

**Questions and Answers**  
**IFNEC Webinar #3**  
***SMR Licensing: Sharing Experiences on Regulatory Collaboration***

***To be updated upon receipt of other answers***

Question	Asker Name	Answer(s)/[answered by]
Akira Tokuhiro, Ontario Tech University, Canada. Question for Mr. Magwood. What are the major differences in SMR deployment possibilities for those (SMR) designs that have to compete in the commercial energy sector versus those that are strongly backed by their government such as concepts from Russia and China.	Akira Fitzsimmons	<b>[William Magwood, IV]</b> There are no significant differences between the deployment possibilities of different SMRs sponsored by developers in various countries. All these new technologies are likely to require substantial governmental support of various types to move from design concept to full demonstration and, eventually, commercial deployment. In some cases, this support is clear and comprehensive and in other cases, governmental support is still evolving.
Could the IAEA host a sort of "International licensing service" for SMRs? (A service staffed by experts from a number of interested participating member states). Regulators in those countries could then recognise the standard design certificate issued by such service and then focus on the specific site construction/operating license.	Miguel Peinador	<b>[Answered during session]</b> IAEA facilities generic design reviews which are conducted by international experts against IAEA Safety Standards. Two SMRs underwent this review.
there are so many SMR styles at home and aboard, how to create the harmonized regulatory rules to license the SMR?	zhan liu	
Is it practicable to reduce the Emergency Planning Zone size for the SMRs since it has good amount of radioactive inventories?	Krishna Kumar	<b>[Rachna Clavero]</b> The Emergency Planning Zones in Canada must meet requirements in REGDOC 1.1.1, which allow for the use of a graded approach and scalability based on risk. This aligns with a USNRC decision in 2016 that scalable EPZ for SMRs are feasible: <i>The US Nuclear Regulatory Commission (NRC) has agreed that small reactors do not require the same extensive emergency planning zones (EPZs) around them as large units, and that today's 16-km zones for large units could safely be scaled down.</i>

		<p>Finally, the IAEA SMR Regulators Forum also wrote a paper on EPZ's for SMRs which discusses scalability.  <a href="https://www.iaea.org/topics/small-modular-reactors/smr-regulators-forum">https://www.iaea.org/topics/small-modular-reactors/smr-regulators-forum</a></p> <p><b>[Reno Alamsyah]</b> With graded approach, this could be done through a demonstration by the applicant through their safety analysis report assessing of the safety design of SMR both for design basis accident and design extension condition.</p>
Presently the power range considered for SMRs are from few MW to 300 MWth and the technologies are also different. How a uniform regulatory requirements can be made which is generally applicable to all SMRs?	Krishna Kumar	<p><b>[Answered during session]</b> Yes, there is one CANDU SMR technology under development:  <a href="https://www.snclavalin.com/~media/Files/S/SNC-Lavalin/download-centre/en/brochure/our-candu-smr_en.pdf">https://www.snclavalin.com/~media/Files/S/SNC-Lavalin/download-centre/en/brochure/our-candu-smr_en.pdf</a></p>
Are there any CANDU based SMRs are under consideration/planning by CANDU OWNERS GROUP SMR FORUM?	Krishna Kumar	<p><b>[Rachna Clavero]</b> Yes, there is one CANDU SMR technology under development:  <a href="https://www.snclavalin.com/~media/Files/S/SNC-Lavalin/download-centre/en/brochure/our-candu-smr_en.pdf">https://www.snclavalin.com/~media/Files/S/SNC-Lavalin/download-centre/en/brochure/our-candu-smr_en.pdf</a></p> <p>Please note that the CANDU Owners Group is not evaluating designs. The utilities themselves are evaluating designs under their own commercial agreements.</p>
Interesting discussion in relation to different countries actions and approach to SMR's; however, most of the panelists mentioned the need to standardize SMR's technology similar to the airline industry. Recommend having a more focused group on standardizing licensing regulations to the extent possible especially with one country regulator uses PRA as part of the licensing process while other country regulator does not and require testing or other means of assurance.	Farid Berry	<p><b>[Reno Alamsyah]</b> Design standardization is a very good practice for certain licensing process. It is then the responsibility of regulatory body to perform an independent safety review and assessment of the complete safety analysis report submitted by the applicant, with respect to the applied national legislation and regulation, and considering international standard and best practice.</p>
Is a benchmark or reference SMR design needed, similar to the LWR sector? Would	Akira Fitzsimmons	

<p>this facilitate regulatory and licensing globally?</p>		
<p>Which SMR designs have underwent IAEA generic design reviews? Are any more applied to that review?</p>	<p>Kalev Kallemets</p>	<p><b>[Reno Alamsyah]</b> This would depend on many variables, such as the application of a graded approach and combined license practice with regard to standardized design. In any condition, law and regulation shall put safety as the paramount objective. Interaction of the regulatory body with the stakeholders, including the applicant and licensees, should apply transparency and openness principles while maintaining its independence and professionalism (effectiveness) at the same time.</p>
<p>to every Panelist: Presentations have been somehow generic, talking of the great efforts ahead. Are we using with SMR the 50+ years experience in licensing large G-W reactors?</p>	<p>Oscar Mignone</p>	<p><b>[Rachna Clavero]</b> The SMR activities under the CANDU Owners Group are leveraging the 50+ years of experience and expertise in all areas of the life cycle of reactors to enable development and deployment of SMRs. This includes leveraging expertise in the areas of licensing and safety analysis.</p> <p><b>[Reno Alamsyah]</b> The challenges faced by the regulatory body in the licensing of SMR might be the application of a graded approach in developing an appropriate regulation, especially for a country that tends to adopt a more prescriptive framework. Lawmaking might take a longer process due to the many variations of SMR size and technology, especially with the non-LWR type. The concept of proven technology for an embarking country and how to handle FOAK is another challenge as well.</p>
<p>SMRs could give a chance to reduce construction period on two-three times in comparison with high capacity NPP. But current approaches for licensing require a lot of time. Is it possible to reduce the licensing period and make it parallel with construction?</p>	<p>Alexander Bychkov</p>	
<p>To every Panelist, please, could you give two practical examples of challenges in the SMR licensing that were different from licensing of large G-W reactors?</p>	<p>Oscar Mignone</p>	<p><b>[Rachna Clavero]</b> Examples were provided in the COG presentation:</p> <ol style="list-style-type: none"> <li>1) Nuclear security regulations are quite prescriptive – for SMRs a risk-based approach may be more appropriate</li> <li>2) Nuclear liability – similar to security is also prescriptive and set up for large-scale reactors</li> </ol>

		<p><b>[Reno Alamsyah]</b> This would depend on the country regulatory framework and the completeness of the safety analysis report. Basic of conceptual engineering document is usually used for the application of design approval. In Indonesia, the process of design approval could be applied after the applicant obtain the site permit, or could be requested after most of the major site evaluation works have been carried out with good results. The detail design information is required for the construction permit. According to the existing regulation, the regulatory body may take one year for design approval, and two years for construction permit.</p> <p>Considers also the fact that the country dost not yet explicitly stated for 'go nuclear' until this time, as it is the first key to start the national nuclear program through the NEPIO establishment.</p>
To every Panelist, please, could you give a preliminary time frame for licensing a SMR provided that you have received the basic (or conceptual) engineering documents, including preliminary safety analysis report?	Oscar Mignone	
If SMRs market is focused on developing countries - how does the paneel consider the issue of secutity not just the SMr but the broader politial issues that could be prohibitive. A reacor will last 50 years, goverment last only 5	Biplab Rakshi	
One dery discouraging example of SMR licencing is NuScale Part 52 licencing cost of ca 700 million USD? Can other designs by other regularots licenced at cost that is meaningfully lower?	Kalev Kallemets	
The airline model has been used as an example of another regualtory approach and CORDEL has looked into that. Are there any other examples that have been considered. Pharmaceuticals for example?	Neil Alexander	

<p>One option to facilitate the licencing process of SMRs could be to endorse the assessment performed by the regulator of the manufacturing country. This licencing scheme is already in place in other sectors (e.g. aircrafts or cars industry). From your point of view, what are the main obstacles in the nuclear sector and how to overcome them? What could be the role of international organisation?</p>	<p>Thomas Buckenmeyer</p>	<p><b>[Reno Alamsyah]</b> Such endorsement should firstly be put in the appropriate national law and regulation. International organization like the IAEA is tight with the written mandate, and not to interfere the sovereignty of the member states. However, one of the principles of the Vienna Declaration on Nuclear Safety stated that “National requirements and regulations for addressing this objective throughout the lifetime of nuclear power plants are to take into account the relevant IAEA Safety Standards and, as appropriate, other good practices as identified inter alia in the Review Meetings of the Convention on Nuclear Safety”.</p>
<p>Are not the main obstacles to harmonization primarily political, social, linked to questions of security and national responsibility more than technical?</p>	<p>Thomas Buckenmeyer</p>	<p><b>[Reno Alamsyah]</b> Taking into account the IAEA (requirement) standards into national requirements and regulation is the possible harmonization by the IAEA member states, and it can be reviewed during the periodic review meeting of the Convention on Nuclear Safety, and by a requested IAEA International Regulatory Review Service Mission.</p>
<p>Does the IAEA have any plans to organize a separate INIR mission for SMR similar to INIR-RR?</p>	<p>Galaxy Tab S6 пользователя Ivan</p>	
<p>To every Panelist: I have seen a lot of emphasis in "Harmonization", however, this could be the "perfection" is enemy of the "good" , attention fellows, we need to implement a "sense of urgency" here that allow to have concrete answers in relation to SMR licencing. On the contrary, we will need too many years to put a SMR on line, which is absurd considering that we have now SMR working and delivering energy.</p>	<p>Oscar Mignone</p>	<p><b>[Reno Alamsyah]</b> Again, for many countries taking into account the IAEA (requirement) standards into national requirements and regulation is the possible harmonization, and it can be reviewed during the periodic review meeting of the Convention on Nuclear Safety, and by a requested IAEA International Regulatory Review Service Mission. The sense urgency in terms of economic consideration is for sure important and will not sacrifice the safety principles.</p>

<p>Recently the need for a “paradigm shift” has been recognized: Cf. CNSC President Rumina Velshi “ ...I think the time is now to think boldly and look critically at regulatory frameworks and be open to the need to re-engineer them. It may be time for a paradigm shift in the regulatory space.” Do someone has an idea of what this “paradigm shift” can be ? or, in other terms, : how this paradigm shift can e materialized? Many thanks in advance</p>	<p>Gian Luigi Fiorini</p>	
<p>Are the any plans to involve some industry representatives in the work of the SMR regulatory forum?</p>	<p>пользователя Ivan</p>	
<p>Do we have any international organizations which could lead a work for establishing international standards ? As WENRA for NPP ?</p>	<p>Sylvain PETIT</p>	<p><b>[Rachna Clavero]</b> There are a number of potential international organizations to lead the harmonization effort. WNA and IAEA come to mind.</p>
<p>The advantages of SMRs are presented as a fleet approach with factory manufacture of standardized designs deployed in different countries as a means of reducing cost and project risk. Yet dozens of varied designs are currently vying for approval. How does the panel see this shaking out?</p>	<p>Ian Grant</p>	<p><b>[Reno Alamsyah]</b> In principle, good regulatory practice should maintain their independency and effectiveness, and also apply transparency and openness in dealing with their stakeholders. Risk informed and graded approach should be implemented appropriately. As long as granted by the existing law and regulation, these practice may reduce the licensing time, while the regulatory body keep ensures that safety is always the top priority.</p>
<p>Question for Diane Cameron - How has the Candu SMR design and development funded thus far? Is there collaboration between the private sector (Candu) and the Canadian Government?</p>	<p>AMJAD GHORI</p>	

Considering different types of SMRs, such as SMART of South Korea which has been certified; Nuscale of the United States which is under the review of design; KLT-40S of Russia which is in operation, etc., and the principles of certification which is being explored, how could we jointly establish a certificating framework and principles which are universally suitable for the existing SMRs?	DANRONG SONG	
SMR Panelists: Please, take the US Utility Requirements that include also SMR (2011) and create a practical guide of requirements for SMR that can be used by everyone. The European Utility Requirements proved to be very useful for large G-W Reactors. We should have the same for SMR, this should be a practical step forward for SMR implementation.	Oscar Mignone	<b>[Rachna Clavero]</b> Thank you for this suggestion. COG is working with EPRI to share both the owner/operator requirements EPRI developed and the requirements developed by EDF. We plan to hold a webinar in September hosted by the Canadian Nuclear Society.
How can we introduce more sustainability goals into SMR design and regulation. So much international focus is on safety systems, when many SMRs have challenges associated with challenging waste streams, etc	Ian Streatfield	
Would the panelist identify the role of the academy - the universities in producing the R&D and workforce well versed in all aspects of the SMR?	Akira Fitzsimmons	
Inlight of the current licensing regimes and stages across different countries like the UK, USA and Canada, for the current fleet of SMR's, which SMR technology and country	Princewill Okpala	

do you think would be first to have a commercially built and operating SMR?		
SMR startups have challenges like many startup companies in securing investments while advancing the design. Are the panelist making a distinction between SMR startups and those supported by legacy vendors such as GEH, Westinghouse and Rolls Royce, etc. ?	Akira Fitzsimmons	
The question is related to countries, which are interested in importing or exporting SMR technology and further implementing it for operation. The SMR technology is obviously subject to export control. We also know that there is no common approach for export control of transfer of this technology (no regulation on international level, such as for example the Nuclear Suppliers Group regulations, no additional international agreements on control of SMR transfer were signed). In your opinion, how shall the transfer of SMR and SMR technology be regulated? What are possible options for licensing process and allocation of responsibilities relating to export control of SMRs transfer?	Timur Mukhanov	
A great example of collaboration between regulators and industry is a recent workshop initiated by the CNSC and hosted by WINS where regulators, researchers, utilities and SMR vendors came together to share perspectives and challenges on security of SMRs. This workshop led industry (through	Fred Dermarkar	<b>[Rachna Clavero]</b> Thank you for sharing, Fred.

COG) to develop a white paper on SMR security. There is value to holding more of these workshops that bring multiple stakeholders together.		
How do we overcome the FOAK cost barrier?	Farshid Shahrokhi	
Give not all technologies can be commercialized. How do we select the winner and thereby lots of losers.	Farshid Shahrokhi	
Concerning the site level safety goals for SMRs, are you proposing numerical indicators that can be commonly used by all regulatory bodies? During the webinar, the alliance of the airline industry was discussed as a good example. I think that SMR's common criteria numbers, safety cases and safety analysis method are important for the future installation	Keiko CHITOSE	