SMR ecosystem
Nuclear district heating

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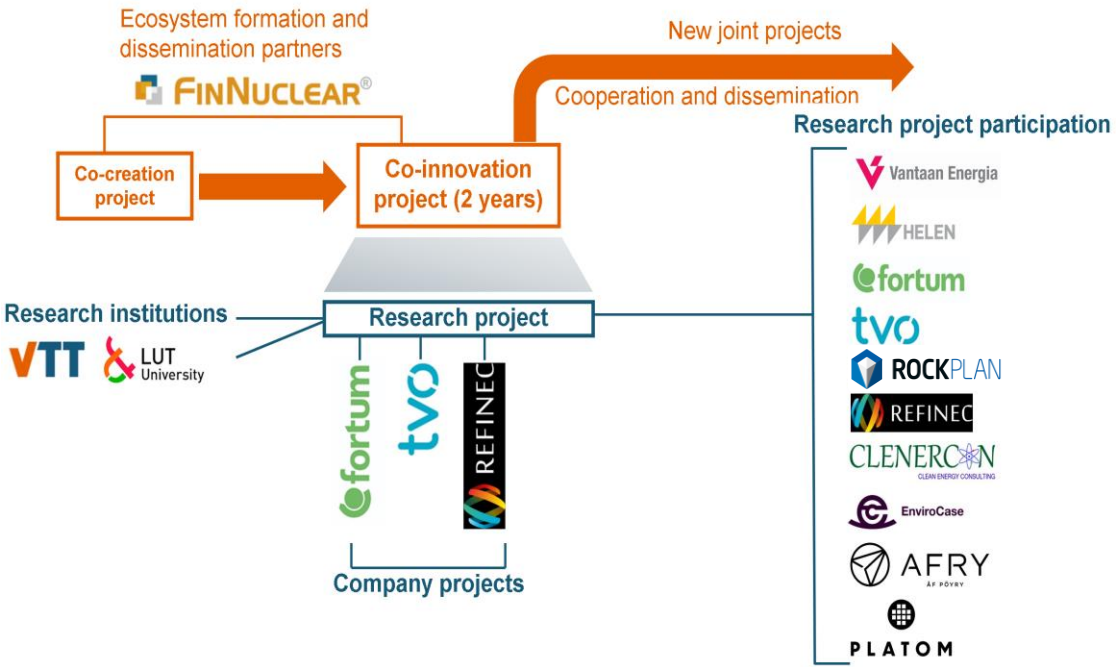
25/10/2023 **VTT – beyond the obvious**

Contents

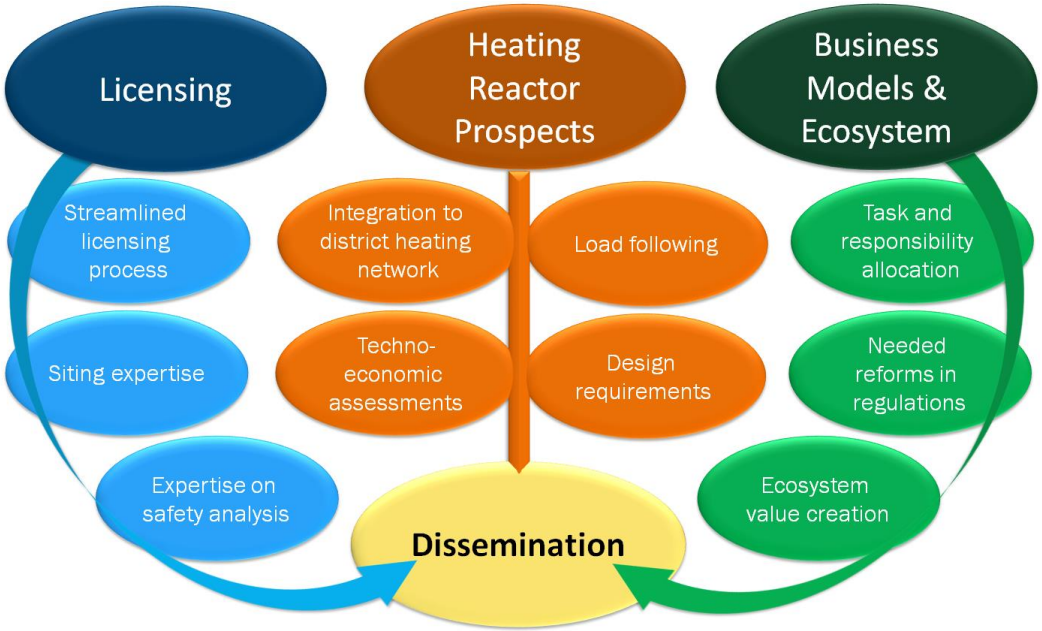
- The successes in building the Finnish SMR ecosystem
  - EcoSMR
  - EcoSMR hub
- Nuclear district heating as a specific SMR application in Finland

EcoSMR project



- Business Finland funded project
- Duration: 08/2020 – 12/2022
- Goals
  - Development of SMR ecosystem
  - Development of key areas of technology

EcoSMR content



EcoSMR some key results

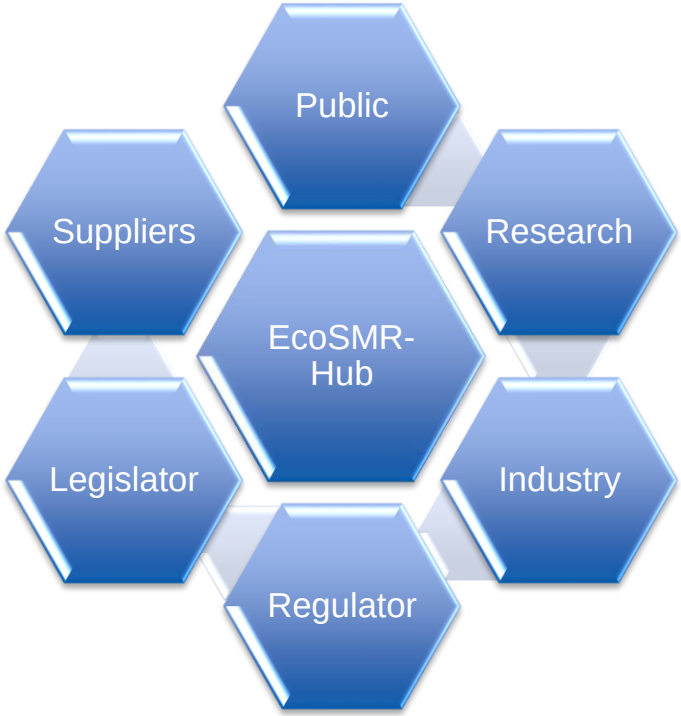
- Suggestions for regulation change
  - Site and technology licensed separately
  - → All actors can benefit from previously licensed tech and site
- Heating reactor prospects
  - Market potential for district heating is significant in Finland
    - 50-100 reactors could fit in 12-19 DH networks
  - SMRs would be profitable in the capital regions of Finland, Estonia and Latvia
- Current project: **EcoSMR-Hub**

- Business models
  - Correct division of rights and responsibilities enables unlocking finances
  - Four business cases examined
    - Municipal DH only
    - Combined heat and electricity
    - Electricity only
    - Process heat

https://www.ecosmr.fi/wp-content/uploads/2023/04/EcoSMR_Final_report.pdf

EcoSMR-Hub: Dialogue Facilitation

- Stakeholder priorities
- Legislation & regulation development
- Training and education requirements
- Co-research topics of unknowns
- Co-building vision, scenarios and roadmap



EcoSMR-Hub in practice

https://www.ecosmr.fi/

Workgroup #1 – Licensing
Regulation process reviews and feedback
Identifying licensing risks & solutions
Co-evaluating licensing process updates

Workgroup #2 – Business Opportunity
Identifying topical business opportunities
Identifying barriers to markets
Co-innovating topical services & products

Workgroup #3 – Customer Perspective
Innovating applications for SMRs
Identifying implementation risks & solutions
Co-assessing project feasibility and impacts

EcoSMR-Hub Newsletter

Why nuclear district heating?

The market need is there!

Electricity

1600 TWh/y
EU Low carbon electricity production to be deployed by 2040

80GW
European Nuclear capacity to be replaced by 2050 (end of life)

Hydrogen

>20 Mt H_2/y
REPowerEU Market Estimate for 2030

1000 TWh/y
Equivalent additional clean electricity demand

>125 GW
Equivalent nuclear capacity

Industrial heat

~1250 TWh_{th}/y
Iron – Steel, Non-metallic minerals and chemicals heat demand in EU26

> 45% market
Heat < 400°C

District heat

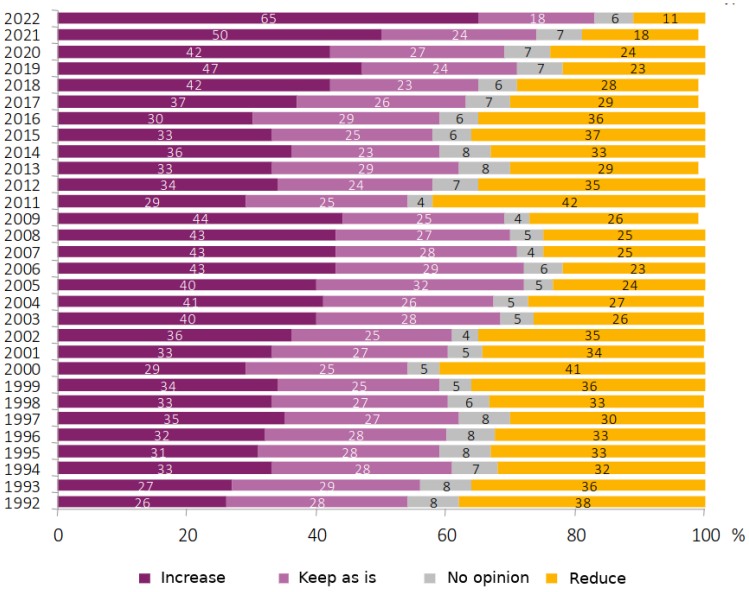
~500 TWh_{th}/y
Current district heat demand in EU26

> 2/3 fossil- fueled
Assets to be retired and replaced in the coming two decades

ENSREG European Nuclear Safety Regulators Group
nuclearneurope
SNETP Sustainable Nuclear Energy Technology Platform

Nuclear district heating for Finland

- Several municipal energy companies see nuclear district heating as a promising option for the 2030's
- Potential market covers European countries with existing district heating networks and public support for nuclear
- Major contribution from EcoSMR and related activities to positive atmosphere and public acceptance in Finland.



Survey on Finnish energy attitudes – Should reliance on nuclear energy be increased, kept as-is or reduced?
Source: Energiateollisuus ry

SMR ecosystem work is bearing fruit

MoU between USNC and LUT to explore the deployment of a MMR in Lappeenranta
https://world-nuclear-news.org/Articles/Agreements-for-microreactor-deployment-in-Finland.

Fortum and Westinghouse explore possibilities for new nuclear in Finland and Sweden
https://www.fortum.com/media/2023/06/fortum-and-westinghouse-explore-possibilities-new-nuclear-finland-and-sweden.

EcoSMR
https://www.ecosmr.fi/wp-content/uploads/2023/04/EcoSMR_Final_report.pdf

EcoSMR Hub
https://www.ecosmr.fi/

Letter of intent between Helen and Steady Energy
https://www.helen.fi/en/news/2023/helen-and-steady-energy-aim-to-introduce-nuclear-heat-production-in-finland