Questions and Answers
IFNEC Webinar #1
National Market Perspectives Regarding SMR Market Development – Emerging Countries Have a Conversation on Deployment

QUESTIONS	RAISED BY	ANSWERS [ANSWERED BY]
1. "Dr. Araj, you showed a slide with approximately 8 SMR designs you are evaluating. Will you be downselecting a subgroup of this number for more careful analysis (and if so when) or will you simply select one of these designs for phase II?"	Jeff Merrifield	[Prof. Araj] JAEC is assessing these potential technologies. The next phase will shortlist the qualified technologies by end of 2020, then the BIS will be sent to them to submit binding proposals, and JAEC select the preferred technology.
2. "In Ireland, we fully agree with the 'Project Risks' identified by Prof Araj of Jordan AEC, particularly regarding SMR licensability.		[Prof. Araj] Most of the project risks outlined are common for all new-comer countries. Some are risks generic to Nuclear Projects as a whole, whilst other have been identified for SMR projects.
3. How can the licensing cost of SMR be reduced to more appropriate levels so that SMR is affordable to smaller nations?"	Denis Duff	[Prof. Araj] Close collaboration between vendor country and host country regulator in all phases of licensing will both expedite and lower costs for host country. Regulations have to be tailored to SMRs using larger NPP regulations will deem this endeavor very costly. Meanwhile, IAEA has to expedite in developing SMR guidelines so that can be used as reference for all countries.
4. How much is the CO2 tax?	Andrew Paterson	[K. Kallemets] In European Union CO2 price is now around 24-25USD/t
5. HTGR project as we know has been supported by European Commission. In such a context how do you plan to share intellectual properties between Polish companies and EC?	Evgeny Ivanov	[Answered during the session] NCBJ is engaged in various EU programs so we can expect that it would be platform for sharing the information and knowledge.
6. This question is directed to all the speakers. What is your strategy for the long term management of spent nuclear fuel from SMRs?	Galaxy S10+	[Prof. Araj] The return of SNW to Vendor country is a preferred option. Regional repository can be developed via mutual agreement and coordination between countries.

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7. how can SMR be commercially funded independent of gov. support	Biplab Rakshi	[Prof. Araj] Due to lower total investment costs compared to large reactors, and in a regulated market, where the offtake agreement is present and guaranteed, the future of SMRs is envisioned to be similar to conventional power projects. Large utility developers have the balance sheets to deploy multiple SMRs at a time thereby diversifying construction risks. However, the component of developing SMRs outside the fence follow the same requirements as any other nuclear projects (Treaties, International Obligations, etc.) and thus needs government support.
8. Why is Germany closing its nuclear plants?	Andrew Paterson	[G. Kwong] Shortly after the Fukushima accident, the German government announced that it would close all of its nuclear power plants by 2022.
9. You mentioned a technology assessment process. You are inviting numerous advisors and consulting companies to assess the TRL while majority of them are plus-minus concerned parties. What kind of international support would be needed in order to guarantee fully independent and objective judgement?	Evgeny Ivanov	The panelists are unclear which presentation this question is referring to.
10. "Who pays the CO2 tax -- the utility, or electricity consumers? Is it passed along to industry and households?"	Andrew Paterson	[G. Kwong] It can be levied at any point in the energy supply chain, i.e. “upstream,” - suppliers of coal, natural gas processing facilities, and oil refineries; “midstream” -electric utilities; or “downstream” - energy-using industries, households, or vehicles.
11. "How can SMRs guarantee the cost certainty that has been absent from larger reactors? SMRs will struggle to gain the attention of policy makers until its cost is lower and more certain, especially as renewables appear to them to offer a more attractive solution."	Denis Duff	[Prof. Araj] The shorter construction period and modularity of SMRs could increase the certainty of cost. This, however, will only be achieved once multiple units are developed by a vendor (Cascade of projects). The SMRs are baseload generators and could replace fossil fuel technologies. Nuclear and Renewable

		complement each other and form a synergy to assist in achieving the sustainable development goals of 2050.
12. For Kalev: What methods did you use in your public engagement to increase support? What recommendations would you have for a country yet to begin public engagement or public debate?,S,"Talk to everybody :)	Sarah Cullen	[Answered during the session] We have talked to 20 schools of 250 in Estonia. All politicians, all officials, all people at site."
13. Would Fermi be willing to build first-of-a-kind SMRs? Or is it looking for nth of a kind, like Jordan?	Philip Chaffee	[Answered during the session] Definetly FOAK has to be go critical in country of origin before applying construction licence in Estonia
14. How is the public acceptance in Kenya?	Yuko Wada	[Erick Ohaga] In Kenya as at 2018, the public acceptance stood at 41%
15. which tariff for electricity is considered for Jordan SMR?	Yulia Chernyakhovskaya	[Prof. Araj] Tariff that is competitive with other baseload generation. For Jordan, the SMR Tariff must compete with LNG tariff –about 80-100 USD/MWh
16. Question for Mr. Kallets - Do you believe private capital can be induced to provide funding during the construction stage?	Amjad Ghori	[Answered during the session] Yes, absolutely if there is proper rule of law, democratic governmance, political stability, reliability of power market and especially if policy in place on carbon neutrality - thus in European Union it is possible in most countries.
17. Would a regional nuclear energy strategy with time- bound benchmarks to increase the contribution of nuclear power to electricity production and to decrease the use of fossil fuels work for East Africa Community countries or each country on its own? Your take	David Otwoma	[Erick Ohaga] Kenya is a member of East African Power Pool and will be connecting to South African Power Pool. In view of this regional interconnection, would ensure regional trade in clean energy from Nuclear power. Most East African countries have incorporated NPP in their Energy mix and therefore energy strategy would be a good idea going forward
18. "Kalev, has the European SMR Alliance yet addressed potential spent fuel management challenges, or are they primarily focused on the	Alex Bednarek	[Answered during the session] You are correct, back-end really is not primary issue.

business case and licensing challenges for right now?"		
19. "For new comers, why considering non-proven technologies other than LWR's?"	Farid Berry	[Prof. Araj] New-Comers might opt for SMRS for several reasons: 1. Grid Size 2. Flexibility in expansion to meet growth in demand 3. Lower Initial Capital Commitment 4. Siting flexibility 5. Lower offsite infrastructure upgrade
20. "For Mr. Kamal Araj, why you did not selecte Argentinean CAREM as on possible technology for the pressurized water SMR. Thanks"	Oscar Mignone	[Prof. Araj] Yes, we looked at the CAREM. Studied the technology quite well. The current technology is 25 MWe and the requirements for Jordan set SMRs at 50MWe or more. We are aware of the potential of a larger unit 100-200 to be developed. When that happens, Jordan will be definitely consider.
21. "What regulation (control) approach may be or should be used in SMRs technology import, in your opinion?"	Eugenia Tkachenko	No comments from panelists
22. To what extent does the struggle over the taxonomy of sustainable energy in the EU impact the financeability of SMRs and other new nuclear in Poland or Lithuania? Will the outcome be make-or-break for the viability of these Polish and Lithuanian projects?	Philip Chaffee	[K. Kallemets] There is no Lithuanian project anymore. For Estonia, yes it is important in principle, but no, it is not a show-stopper
23. (how) are the proponents of new nuclear plants including development of a spent fuel/radioactive waste strategy in their planning?	Charles McCombie	No comments from panelists
24. For Mr Kubacki: What is the role of young generation in the capacity building for SMR introduction to national energy mix?	Evgenii Varseev	[Z. Kubacki] Young generation of Poles participates in various international program devoted to SMR technology development, organized by renowned organization – IAEA, NEA, IFNEC, CEM. As Polish

		Nuclear Institutes set up many scientific projects related to advanced nuclear technologies like for example HTR, Young students and PhD graduates are invited to participate and develop their competences in this field.
25. How much investment for GRID is needed in Kenya?	Andrew Paterson	[Answered during the session] Lots upgrade is required in the transmission system to ensure efficient evacuation of power. The estimates from our preliminary grid studies shows approximately 1bn USD
26. "To the presenters, as you consider SMRs as a prime option for your country, would there be any differences in your approaches to human capacity development for SMR technologies compared to large reactors?"	Kenneth Peddicord	[Prof. Araj] The principle is the same for the large and SMR. That said, other considerations have to be taken into account for SMR such as: 1. Construction period 2. Modularity and the learning curve. 3. Size of the Project
27. What would you all like to see from national regulators across the globe as they start to create regulations for SMRs? How likely do you think some sort of standard global licensing process is?	Philip Chaffee	[Prof. Araj] Global licensing process will be a paradigm shift and a increase the market and potential for SMRs deployment. This of course has to be in conjunction with the IAEA.
28. "If one can agree that the UK has all the characteristics that should provide confidence for private funding to support nuclear projects, why then do you believe that the Government is stepping up pockets of financial support during the early stages of a nuclear project life-cycle?"	Amjad Ghori	[Prof. Araj] Any new homegrown technology will require some sort of government support in the initial stages. This support is an added value at the end of the day and supports the economy and industrial development of the vendor country (in this case, the UK).
29. How do you estimate the safety and security costs per KwH vs. large reactors - and even vs. other energy sources?	Debra Decker	[Prof. Araj] You cannot estimate such costs especially vs. other energy sources. This is mainly due to the fact that in the last 30 years, the cost component of nuclear associated with safety and security is mostly related to very tough regulations absent from pretty much everything else, so of course it is higher.

		Versus Large reactors, regulations are different in different countries. Albeit the smaller size (larger cost per KwH), some of these regulations are being modified/adapted as they are not necessary (SMRs are inherently safer). Again, this is technology specific too.
30. How do you rate the prospects of cooperative work of SMR and wind/sun? Is the reasonable to consider symbiosis of wind/sun energy and SMR?	Eldar Alibayev	[Prof. Araj] The Nuclear – Renewable synergy is the most promising option to achieve zero-carbon power generation in the future but requires practical demonstration.
31. Is there lessons we can pick from large reactor licensing that can be utilised for SMR license?	S.YAMOAH	[G. Kwong] There are many lessons learned and relevant experience that can be applied to SMR. Many SMR developing countries now realized that the existing NPP licensing process is too stringent, time-consuming, not be effective for licensing SMR. SMR licensing needs to be simple, clear, and take into account of the SMR design characteristics. E.g the shorter construction time will not benefit if the licensing process is long and complicated.
32. Why do you choose small reactors and what problems do you want to solve with them?	Bo Qi	[Prof. Araj] New-Comers might opt for SMRS for several reasons: 6. Grid Size 7. Flexibility in expansion to meet growth in demand 8. Lower Initial Capital Commitment 9. Siting flexibility 10. Lower offsite infrastructure upgrade
33. "Is there any international efforts to harmonize the SMR licensing in order once a license of SMR is issued in one country, this to be recognized in other countries?"	Jordan Yankov	[G. Kwong] The CORDEL working group SMRAG developed a pathway for harmonizing regulations for global SMR deployment. The IAEA SMR Regulators' Forum facilitates regulatory decision making by evaluating common safety issues that may challenge SMR regulatory reviews.

34. "Sounds like Germany is ""contaminating"" its neighbors with negative electricity prices, Ja?"	Andrew Paterson	No comments.
35. How can EU require Germany to invest a lot in batteries to avoid the impact of negative electricity prices?	Andrew Paterson	This question will be addressed by the EU.
36. "Regarding the SMR licensing approach, i think this maybe of interest https://www.nrc.gov/reactors/new-reactors/advanced.html, taking into account USA aggressive approach and intensive projects to deploy SMR (LWR & Non-LWR)"	Dr. Hamdi	[Prof. Araj] Thank You for sharing the link.
37. How will fusion interact with nuclear fission plans	Randall Bradley	[Answered during the session] Fusion will not be ecomomical business investment case in next 20 years
38. For Mr Kubacki: What is the role of young generation in the capacity building for SMR introduction to national energy mix?"	Evgeny Ivanov	[Z. Kubacki] This question is similar to Q24. Young generation of Poles participates in various international program devoted to SMR technology development, organized by renowned organization – IAEA, NEA, IFNEC, CEM. As Polish Nuclear Institutes set up many scientific projects related to advanced nuclear technologies like for example HTR, Young students and PhD graduates are invited to participate and develop their competences in this field.
39. "To Bill Magwood or others, What do you see the future EU attitude and acceptance of nuclear power in the clean-energy and value of carbon-free energy, i.e. Taxonomy, Emissions Trading, etc.?"	Rob Sweeney	[W. Magwood] Obviously, many EU countries are focusing on the expansion of renewable energy capacity and the current policy environment reflects that direction. Over the next decade or two, I expect that many countries around the world will find that meeting their carbon reduction targets is an exceedingly difficult undertaking, especially since they also value the reliability and resilience of their electricity supplies. As countries, including EU countries, strive for deep reductions in carbon

		emissions, they will need to assess all available options. For some countries, nuclear energy will be considered. If the nuclear sector has competitive products available, I believe many countries around the world will choose nuclear energy as a part of their overall energy portfolios. [K. Kallemets] Based on recent experiences with EPR newbuild in Olkiluoto, Flamaville and cost of Hinkley Point C- mainstream understanding is that nuclear is just too expensive and risky in business case, thus uncompetitive if there are Renewable alternatives (which not the case in relevant volumes for host of countries in Centra Europe). If there will be commercially successful SMR deployment at investment cost below 1 billion eur and construction time below 3 years for 200-300MWe unit, it will be game changer as it is scaleable and deployable at sites of current coal and gas generation stations.
40. "Yes, but this concerns licensing of brand new SMR projects. The quenstion whether these licenses would be accepted in other countries?"Jordan Yankov,office@nucleon-consulting.eu	Jordan Yankov	[K. Kallemets] "Yes, but this concerns licensing of brand new SMR projects. The quenstion whether these licenses would be accepted in other countries?"Jordan Yankov,office@nucleon-consulting.eu Jordan Yankov [K.Kallemets]: The licences in full cannot be 100% accepted as they consist of 3 main elements: licencing of the site; licencing of operator (to be able to operate particular design) and licencing the design. The latter, which is based on Safety Assement Report, indeed should be and must be accepted mutually similarly as airplane and pharmaceuticals safety sertificates are mutually accepted by EU and US/Canadian regulators.

		Senseless protectionism that evolved with national standards, codes and tailor made prescriptive Safety Assesment mechanisms have to be abandoned for there to be international SMR market. Tailoring of SMRs (like being done with EPR in Finland, France and UK) is definetly unfeasible.
41. "Why do we not consider a supra national licensing for SMR, managed by WENRA for instanc, and by ENSRA for security purposes ?"	Sylvain PETIT	[Answered during the session] It's very very complicated
42. A question for Dr. Kamal Araj - Whenever they have made the selection of the SMR pressurized water reactor type, why they did not consider the Argentinean CAREM as one of the options?	Oscar Agostino Mignone	[Prof. Araj] We looked at the CAREM. Studied the technology quite well. The current technology is 25 MWe and the requirements for Jordan set SMRs at 50MWe or more. We are aware of the potential of a larger unit 100-200 to be developed. When that happens, Jordan will be definitely consider.
43. If we are to deploy SMR's do we need greater collaboration in areas of overlap/non-core business? Should IFNEC outline aspirations for SMR success and outline areas where collaboration will succeed whilst not jeopardising commercial confidentiality?	Biplab Rakshi	[G. Kwong] IFNEC is promoting collaboration, knowledge, and experience sharing. E.g. our vendor's forum (scheduled for June 23) gathered the more mature designs to discuss common challenges and effective means to address these challenges. A 2021 SMR workshop is also planned for to continue collaboration opportunities.