

Nuclear Feasibility Study Workgroup Stakeholder Meeting #2 Meeting Notes and Stakeholder Questions and Answers – 9/8/2023

- Will the slides be posted on the MPSC webpage?
 - Yes, the slides will be posted on the [Nuclear Feasibility Study webpage](#) after today's meeting concludes.
- Will the 200-page draft be shared soon?
 - Yes, the draft report will be made available for review prior to the next and final stakeholder meeting, allowing for Stakeholder feedback at the December 14, 2023, meeting.
- There is a newly proposed climate package and there's been a lot of concern about the costs associated with nuclear. Do you have an idea of what the cost could potentially be?
 - The [US Department of Energy Liftoff Report on Advanced Nuclear](#) includes costs that are representative of what could be expected as far as first of a kind nuclear build and then second of a kind after some learning curves. For the first of any kind of unit and especially in the US, it is going to be costly, but follow-up plants should be less expensive.
 - Another aspect of small modular reactors (SMR) that people think is a good idea, is that a lot more of the construction could be done in a manufacturing environment rather than on site, which should reduce the overall cost. Additionally, because SMRs are generally smaller, the total capital outlay is much, much smaller, so the amount of financing that would have to be done is smaller. Those project sizes would be much more achievable than a megaproject of multiple gigawatts.
 - There is also a report from MIT that looked at AP1000 costs <https://web.mit.edu/kshirvan/www/research/ANP193%20TR%20CANES.pdf> .
- Regarding economic impact, is there any look at actually building reactors in Michigan?
 - The power system modeling has been used to create a larger reactor; we will be looking at creating a small modular reactor.
 - An SMR factory is not being considered for construction in the state of Michigan.
- Texas and other places are testing pilot programs on SMRs. Is there a timeline or proposals for when SMRs will go online?
 - There are three major projects that are underway that are all receiving funding from the Department of Energy's Advanced Reactor Demonstration Program (ARDP). One of them is the Sodium Reactor Demonstration Project, which is going to be in Kemmerer, Wyoming. Terra Power is the main company designing that reactor, but they're partnered with Bechtel Power Corporation, GE Hitachi and a number of other organizations on that effort. The cost share portion of that, I believe, is \$2 billion and it's going to be built adjacent to a retiring coal site in Kemmerer, Wyoming.
 - Also, there is the Seadrift project in Texas. Dow and X-energy are partnered together for that project. They are going to build 4X E 100 reactors, which are 80 MW electric capacity at the Seadrift site in Texas to provide process steam as well as electricity. Dow is headquartered in Midland, MI, so that's relevant to this study.

- In addition, there is the Carbon Free Power Project, which is going to be built at the DOE's Idaho National Laboratory and will use NuScale SMRs. It will supply power to the Utah Associated Municipal Power Systems.
 - Roughly \$5 billion of funding from the ARDP program is going toward those projects. That amount of funding also has to be matched by the other partners, so there has to be at least that much private funding as well.
 - There are other projects that are at different phases as well.
- You just reviewed the projects that are underway. When are those projects expected to come online? When will we begin to see the learnings of one of those projects to assess how those learnings influence the other projects?
 - My understanding is that the Seadrift in Texas is either 2029 or 2030, the Carbon Free Power Project is in the 2029 time frame, and the current date for operation to begin for the Natrium project is 2030. They have started to make the initial reactor modules in Korea for NuScale, so they are making components for that. The procurements are underway for the Natrium project. Components are in the process of being designed and built for these projects.
- What are the two or three major challenges that the Michigan Public Service Commission and Enercon see facing the question of the recovery and return of nuclear power for the state of Michigan?
 - One of the big challenges is the initial cost and just getting off the ground. Having a project in place that has funding is the biggest challenge, and then having a design that has progressed enough to be built.
 - The other potential challenge is supply chain, workplace development, and development of the workforce. If multiple states started siting advance reactors, there could be major challenges with workforce development.
- You have talked about a couple different projects throughout the US. Have you also been looking at Ontario Power with their small modular projects?
 - I believe they selected the BWRX-300 as the SMR that they are going to build. They are pooling some resources to do some design work and cost share to help support the development of that BWRX-300 reactor, which is a GE Hitachi design.
 - TVA at the Clinch River Site has an early site permit that has been granted by the Nuclear Regulatory Commission. The licensing process utilized a plant parameter envelope methodology. They looked at different SMR designs, which is a process they started years ago.
 - They will still need to get a construction permit for the project.
- How many sites in Michigan are feasible as depowered coal plants that could be spun up as nuclear?
 - Terra Praxis does a lot of work on identifying coal power plants around the US that are available for retrofitting with nuclear. They have a US map which identifies coal plants that could be repowered. Substantial follow-on site specific work is necessary to fully vet the suitability for re-powering any coal sites.
 - <https://www.terrapraxisrepower.com/The-Platform/Global-Plant-Data/>
- Is the study of transport, disposal, and storage of waste within the scope of this study?
 - No, it is not within the scope of the study.

- There are currently three locations that can accept low level radioactive waste (LLRW) from Michigan. Not greater than class C or spent fuel.
- In the report for the setting of difficulties, is anything being looked at for the public perception and how to overcome those types of situations, especially in regards to a small modular reactor located in a population center?
 - Because public opinion is incredibly important, within our Literature Review section, we are looking at a specific report that covers a survey of over 13,000 respondents. It was a study that covered four different groups. The report showed that there is still resounding support from the first three groups of pro-established growth, concerned professionals, and hard working pragmatists, while the lowest support came from determined skeptics. We also outline all the percentages of who actually contributes to those 13,000 individuals.
- LLRW and "spent fuel" are at opposite ends of the spectrum; is high level spent fuel currently approved for long term storage and/or disposal in Michigan?
 - Ultimately, the long-term storage is in the purview of the US Department of Energy.
 - All commercial operating nuclear sites in Michigan store spent nuclear fuel at specific independent spent fuel storage installations. Basically, it is a concrete pad that the dry casks sit on, and all the previous facilities have the same thing. Big Rock Point Nuclear Power Plant is a decommissioned plant and the cask systems themselves are licensed through the Nuclear Regulatory Commission (as they are in all nuclear plants in the US). The casks are licensed for 20 years and if there is no resolution with the DOE or the owner of the fuel, then the plants will go through another renewal period to extend the license for another 20 years. That's been done at several plants. Palisades Nuclear Plant has extended their period of operation for their initial cask system to go into an additional 20 years. So, Palisades is past the initial 20 years, and it has been extended into the second 20-year period.
 - Spent Nuclear Fuel (SNF) and Greater than Class C Waste is stored onsite at the operating and decommissioned plants in Michigan in NRC approved Dry Fuel Storage (DFS) systems.
 - A map from the NRC website of licensed ISFSI's in the U.S. can be found here: <https://www.nrc.gov/waste/spent-fuel-storage/map-fuel-storage-facilities.pdf>
- Is it correct that currently there is not a plan in place for the final disposal of high-level waste, but what is happening is just long-term storage of high-level waste? And the second part of the question is the Michigan Public Service Commission and Enercon engaged in or open to discussion about final disposal of high-level waste?
 - You are correct that this system in the United States is really an interim solution until the Department of Energy who will be the off taker of the fuel can decide how the disposal piece, or the permanent storage, is going to be handled.
 - Long-term storage and disposal are outside of the scope of the study.
- The MPSC participates in the Nuclear Waste Strategy Coalition. More information about the coalition can be found here: <https://thenwsc.org/>.
- Will a recording of this meeting be made available?
 - A recording of the Nuclear Feasibility Study Workgroup Stakeholder Meeting #2 will be posted on the [Nuclear Feasibility Study Workgroup webpage](#).

- To further clarify on the topic of SNF: The Department of Energy formally owns and is responsible for the fuel, since it is classified as special nuclear material (SNM). The nuclear plants are storing and maintaining the SNF on an interim basis. All costs for fuel enrichment and manufacturing are covered by the plant operator.

Shared Links:

- US Department of Energy – Pathways to Commercial Liftoff: Advanced Nuclear
 - <https://liftoff.energy.gov/wp-content/uploads/2023/05/20230320-Liftoff-Advanced-Nuclear-vPUB-0329-Update.pdf>
 - Page 17 mentions three major Advanced Reactor Demonstration Program (ARDP) projects that are underway.
 - Pages 18-22 include cost information.
- Advanced Nuclear Power Program – Overnight Capital Cost of the Next AP1000
 - <https://web.mit.edu/kshirvan/www/research/ANP193%20TR%20CANES.pdf>
- Global Coal Plant Data Source provided by Terra Praxis Repower
 - <https://www.terrapraxisrepower.com/The-Platform/Global-Plant-Data/>
 - Contains information on potential coal to nuclear plant sites.
 - Be mindful that for true site selection, many additional studies for a site are necessary, such as geotechnical and seismic evaluations, so the Terra Praxis information is more of a high-level view.
- Michigan Public Act 113 of 1978 – Radioactive Waste Excerpt
 - [http://www.legislature.mi.gov/\(S\(l23gh1dojotzsjoecdo3jouu\)\)/mileg.aspx?page=getObject&objectName=mcl-325-491](http://www.legislature.mi.gov/(S(l23gh1dojotzsjoecdo3jouu))/mileg.aspx?page=getObject&objectName=mcl-325-491)
- Nuclear Waste Strategy Coalition
 - <https://thenwsc.org/>