenarios associated with fission.
 - Proposed designs indicate that most accident scenarios would not require evacuation beyond a 1 Km site boundary.
 - Fusion produces low-level and intermediate-level radioactive waste with relatively shorter half-lives, rather than spent fuel or high-level waste. Generally, there are established commercial pathways for safely storing (or even recycling) low-level and intermediate waste.

Applying nuclear liability to fusion

Pros	Cons
Nuclear liability is an established and well-known regime.	Public perception may be distorted: the public may consider that fusion is as dangerous as fission.
Nuclear liability is channelled on the operator.	Amending international conventions and national laws may take decades.
Prescription period in case of loss of life or personal injury is extended under certain nuclear liability conventions.	Certain nuclear liability principles may not be relevant or acceptable due to the nature of potential damage, e.g. exclusive liability of the operator, capped nuclear liability amount, extended prescription period, or principles applicable in case of transboundary damage.
Operator's liability may be capped, and fusion may be considered a low-risk installation, providing visibility on the cost of the risk.	Commercial insurance coverage remains limited because of the nuclear-risk exclusions. During the construction phase, developers and suppliers can generally rely on conventional energy-project insurance, but the problem will rise when radioactive tritium will be stored or used on site.
Compulsory insurance or other financial security coverage.	If private insurance is not available, the State where the fusion installation is located could provide, against payment, such insurance or financial security.
Legal certainty regarding competent court and applicable law in case of transboundary damage if concerned States are parties to the same nuclear liability convention.	Suppliers seem to become increasingly comfortable over time providing equipment or services for fusion.
National legislations would be harmonised.	Fragmented participation of countries in nuclear liability conventions.

The insurance paradigm

- Because of the nuclear liability regime for nuclear damage, the insurance industry provides a “**nuclear risks exclusion**” **clause** in all commercial insurance policies (particularly property and liability policies).

“This policy does not cover:

- loss of or destruction of or damage to any property whatsoever or any loss or expense whatsoever resulting or arising there from or any consequential loss;*
- any legal liability of whatsoever nature;*

directly or indirectly caused by or contributed to by or arising from:

- the radioactive, toxic, explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof;*
- the radioactive properties of, or a combination of radioactive properties with toxic, explosive or other hazardous properties of, any other radioactive properties with toxic, explosive or other hazardous properties of, any other radioactive material in the course of carriage as cargo, including storage or handling incidental thereto;*
- ionising radiations or contamination by radioactivity from, or the toxic, explosive or other hazardous properties of any other radioactive source whatsoever.”*

Nuclear Risks Exclusion Clause AVN 38B, Version 05.2003, AXA.

- **Radioisotopes used for industrial, commercial, agricultural, medical, scientific or educational purposes** are generally dealt with under general tort law or a specific civil liability regime, and the associated risks are usually covered by the insurance sector in the overall general or professional liability policy for the insured installation

What about other hazardous activities?

- Extraordinary consequences, liability and compensation are not exclusive to nuclear energy and have not raised the need to provide for a special civil liability regime in other sectors, notwithstanding the potential legal and judicial challenges.
 - **Monongah, US (Dec. 1907):** The worst mining disaster in U.S. history. An explosion collapsed the mine entrance and its ventilation system during one of the busiest parts of the workday. More than 350 miners were killed in the explosion or suffocated as poisonous gas.
 - **Bhopal, India (Dec 1984):** The single worst industrial accident in history. Some 45 tons of dangerous gas methyl isocyanate escaped from a pesticide production plant into densely populated neighbourhoods. The final death toll was between 15,000 - 20,000 people, while half million survivors suffered respiratory problems, eye irritation or blindness.
 - **Toulouse, France (Sept. 2001):** Between 20 and 120 tonnes of a stock containing more than 300 tonnes of ammonium nitrate refuse detonated in a fertiliser plant. The explosion, corresponding to a 3.4 magnitude earthquake on the Richter scale, could be noticed up to 75 km away. Its intensity was evaluated as equivalent to 20-40 tonnes of TNT.
 - **Gulf of Mexico (April 2010):** The largest marine oil spill in history. An explosion rocked the Deepwater Horizon oil rig. By the time the well was sealed in September 2010, an estimated 4.9 million barrels of oil had leaked into the Gulf, and immense damage had been done to the Gulf's economy and ecology.
 - **Beirut, Lebanon (Aug. 2020):** The largest non-nuclear blast in modern history. An estimated 2750 tons of stored ammonium nitrate exploded. It resulted in over 6000 injured, 200 fatalities, and over 100 missing casualties. It also destroyed a major part of the city with an estimate of over US \$10 billion in infrastructure damage leading to over 300 000 displaced individuals.

The fusion fuel materials (1/3)

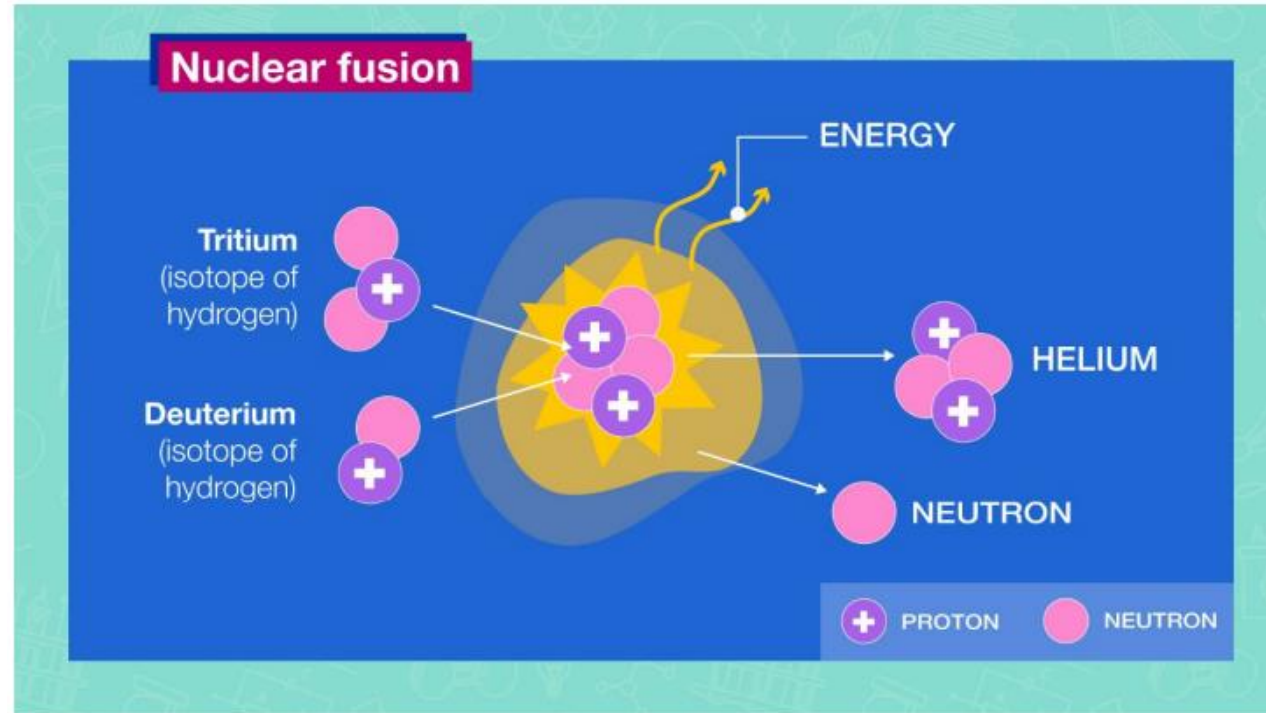


FIG.1. A mixture of deuterium and tritium – two Hydrogen isotopes – will be used to fuel future fusion power plants. Inside the reactor, deuterium and tritium nuclei collide and fuse, releasing Helium and neutrons.

Source: [IAEA World Fusion Outlook 2024](#)

The fusion fuel materials (2/3)

TRITIUM (a radioactive isotope of hydrogen / a by-product of nuclear reactors)

- **Medical and Biological Research:** Tritium-labeled compounds are used as tracers in biochemical and pharmaceutical research, particularly in radiolabeling (e.g. tracking drug metabolism or studying DNA synthesis) to study and diagnose heart disease, cancer and AIDS.
- **Illumination and Electronics:** Tritium can be combined with phosphor to create glow-in-the-dark lighting, such as exit signs, emergency lighting in buildings, and airport runway lights. Tritium gas tubes (GTLS) provide long-lasting luminescence for watches, exit signs, and aircraft instrument dials (e.g. diving watches and aircraft cockpit indicators).

DEUTERIUM (not radioactive)

- **Pharmaceutical and Biotech Industries:** Deuterium is used by deuterated drugs in place of hydrogen to improve metabolic stability, slow breakdown, or reduce toxicity (e.g. Deutetrabenazine for Huntington's disease; also used in NMR spectroscopy as a solvent or tracer)
- **Semiconductor and Materials Science:** Deuterium is used in plasma etching, deuterium annealing, and passivation of silicon chips to improve transistor performance and lifespan (e.g. semiconductor fabrication processes, such as DRAM, flash memory).
- **Analytical Chemistry and Research:** Deuterium-labeled compounds are used as tracers in chemical, environmental, and metabolic research (e.g. isotope dilution mass spectrometry, environmental hydrology studies)
- **Oil and Petrochemical Industry:** Deuterium is used in reaction mechanism studies, cracking research, and as a tracer in refinery processes.

Deuterium itself is non-toxic and non-radioactive, which makes its handling and insurance less complex than tritium.

The fusion fuel materials (3/3)

HELIUM (not radioactive)

- **Healthcare and Medical Imaging: Use:** Helium (especially liquid helium) is used as a cryogenic coolant in MRI machines and NMR spectrometers.
- **Semiconductor and Electronics Manufacturing:** Helium is used in leak detection, cooling, and controlled atmospheres during semiconductor fabrication and optical fiber production.
- **Aerospace and Defense:** Used for purging fuel systems, pressurizing tanks, and cooling rocket engines (e.g., in NASA missions, SpaceX, and military aerospace).
- **Welding and Metal Fabrication:** Shielding gas in arc welding (TIG/MIG).
- **Cryogenics and Low-Temperature Physics:** Research in superconductivity, quantum computing, and particle physics relies on liquid helium for ultra-low temperatures.
- **Leak Detection and Testing:** Helium is used in mass spectrometer leak detectors because it's non-reactive and has small atomic size (e.g. automotive, aerospace, vacuum systems, and nuclear industries).
- **Lifting and Balloons:** Airships, weather balloons, and party balloons. While this is a visible use, it represents a small fraction of helium demand and is declining due to supply limitations.

Helium is a non-toxic, non-flammable, and inert noble gas with a wide range of critical applications across various industries.

International community needs to act now

- ❑ As fusion energy progresses **from experimental to commercial stages**, legal certainty becomes essential.
- ❑ There is **no global consensus among governments** on the liability regime that should apply. Some jurisdictions may extend existing nuclear liability rules to fusion, while others may adopt a dedicated regime, however, in most countries general tort law remains the default position.
- ❑ However, the **fusion private industry is not in favour of applying the nuclear liability conventions** to fusion:
 - it may convey the erroneous impression that fusion and fission risks are similar
 - they have not faced to date challenges contracting with suppliers, obtaining insurance for ever-larger research systems, or siting facilities
- ❑ **Divergent national regimes could affect competition, financing and project delivery.** Suppliers would need to assess and allocate risk under each applicable national framework, while insurance availability and costs could vary materially. This could affect the overall cost of projects and lead to different levels of compensation for victims.
- ❑ **An internationally harmonized approach would improve legal certainty** for investors, developers, suppliers, insurers and potential claimants as commercial fusion projects move toward deployment. Harmonization should also consider the relationship between licensing requirements and civil liability rules.
- ❑ **Any framework should be based on a careful assessment of fusion-specific hazards** and should not simply replicate the fission regime without considering fusion's distinct risk profile.
- ❑ **Governments, the fusion industry and insurers should work together** to establish proportionate and internationally consistent liability and insurance arrangements. A well-designed framework could support investment and innovation while ensuring effective public and environmental protection.



Any questions?

Let's keep in contact



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Coffee Break

Session 5: Thinking Outside National Categories

EU legal framework on fusion energy

B. Batandjieva, B. Fourestié, DG ENER, European Commission

International Symposium on Fusion Energy Law, 1 October 2026

EU Legal Framework

- **Euratom Treaty (1957)**

- Article 2:, the Community shall, as provided in this Treaty:

- (b) establish uniform safety standards to protect the health of workers and of the general public and ensure that they are applied

- Article 30 (Chapter 3 Health and safety):

- Basic standards shall be laid down within the Community for the protection of the health of workers and the general public against the dangers arising from ionizing radiations.

- **Secondary legislation (main)**

- Basic Safety Standards Directive 2013/59/Euratom

- Nuclear Safety Directive 2009/71/EURATOM (amended Directive 2014/87/Euratom)

- Radioactive Waste and Spent Fuel Directive (2011/70/Euratom)

- Supervision and Control of Shipments of Radioactive Waste and Spent Fuel Directive (2006/117/Euratom)

High Level Expert Group on Nuclear Safety and Waste Management (ENSREG)

Council decision 2007/530/Euratom (Article 2)

The High Level Group, at its own initiative or at the request of the Commission, shall advise and assist the Commission in progressively developing common understanding and eventually additional European rules in the fields of:

- (a) the **safety of nuclear installations**, and
- (b) the **safety of the management of spent fuel and radioactive waste**.

It shall facilitate consultations, coordination and cooperation of national regulatory authorities.

- European Nuclear Safety Regulators Group (ENSREG)
- 27 EU Member States and EC members
- Observers (Norway, Switzerland, Türkiye, Ukraine, and UK; IAEA, NEA, WENRA, HERCA and Council of the EU)



Questions

- **What is the applicable legal framework in the EU for regulation, licensing and oversight of fusion facilities?**
- **Is the present EU legal framework sufficient or is something missing?**
- **Is it well suited for commercial fusion power plants? What fusion-specific codes and standards are needed?**

EU Legal Framework on Fusion Energy

- **Extensive dialogue with stakeholders (research organisations, startups and regulators) as part of consultation in view of EU Fusion Strategy (2023-2026)**
- **Public consultation – 80 responses (June 2025)**
- **16 EU Member States, Switzerland, Ukraine, UK and USA**
- **ENSREG consultation (September 2025)**
- **Principle decision of ENSREG to establish a task force based on Commission's proposal (November 2025)**
- **Task Force on Fusion Strategy established (March 2026)**
 - Chair Mr A. Sikorski, BMUKN
 - Members: CZ, DE, FR, FI, ES, IR, IT and SE
 - Observers: HERCA, IAEA, and UK



Main takeaways from the Public Consultations

- Importance of **stable and clear regulation** of fusion facilities for the industry and Member States to **secure investments** and **foster fusion commercialisation** in Europe
- Technological neutrality and support to startups
- Application of risk based (graded) approach
- Radiation protection, radioactive waste, safeguards, liability
- Different messages/views about the way to address fusion regulation – e.g. build on existing EU legal framework or develop a new legal framework
- Competence (and workforce) building for industry and regulators

[Commission launches Call for Evidence to support first-ever EU-wide Fusion Strategy](#)



Expected ENSREG Proposals

- **Commission expects ENSREG recommendations by 2027**

A safety objective and a risk-proportionate approach for regulation, licensing and oversight of fusion facilities, based on a technology-neutral perspective and taking account of the existing Euratom legislation and practices;

Technical areas requiring development of fusion-specific engineering codes and standards;

Competence building and knowledge management within EU Member States' regulatory authorities, focusing on common technical and organizational cross-cutting themes on fusion energy.

- **Commission expects ENSREG support for implementation of these recommendations (after 2027)**



ENSREG Task Force work



- **Work Plan**

- Kick off meeting, 25-26 May 2026, ITER (France)
- 2nd meeting, 3-4 September 2026
- 3rd meeting, 30 November – 1 December (Luxembourg)

- **Task Force feedback and engagement with stakeholders**

- Fusion Now, EFA, FIA, CATF and FELEX
- Invitation to WENRA (observer)
- IAEA (70th General Conference side event [Regulatory framework for fusion: recent developments of the ITER licensing roadmap, perspectives on specific safety requirements for fusion in the EU](#))
- ISO (planned)



Concluding remarks

- European Commission is looking forward to ENSREG recommendations in 2027 to develop a proposal for an EU legal framework on fusion energy
- This legal framework must be technology neutral, risk-based and goal-oriented
- It must comprehensively address safety, radioactive waste, safeguards and liability
- It must provide clarity and predictability for Member States, investors and developers for safety of public, workers and the environment

→ The EU will continue engaging with key partners, industry, stakeholders and international organizations

Useful Links

Nuclear energy, https://energy.ec.europa.eu/topics/nuclear-energy_en

ENSREG - European Nuclear Safety Regulators Group - European Commission, https://nuclear-safety-regulators.ec.europa.eu/ensreg_en

task-force-fusion-energy - European Nuclear Safety Regulators Group,
https://nuclear-safety-regulators.ec.europa.eu/ensreg/activities/task-force-fusion-energy_en

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FELEX

INTERNATIONAL GROUP
OF LEGAL EXPERTS ON
FUSION ENERGY





Wolfram Tonhauser
Chairperson, FELEX



Karoly Tamas Olajos
Secretary, FELEX

- **Origins and Objective**
- **Achievements and Work Programme**
- **Technical Working Groups**
- **FELEX - EU Group**

- **FELEX was created further to a proposal of delegates at the 2023 Fusion for Energy Roundtable, as a joint initiative of Fusion for Energy and the International Nuclear Law Association**
- **FELEX is an informal, independent international expert group, with members serving in their personal capacity**
- **The initial members of FELEX were appointed by Fusion for Energy and are from the fusion industry, international law firms, regulators and international organisations**

Objective of FELEX

... to provide expertise and guidance on the legal and regulatory aspects of the development of fusion energy for peaceful purposes with the aim of fostering the widest international cooperation possible, facilitating the development of state-of-art legal and regulatory frameworks for fusion technologies, and promoting the safe and sustainable advancement of fusion energy...

- **As an immediate task, FELEX analysed and reviewed the key findings of the Fusion for Energy Roundtables in 2022 and 2023, as prepared by the Secretary of the Meeting**

- In December 2023, FELEX issued a report which identified some key issues arising from the Roundtable discussions in 2022 and 2023 - the Key Issues Report



**International
regulatory
considerations**

**National regulatory
considerations**

**Procurement and
contracts**

**Public-private
collaboration and
intellectual property
management**



- The Key Issues Report was complemented by a number of questions to assist FELEX's work in the future



- The Key Issues Report was presented in various forums and meetings and shared with key stakeholders





- In the meantime, FELEX has expanded its membership and comprises now 17 members and 16 observers, including observers from all relevant international organisations, such as the IAEA, OECD Nuclear Energy Agency, and the European Commission
- FELEX so far met altogether seventeen times from September 2023 to September 2026

**FELEX is currently the only group dealing with
legal matters related to fusion energy in a
comprehensive manner**

With the expanded membership, FELEX adopted a revised Work Programme where FELEX:

- **Has analysed and revised the Fusion for Energy Roundtable 2024 Proceedings to confirm that the legal and regulatory issues identified in the Proceedings are relevant, complete, and accurate**
- **Reviewed and updated its Key Issues Report in November 2024**
- **Responded to the questions raised in the Attachment to the Key Issues Report**

According to its revised Work Programme, FELEX is also in the process of preparing discussion papers on legal aspects of the following topics:

- Third-party liability arising from the operation of fusion facilities
- Safeguards and export controls related to fusion technologies
- Public engagement for, and social acceptability of fusion technologies
- Legal and regulatory harmonisation respecting fusion technology development and deployment
- Public-private partnership for, and financing of fusion projects
- Knowledge management in the legal and regulatory fields, respecting fusion technology development

Also, according to its revised Work Programme, FELEX will:

- Consult and cooperate with third parties
- Participate in initiatives of international organizations, international civil society organizations, academic institutions, and industrial stakeholders active in the field, related to the legal and regulatory aspects of the development of fusion energy for peaceful purposes
- Provide expert advice and guidance to international organizations, international civil society organizations, academic institutions, and industrial stakeholders active in the field, on matters related to the legal and regulatory aspects of the development of fusion energy for peaceful purposes, as required.

**(1) Third-party
liability**

**(2) Safeguards and
export controls**

**(3) Public
engagement / social
acceptability**

**(4) Legal and
regulatory
harmonization**

**5) Public-private
partnership /
financing**

**(6) Knowledge
management in the
legal and regulatory
fields**

(TWG 4) Legal and regulatory
harmonization



**(TWG1) Third-party
liability**



(TWG2) Safeguards and export
controls



**(TWG 3) Public engagement / social
acceptability**



FELEX - EU Group



Thank you for your attention

The image features a background of a classical building facade, likely the main entrance of the Julius-Maximilians-Universität Würzburg, with a statue on the roof and arched windows. A blue sky and some trees are visible in the upper left. A white logo, consisting of a stylized 'J' and 'M' forming a square, is positioned to the left of the university's name.

Julius-Maximilians-
**UNIVERSITÄT
WÜRZBURG**

Fusion Regulation in Germany and the US

International Symposium on Fusion Energy Law

Würzburg, 10/1/2026

Regulatory Framework - Germany

Legal Frameworks

Atomic Energy Act
(*Atomgesetz*, AtG)

Radiation Protection Act
(*Strahlenschutzgesetz*, StrlSchG)

Definition ‘radioactive material’

§ 2 (1) AtG; § 3 (1) StrlSchG

‘Radioactive material (**nuclear fuel** and **other radioactive material**) is any material containing one or more radionuclides whose activity or specific activity cannot be ignored in the context of nuclear energy or radiation protection. Nuclear fuel is special fissile material in the form of [...]’

Legal Frameworks – German Law

Regulated Radioactive Materials

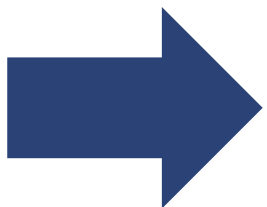
Atomic Energy Act

- ☐ Contains regulations only for **the use of nuclear fuels** (fissile material as Uranium, Plutonium, etc.)
- ☐ Licensing of facilities and activities which use nuclear fuels, particularly nuclear power plants
- ☐ D-T-fuel is not nuclear fuel.

Radiation Protection Act

- ☐ Contains regulations of **radioactive materials other than nuclear fuels**
- ☐ Licensing of facilities and activities that use radioactive materials and generate ionizing radiation
- ☐ D-T-fuel contains radioactive material

Legal Frameworks – German Law



Under German Law, fusion facilities are **subject to current Radiation Protection Legislation** due to the use of radioactive material.

Three Licenses under the StrlSchG

Construction licence, § 10 (1) No. 1 StrlSchG

- ☐ “Any person who constructs a **facility for the generation of ionising radiation** of the following type requires a licence:
 - 1. an accelerator or **plasma facility** in which more than 10^{12} neutrons per second can be generated, [...]”
- ☐ Licensing requirements in § 11 StrlSchG

Operating and handling licence, § 12 (1) No. 1, 3 StrlSchG

- ☐ “A licence is required by any person who
 - 1. operates a facility for the generation of ionising radiation; [...]
 - 3. handles other radioactive material; [..]”
- ☐ Licensing requirements in § 13 StrlSchG

‘Facility for the Generation of Ionising Radiation’

§ 5 (2) StrlSchG

‘Devices or equipment capable of generating, intentionally or unintentionally, particle or photon radiation with a **particle or photon energy of at least 5 kiloelectronvolts**, in particular electron accelerators, ion accelerators, **plasma facilities**, laser facilities.’

Three Licenses under the StrlSchG

Construction licence, § 10 (1) No. 1 StrlSchG

- ☐ “Any person who constructs a facility for the generation of ionising radiation of the following type requires a licence:
 1. an accelerator or plasma facility in which more than 10^{12} neutrons per second can be generated, [...]”
- ☐ Licensing requirements in § 11 StrlSchG

Operating and handling licence, § 12 (1) No. 1, 3 StrlSchG

- ☐ “A licence is required by any person who
 1. operates a **facility for the generation of ionising radiation**; [...]
 3. **handles** other radioactive material; [...]
- ☐ Licensing requirements in § 13 StrlSchG

Operating and Handling License

- § 12 (5) StrlSchG allows a combined operating and handling license
- Regulatory flexibility: § 13 (5) StrlSchG allows licenses under § 12 (1) no. 1 and 3 StrlSchG to be granted initially for a limited period.

Applicability of the AtG

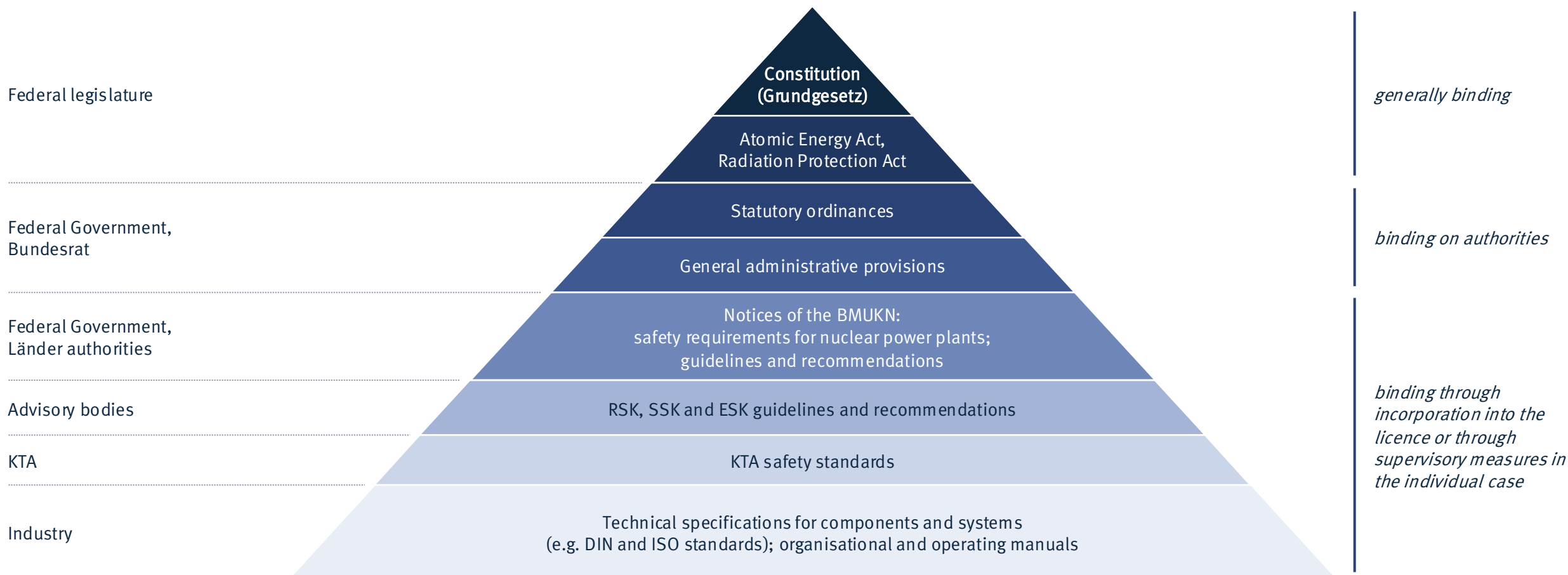
- Licensing provisions not applicable.
- Applicable, however, are:
 - Waste management requirements under § 9a AtG
 - Liability under § 26 (1), (2) AtG (§ 176 StrlSchG)
 - Supervision, § 179 StrlSchG in conjunction with § 19 AtG
 - Experts, § 179 StrlSchG in conjunction with § 20 AtG
 - Reliability assessment, § 75 StrlSchG in conjunction with § 12a AtG



Despite the separation of the licensing regimes, nuclear and radiation protection law form a single body of law.



Hierarchy of German Nuclear and Radiation Protection Law



Fusion-Specific Adaptation of the StrlSchG

The StrlSchG *de lege lata* contains no fusion-specific licensing provisions or requirements.



Need and options for further development?

Legislative Competence

Art. 73 (1) No. 14 GG

“the **production and utilisation of nuclear energy** for peaceful purposes, the construction and operation of facilities serving such purposes, protection against hazards arising from the release of nuclear energy or from **ionising radiation**, and the disposal of radioactive substances.”

Principle of Legality (Vorbehalt des Gesetzes)

The delegation of normative powers is limited by the **principle of legality** (*Vorbehalt des Gesetzes*).

The parliamentary legislature must itself take **all essential decisions**, in particular those affecting fundamental rights.



Given the **fundamental-rights relevance** of fusion regulation with regard to Art. 2 (2) sentence 1 GG on the one hand and Art. 12 (1), Art. 14 (1) GG on the other, fundamental regulatory decisions **must be taken by the parliamentary legislature**.

Summary

Three licenses requirement
under the StrlSchG

New fusion-specific
regulatory requirements
are enacted **uniformly at
federal level** on the basis
of the exclusive federal
competence under Art. 73
(1) No. 14 GG

Fundamental adaptations,
in particular those
affecting fundamental
rights, must be made by
the **parliamentary
legislature**

Regulatory Framework – US

Legal Framework under US Law

Atomic Energy Act (AEA)



U.S. NRC Regulation / state-level regulation (Sec. 274 AEA)

Atomic Energy Act (AEA)

- Statutory basis for both the civilian and military use of nuclear and radioactive materials.
- The Act empowers the US NRC to govern and license such uses and facilities.
- With the ADVANCE Act of 2024 fusion specific amendments were made
 - Amendments to the Act's definition of byproduct material to address fusion machines explicitly (Sec. 3e. (3) (B) AEA).
 - Definition of the term 'fusion machine' under Sec. 11(dd.) AEA.



AEA covers both nuclear fission and nuclear fusion.

Definition ‘fusion machine’

Sec. 11 dd. AEA

‘fusion machine’ means a machine capable of

- (1) **transforming atomic nuclei** into various elements, isotopes, or other particles **by fusion processes** and
- (2) **directly capturing and utilizing the resulting products**, including particles, heat, or other electromagnetic radiation.

Definition ‘byproduct material’

Sec. 3 e. (3) (B) AEA

‘byproduct material’ means [...] any material that **has been made radioactive** by use of a **particle accelerator**, including by use of a fusion machine.

Basic Rule on ‘byproduct material’

Sec. 81 a. AEA

“No person may transfer or receive in interstate commerce, manufacture, **produce**, transfer, **acquire**, own, possess, import, or export any byproduct material, **except to the extent authorized** by this section, section 82 or section 84. **The Commission** is authorized to **issue general or specific licenses to applicants seeking to use byproduct material** for research or development purposes, for medical therapy, industrial uses, agricultural uses, or such other useful applications as may be developed.”

Rulemaking Authority of the U.S. NRC

Sec. 161 b. AEA

“In the performance of its functions the Commission is authorized to [...]

b. **establish by rule, regulation, or order, such standards and instructions to govern the possession and use of special nuclear material, source material, and byproduct material** as the Commission may deem necessary or desirable to promote the common defense and security or to protect health or to minimize danger to life or property [...].“

U.S. NRC Fusion Regulation

- The NRC has approved a *limited scope rulemaking* to establish a regulatory framework for fusion machines within the U.S. NRC's byproduct material framework in **10 CFR Part 30**.
- The existing regulations require only minor adjustments.
 - Proposed Rule: Regulatory Framework for Fusion Machines (91 FR 9476)
 - Draft Consolidated Guidance about Materials Licenses (NUREG-1556, Vol. 22)

Proposed US NRC Rule: Regulatory Framework for Fusion Machines

Element of the Proposed Rule	Provision
Integration of <i>fusion machines</i> by amending the definition of the term ' <i>byproduct material</i> '	10 CFR Part 30
New licence application requirements for the handling of <i>byproduct material</i> in connection with <i>fusion machines</i>	10 CFR § 30.32(k)
Supplementary environmental review requirements	10 CFR Part 51
Supplementary provisions on the disposal of radioactive waste from fusion machines	10 CFR § 20.2008
Specific reporting, record-keeping and inspection obligations for the licensed handling of tritium	10 CFR § 30.55

U.S. NRC vs. State Regulatory Authority

Sec. 274 b. AEA

“[...] the Commission is authorized to enter into **agreements** with the Governor of any State **providing for discontinuance of the regulatory authority of the Commission** under [...] this Act, with respect to any one or more of the following materials within the State: (1) Byproduct materials [...].

During the duration of such an agreement it is recognized that **the State shall have authority to regulate the materials covered by the agreement** for the protection of the public health and safety from radiation hazards“

Regulation of a *fusion machine* under Massachusetts state law

No fusion-specific requirements



The regulatory requirements for *particle accelerators* apply, of which *fusion machines* are deemed a sub-category under Sec. 11e.(3)(B) AEA

105 CMR 120.700: Radiation Requirements for Particle Accelerators

Facility-related registration requirement for *particle accelerators*

Material-related licensing requirement



Key Takeaways

Germany	US
Three licenses required under the StrlSchG	Material-based regulatory approach under 10 CFR Part 30
Regulation by parliamentary statute	AEA as the legal basis, but mainly through administrative rulemaking by the U.S. NRC
Uniform federal legal framework	Federal regulatory approach through Agreement States (National Materials Program)

The background of the slide features a photograph of the main building of the Julius-Maximilians-Universität Würzburg, a grand Baroque structure with multiple stories, arched windows, and a central pediment topped by a statue. The building is set against a clear blue sky. In the foreground, the branches of trees with yellowing autumn leaves are visible on the left side. A white graphic element, resembling a stylized 'U' or a square frame, is positioned on the left, containing the university's name in white text.

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Thank you!

Kristin Weiß

Early-Career Research Group “Legal Issues of Fusion Energy”
University of Würzburg

Panel Discussion

Closing