(Received on 22-01-2022)

Dear Madam,

Please find below the answers to your request of December, 7.

Can you imagine that the SMR concepts can develop seriously different organizational models compared to larger units?
SMR vendors propose innovative organizational models compared to existing larger units, such **as multi-unit control room, or a broader sharing of safety systems** and personnel between units. Also, SMR designs usually rely more on offsite activities than traditional larger units (construction and assembly operation, maintenance, or even fuel loading). Organizational provisions are part of the safety assessment led by ASN.

Would you take SMR reactor designs running on plutonium as fuel into consideration in your country?
SMR projects using plutonium as fuel would be assessed as any other design.

Do you have already defined specific safety issues regarding the multi-unit sites for SMR?
So far, in France, no SMR project has engaged in a licensing process. However, ASN has identified potential SMR specific safety issues regarding the multi-unit sites, such as multiunit control room or sharing of safety systems between different units for example. The SMR Regulators' Forum's Licensing Working Group has released a report on June 2021 which aims at investigating potential issues raised by the licensing of multi-unit facilities. The potential issues mentioned above are developed among others in this report.

Do you see a specific SMR reactor type as particularly fit for France?
This question deals with industrial/energy policy and is not in the scope of ASN's mandate. ASN would assess any design that engages in a licensing process in France, regardless of its power or technology.

Licensing
As far as we are informed, no specific international safety standards for SMR have been developed yet.

1. Do you have national licensing regulations for SMR already in place?
2. Do you consider developing specific SMR licensing rules necessary? 2 A If so, until when do you think they might be available and applicable in your country?
   1 & 2: French legal framework is common to every type of nuclear installation, from large nuclear power plants to fuel cycle facilities and research reactors. Also, although ASN can enact resolutions to address topics specific to a type of installation, French regulatory framework is mainly objective based and technology neutral. Hence, so far, ASN hasn't identified a need for developing national licensing regulations specific to SMR technologies.

3. Which new issues do you expect the SMR licensing process might involve compared to the conventional larger reactors?
   The number of SMR projects engaging in a licensing process in a short timeframe could be superior to the conventional larger reactors. This could be an issue, considering ASN and IRSN's limited resources.

4. Do you expect that the SMR would be licensable with reduced regulatory approaches, is some kind of simplified approach possible which may lead to significantly lower licensing efforts and faster licensing procedures?

SMR's licensing effort is expected to be challenged by:

- a broader use of innovating technologies and passive systems with a limited return of experience. On this point, ASN considers that the simplification of the design and the possibility to provide demonstration elements through 1:1-scale mockup could be leveraged to reduce assessment time, in comparison to traditional large reactors ;
- the number of applications, considering the fact that French regulatory framework doesn't provide a generic design certification. On this point, ASN expects to complete faster safety case assessment for a design already assessed by ASN than for a first of a kind.

One of the actions highlighted in ASN's multi-year strategic plan is to reinforce the implementation of a graded approach to its oversight. Risks for the protection of people and the environment, as well as return of experience are inputs used by ASN to direct the control and assessment efforts.

5. Do you expect non-LWR SMR concepts to become licensable in the near future of several years, and if so, based on which assessments (please make available to us) and experiences?

The possibility to license non-LWR SMR concepts depends on the industrial maturity of these projects and on the vendor capacity to provide a safety demonstration. So far, there hasn't been any non-LWR SMR project submitted to ASN for assessment.

6. Are the testing and approval methods ready for those non-LWR technologies which completely lack operational and permitting experiences? 6. A Do you have research and development activities ongoing to prepare testing and approval methods for those non-LWR SMR designs?

ASN considers that it is the licensee's responsibility to provide a safety demonstration, using testing and approval methods of its choice. ASN and IRSN will assess applicant's safety demonstration and, when needed, will challenge it with independent R&D results. As mentioned in question 4, ASN expects that the size of SMR projects and the simplification of their design should make 1:1 scale mockup testing easier.

7. Some designs are supposed to reduce the design complexity, e. g. having designs without reactor containments. 7 A Has your nuclear regulatory agency already examined the option of SMR with lower safety redundancies than currently required for conventional LWR? 7 B Has your agency already started reviewing those designs? 7 C How long do you expect such a review and preparation of regulatory rules to last, taking into account your current number of staff?

7A & 7B : So far, there hasn't been any SMR project submitted to ASN for assessment.
7C : See answer 4 for more details on expected challenges regarding licensing efforts. Moreover, the law set time limits for the assessments of the files provided at each major step of the licensing process. Indeed, the assessment of the construction authorization file shall not exceed 3 years, extendable to 5 years if the complexity of the file justifies it; and the assessment of the commissioning authorization file shall not exceed 1 year, extendable to 2 years if the complexity of the file justifies it.

8. Another possible major design difference might be fuel without the barriers the fuel rods represent for LWR have? 8 A This would apply for the molten salt reactors, are

new rules already in place or under preparation and when do expect to have them ready?
There are no rule in place nor under preparation regarding this specific topic.

Internal and external events and accidents

9. Do you expect that the range of internal or external events and accidents might significantly differ from those usually applied for licensing conventional reactors? 9 A On top of obviously similar events such as SBO (Station Black Out), internal fires, loss of pumps, containment integrity as foreseen in international safety guides (WENRA, IAEA etc.), do you expect that external issues such as earthquakes, flooding, acts of terrorism and sabotage could be treated differently for SMR? Could possible SMR sites differ from large LWR sites by having to prove e. g. only “relaxed” rules for seismic hazards or external events?

The order of the 7th February 2012, applicable to every type of nuclear installation, lists the internal and external hazards that shall be covered in the safety case. If needed, this list could be extended. Some SMR vendors claim that their project, by design, provides inherent robustness against external hazards. This will be part of the safety case assessment. 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.
Regarding accidents, the list of postulated initiating events highly depends on the reactor design. However, regardless of the design, the approach to identify these events, and to address them is not expected to differ from traditional large reactors.

Emergencies

10. Are you aware of any serious assessment showing that reduced emergency planning zones or no emergency zones at all are possible for SMR and could Small Modular Reactors serve as a flexible solution which could be build “anywhere” – called “plug and play” concept?

ASN is not aware of any serious assessment showing that reduced emergency planning zones or no emergency zones at all are possible for SMR. However, in January 2018, the SMR Regulators’ Forum has released a report which provides considerations about emergency planning zone size for SMR.
In France, following the Fukushima accident, the immediate evacuation zone has been set to 5 km around nuclear power plants, and the emergency planning zone has been set to 20 km around nuclear power plants. So far, there hasn’t been any SMR project submitted to ASN for assessment, so a need to discuss this particular topic hasn’t been expressed yet.

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Best regards.

Centre d'information du public

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