

## SMR – plug in and play? Actual status of preparedness based on a survey conducted among leading EU nuclear regulators

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## Survey on nuclear regulators' preparedness to license SMR

- Nuclear regulators in these countries received our questionnaire: Czech Republic, Hungary, Poland, Bulgaria, Estonia, France, Finland, UK
- We received detailed answers from Czech Republic, Estonia, France, Finland and UK.
  - Hungary answered that Hungary has no specific regulation in this field. Such Hungarian regulation would be adopted if there were political will to build SMRs in Hungary, but HAEA is not aware of such intention at present.
  - Bulgaria informed about a memorandum for SMR in Bulgaria with US NuScale Power; the text of memorandum is not accessible for media and public.
- The survey took place in the end of 2021.

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## Questions on SMR to nuclear regulators

- Licensing
- Internal and external events and accidents
- Emergency Planning
  
- Can you imagine that the SMR concepts can develop seriously different organizational models compared to larger units?
- Would you take SMR reactor designs running on plutonium as fuel into consideration in your country?
- Do you have already defined specific safety issues regarding the multi-unit sites for SMR?
- Do you see a specific SMR reactor type as particularly fit for your country?
  
- The whole list of questions will be made available here: <http://www.joint-project.org/>

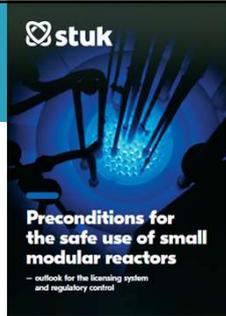
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## Will licensing of SMR be the same as for large NPP?

- UK: The standards for licensing will not be reduced.
- France: French legal framework is valid for every type of nuclear installation; the French regulatory framework doesn't provide a generic design certification; ASN expects to complete faster safety case assessment for a design already assessed by ASN than for a first of a kind; also faster licensing is expected due to simplification of the design
- CZ: some steps will be simplified or replaced by other forms of licensing
- Estonia: expects simplified standardization approach for SMR at EU level

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## Finland (2019 outlook)



- The current license procedure is not necessarily applicable to SMR
- Situations might occur where no decision-in-principle is needed (f.e. when an industrial plant wants to construct a SMR for its own need on its site)
- SMR might deviate from large reactors in many ways:
  - A facility may comprise several reactors that are constructed at different times, similar facilities may be constructed in several different places. The established practice gives a license to only one reactor at a time.
  - Construction may be timed that the first reactors are in operation when the next one is still under construction.
  - There might be other operators than traditional nuclear power companies, with new operating models
  - The construction time of SMR has to be significantly shorter than for large NPPs; the license phase might comprise a significant part of the entire construction phase

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## Initial and severe events and accidents

- France: At the moment, it is not expected to adopt “relaxed” rules for seismic hazards or external events depending on the size or technology of the reactor. The approach to identify these events and to address them is not expected to differ from traditional large reactors.
- UK: The safety and security objectives will be unchanged; designers may be able to demonstrate safety in alternative ways or with different features
- Finland: Reduction of factors which could cause disruptions, f.e. reduced number of pipes result in less leaks; however, new solutions may lead to new kind of disruptions
- CZ: Requirements will remain in many cases, but for SMR it will be easier to fulfil them

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## Emergency Planning Zone (EPZ) and precautionary action zone

- Finland:
  - Precautionary action zone: about 5 km around nuclear facilities: land use restrictions; no hospitals, schools or significant industrial plants are located in this zone; EPZ = 20 km radius
  - Not clear yet how big these zones should be for SMR; esp. as they might be built close to habitated areas
- CZ: Some SMR projects assume approaches to have a reduced EPZ; comparable to research facilities that pose no radiation risk and therefore has no EPZ

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## EUR Key Positions on small modular light water reactors (2021)

- EUR (European Utilities Requirements): association of 13 major European electricity producers, promotes harmonization in requirements
- Some of the EUR High-level requirements:
  - The design shall support an Emergency Planning Zone (EPZ) much smaller than the EPZ for a nuclear site with large reactor.
  - The evacuation zone should be as close as reasonably possible to the nuclear site boundary.
  - A larger scope of External Hazards than those considered for large reactors should be taken into account, due to the wider range of siting options. (Examples of siting options for SMLWR: remote locations or sites such as coastal areas, islands, underground, and near high populated zones or industrial zones.)
  - Potential implementation of innovative fuel designs using advanced fuel and cladding related materials (e.g., accident tolerant fuel (ATF)) shall be considered in order to enable much higher extent of fuel cycle flexibility in the future.
  - The Designer shall prove that simplification with standardisation and modularisation is an essential part of its design.
  - For successful standardisation, the international harmonisation of licensing requirements is necessary

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## Debates on SMR at the ENSREG Conference 20-21 June 2022

- Cooperation types that are ongoing:
  - WENRA (Western European Nuclear Regulators Association) does not work on licensing processes, but on safety objectives for new reactors, a review started in 2019; Safety Reference Levels (SRL) specific to SMR will be prepared the next years
  - SMR Regulators' Forum
  - Trilateral initiative: ASN/F, STUK/FI and SUJB/CZ: France's Nuward SMR design will be the case study for a European early joint regulatory review: safety goals, design condition (DBA, BDBA)
  - European SMR pre-Partnership: Steering committee: SNETP (Sustainable Nuclear Energy Technology Platform), ENSREG, EC, nucleareurope (former Foratom), chairs of the 5 working streams; objectives:
    - Develop the necessary industrial supply chain in Europe
    - Encourage the implementation of common (harmonized) licensing process across the EU
    - Establish a strategic research agenda
- Who should start with harmonizing standards for the reactor designs: industry or regulators? (Ann McLachlan: "Are you playing tennis?")
- Regulator wants to be presented with mature design. Important for vendors to work with different regulators.

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## Conclusions

- Regulators not only expect new reactor designs, but also new types of operators
- Licensing regimes need to be adapted
- Licensing procedures are not ready yet
- Regulators and industry started to work together on harmonization, many open questions
- Sylvie Cadet-Mercier, ASN: Even for 2050 it will be difficult that new designs are available. Report by IRSN in 2014: sodium reactors, HTR were assumed for first part of the century, others like molten salt for second part; nothing has been done on these reactors in the last 8 years.
- The answers of the regulators will be published on <http://www.joint-project.org/>.

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## Contact

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- Joint Project – Nuclear Risk & Public Control: <http://www.joint-project.org/>