

Q&A Session

What are the most important actions EcoSMR participants can take for SMRs to be an interesting business for the Finnish technology industry?

Networking with the big foreign companies capable to deliver an SMR (since there are no Finnish companies capable of doing this)

You mentioned SMRs as one of the key technology for decarbonising district heating, the question is the regulatory environment, which is in Finland still based on the needs of large nuclear plants. What are your concrete actions to speed up the development of the regulatory environment to allow smoother building of SMRs?

Collaboration in YVL update process.

Are there specific limits on the time frame to implement new technologies in the district heating market? For example – if there are delays in applying nuclear, what will then take its place?

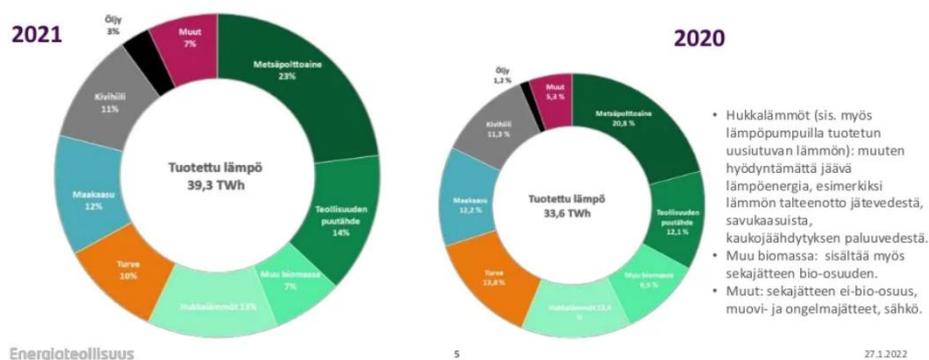
Carbon neutrality should be achieved in Finland by 2030. However, in Finland carbon neutrality is not the end goal as the natural sinks allow reaching it earlier than in most other countries. There will be need to replace gas and minimize biomass energy use in 2030s and 2040s, bringing domestic opportunities for SMRs. Internationally, district heating is mostly reliant on burning fuels and new solutions are needed. Electrification of heating via (industrial) heat pumps is one major technology that is progressing.

Currently, what is the most widely used energy source for the majority of the district heating systems in Finland? What is the original source of the carbon used in most of the district heating systems in Finland?

Last two decades has seen enormous switch to biomass use in heating. Biomass is accounted in LULUCF, not in energy use, so the CO₂ in statistics come from coal, gas, non-renewable fraction of waste, peat and oil.

Ilmastoneutraalin energian osuus jatko kasvuun ja on yli puolet kaukolämmön tuotannosta

Uusiutuvien ja hukkalämpöjen osuus kasvoi edellisvuoden 54 prosentista 56 prosenttiin



When considering the carbon footprint of nuclear-based district heating, it is important to realize that almost 100% of the energy is utilized as heat. In electricity production the CO₂ emissions of nuclear power are at the same level as renewables (wind), but in heat use the carbon footprint is further reduced by a factor of 3 or so. This may not be a significant advantage in practice, but it really underlines the fact that arguments claiming that nuclear energy is not a solution to the climate crisis have no factual basis.

How will the nuclear waste streams from SMRs be handled in Finland?

The waste form is similar to that in conventional LWRs, and the amount of waste scales with the unit size. The main difference to common practices is that instead of having two major sites, there may be several smaller units with smaller waste streams.

Manufacturing and delivering SMRs may require intergovernmental agreements on responsibilities and accountabilities while manufacturing, transporting and using the product. Is there any progress in this area?

Intergovernmental agreements are common in nuclear energy collaboration and these have been made when needed. As district heating reactors are still on conceptual level the first potential need for these would be in technology collaboration with international companies.

What is the level of maturity required on your SMR concept to imagine your detailed supply chain?

VTT's district heating reactor concept LDR-50 relies on very conservative LWR technology, so from the technical point of view the design process was started from an already mature level. What is more challenging is applying the licensing procedures heavily relying on multiply-redundant active components, large emergency planning zone, etc. to an urban reactor with passive safety systems operating without any mechanical moving parts.

Advancing supply side capabilities of SMR ecosystem is important. In addition to regulative changes, what could be done to the demand/market side in order to strengthen the SMR RDI environment in Finland?

Supply chain quality system development / knowhow / awareness to raise readiness. A project where it is possible for companies to participate and learn together the nuclear supply chain requirements. FinNuclear has a role here. We need to have competent training resources that can provide the courses.

How do you take into account the number of SMR planned in construction for the design of the supply chain?

In DH-SMR case we need the first one to learn and design cost efficient process. Then we can replicate this (see previous answer). After that this is not an once only big science project but serial production and manufacturing facility investment issue.

Did you already study methods and systems for data transparency and security?

Existing nuclear regulations e.g., by STUK apply here as well.

How large demand would make a business case for a DH-SMR manufacturing consortium?

Between Foak and "as large as possible" many things will chance in the concept, production and power plant delivery process. Break-even point will be better estimated after the Foak but based on current knowledge DH-SMRs are calculated to be competitive against other DH options. Even the first one can make business case to the companies but this requires external innovation and demonstration support. If companies can use the investments into knowledge/reference/machinery/partnerships as a lever in other business areas this could boost ROI and business case significantly. But this is not only supply side issue but also the customer / Foak location can benefit from this. The total business case is based on Win-Win realization between supplier – customer – Finland.