

# Fermi way to carbon-free Estonia

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**CTO**  
**Fermi Energia**

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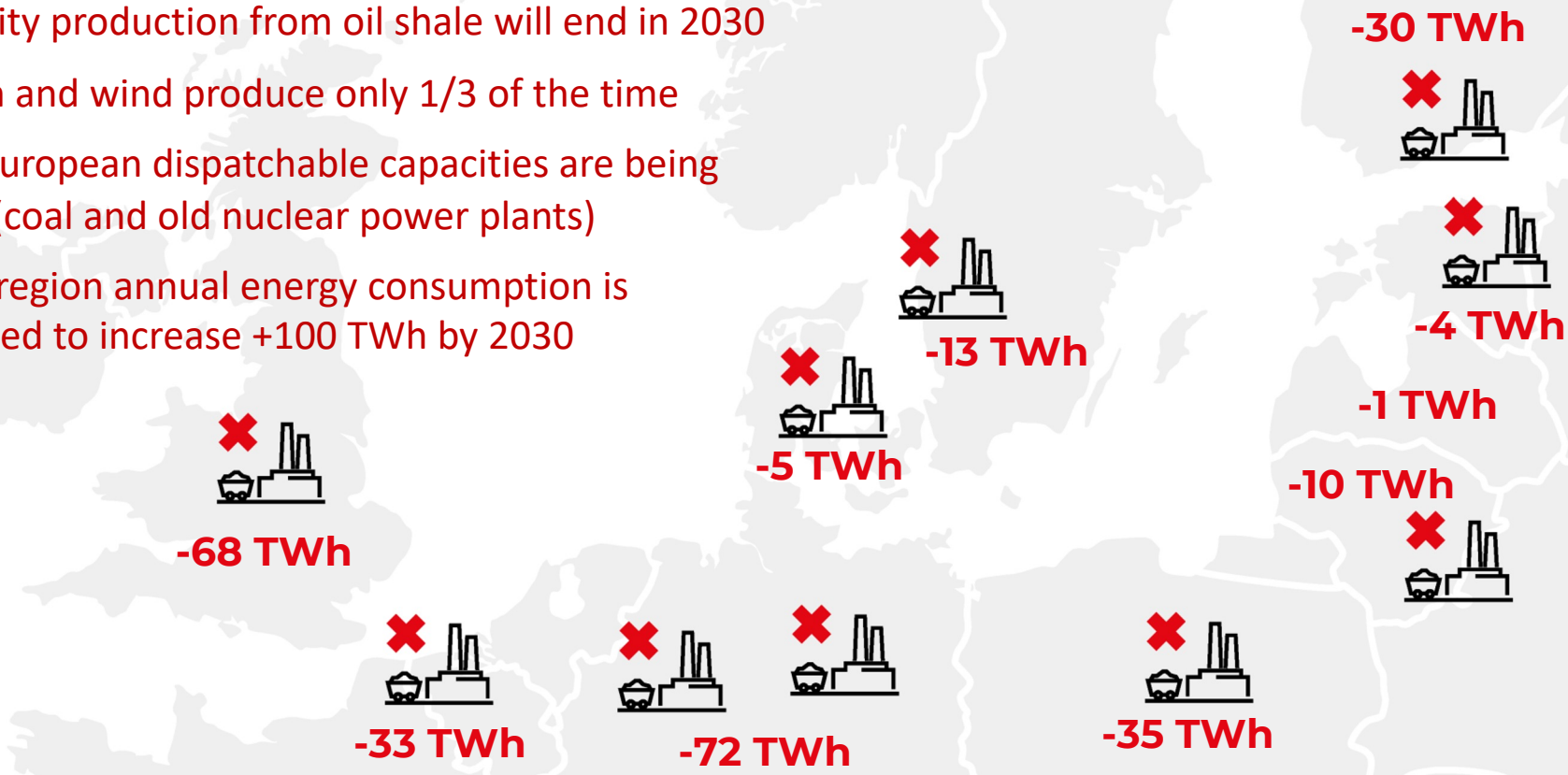
# Outline

- Why Estonia needs nuclear?
- Fermi Energia
  - Team
  - Timeline
- What needs to be done in Estonia for nuclear?
  - Site
  - Technology
  - People



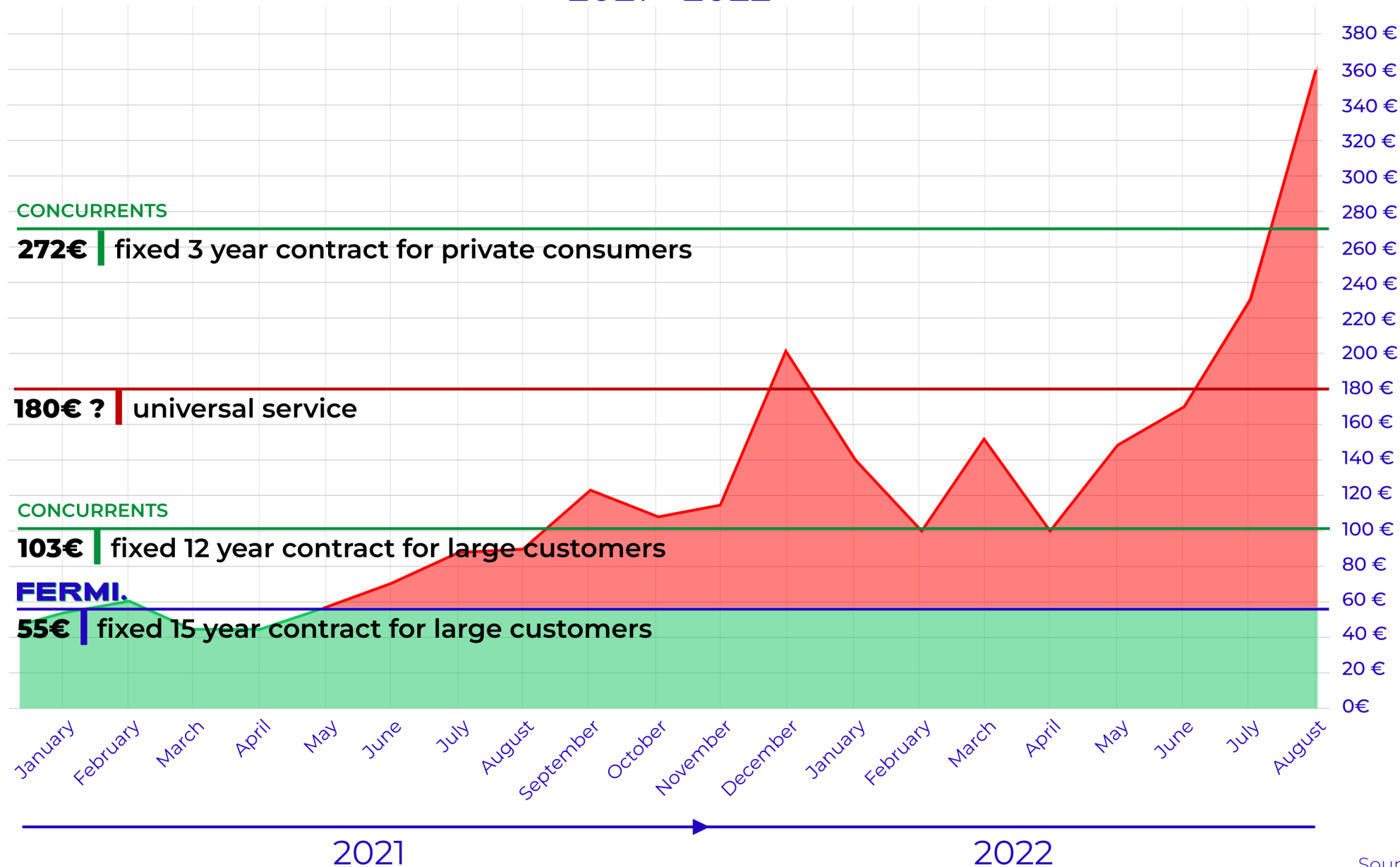
# The electricity deficit in Estonia and in the region is growing - the crisis is emerging

- Disconnection from Russian grid 2025
- Electricity production from oil shale will end in 2030
- The sun and wind produce only 1/3 of the time
- Many European dispatchable capacities are being closed (coal and old nuclear power plants)
- Nordic region annual energy consumption is estimated to increase +100 TWh by 2030



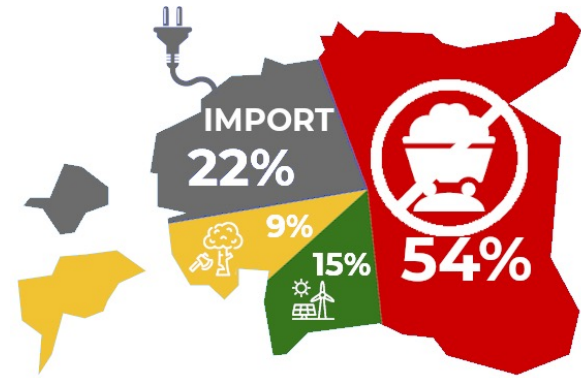
# Electricity price € / MWh

2021 - 2022





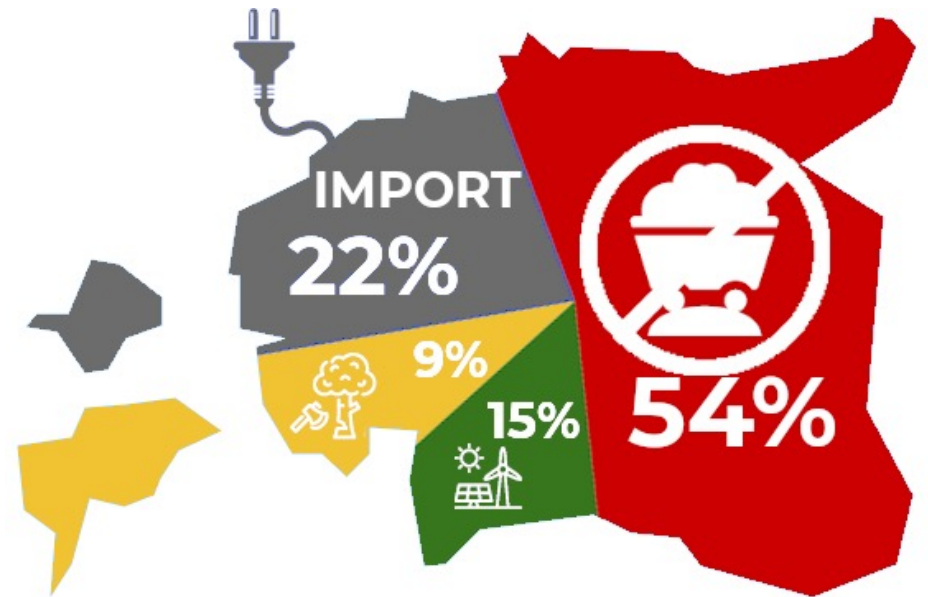
## How to secure supply and reach carbon neutrality at reasonable cost?



- **Import?** – Not economically viable, nor independent
- **Gas?** – Does not guarantee energy security, burning is CO2 intensive.
- **Biomass?** – We don't like burning forests, burning is CO2 intensive.
- **Renewables?** – There is no hydro. The sun / wind are intermittent and not there when needed (in winter), it has large additional cost for the whole system (land use + need for grid development + storage). Storage is currently possible only to flatten daily peaks.
- **We need a sustainable solution: decarbonisation, electrification - stable, dispatchable and reasonably priced solution - nuclear energy!**

# WHY ESTONIA NEEDS NUCLEAR?

- Energy security
- Reliability of energy supply
- High paid jobs
- Tax revenue for the state and local municipalities
- To meet climate targets (CO2 and NetZero)
- Domestic production (imports -> exports)
- Dispatchable and clean energy
- High-tech leap in Estonian energy production
- R&D – promotes high-tech R&D in Estonia



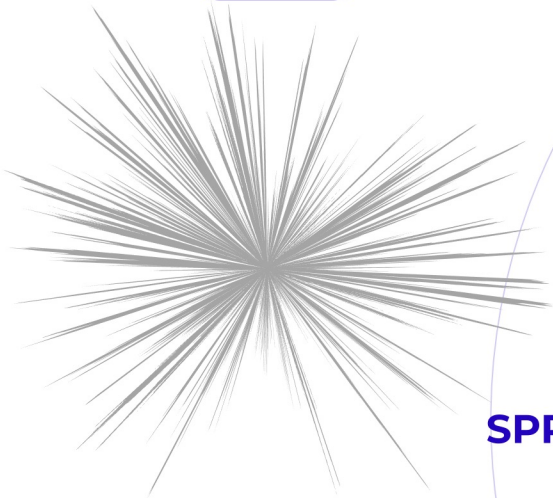


## WIND

Maximum 303 MW

Average 90 MW

Mediaan 74 MW

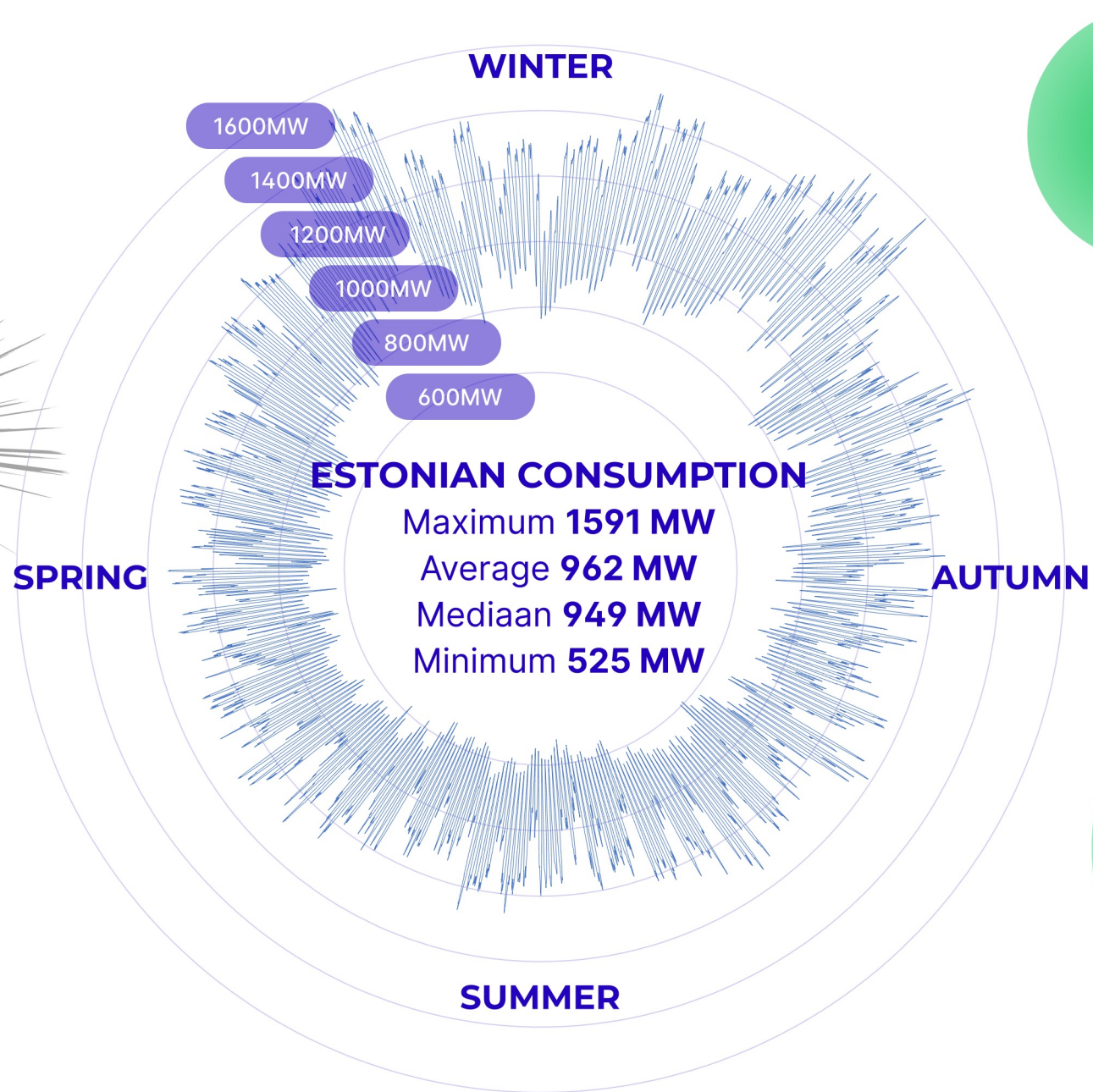


## SUN

Maximum 291 MW

Average 38 MW

Mediaan 0,7 MW

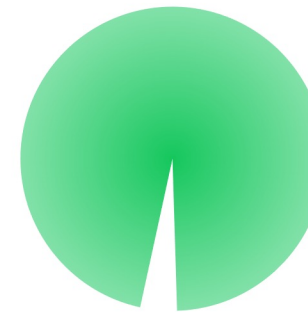


## ONE REACTOR

Maximum 280 MW

Average 269 MW

Mediaan 280 MW

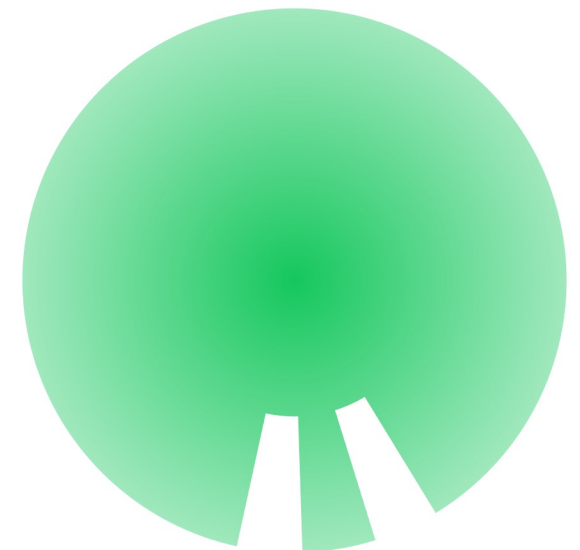


## TWO REACTORS

Maximum 560 MW

Average 539 MW

Mediaan 560 MW



# Fermi Energia



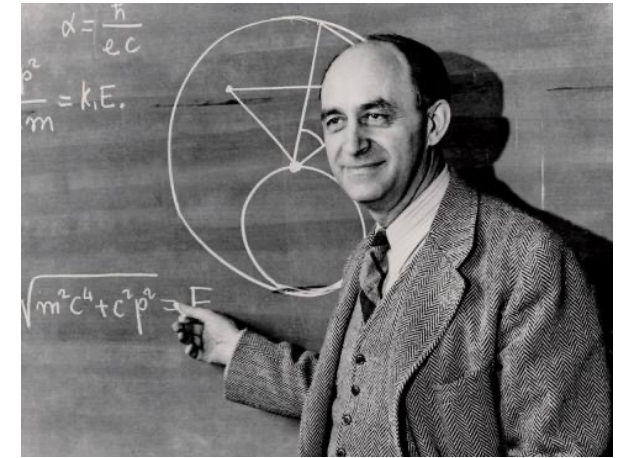
## FOUNDERS

- **Sandor Liive**, M.B.A. Chairman of the Advisory Board
- **Kalev Kallemets**, Ph.D. CEO
- **Henri Ormus**, M.Sc. Member of Board
- **Marti Jeltsov**, Ph.D. CTO
- **Kaspar Kööp**, Ph.D. Safety Manager
- **Merja Pukari**, Ph.D. Fuel Cycle Manager
- **Mait Müntel**, Ph.D. Member of the Advisory Board



## TEAM

- **Albert Kopjev**, M.Sc. Constructional Engineer
- **Allan Vrager**, M.Sc. Thermal engineer
- **Andrei Goronovski**, M.Sc. Nuclear Engineer
- **Andres Ingerman**, Communications Specialist
- **Anet Marii Paumets**, Technical Coordinator
- **Anu Koppel**, M.Sc. Supply Chain Engineer
- **Diana Revjako**, M.Sc. Member of Board, Environmental Manager
- **Helen Cook**, Ph.D. Nuclear Law Partner
- **Mihkel Loide**, M.A. Head of Communications
- **Peter Treialt**, M.B.A. CFO
- **Rainer Küngas**, Ph.D. Hydrogen Expert
- **Albert Rice**, Nuclear Engineer



## SHAREHOLDERS

Founders, Tractebel Engineering, Kunda Trans, T. Kaasik, K. Järvelill, K. Pärnoja, J. Luts, Last Energy VC, M.Henk, H.Meerits, N. Seli, S. Aswani, A. Lumberg, 1281 Funderbeam investors + Vattenfall (IMEUR)



Raised capital 2019-2021: 3,9 MEUR

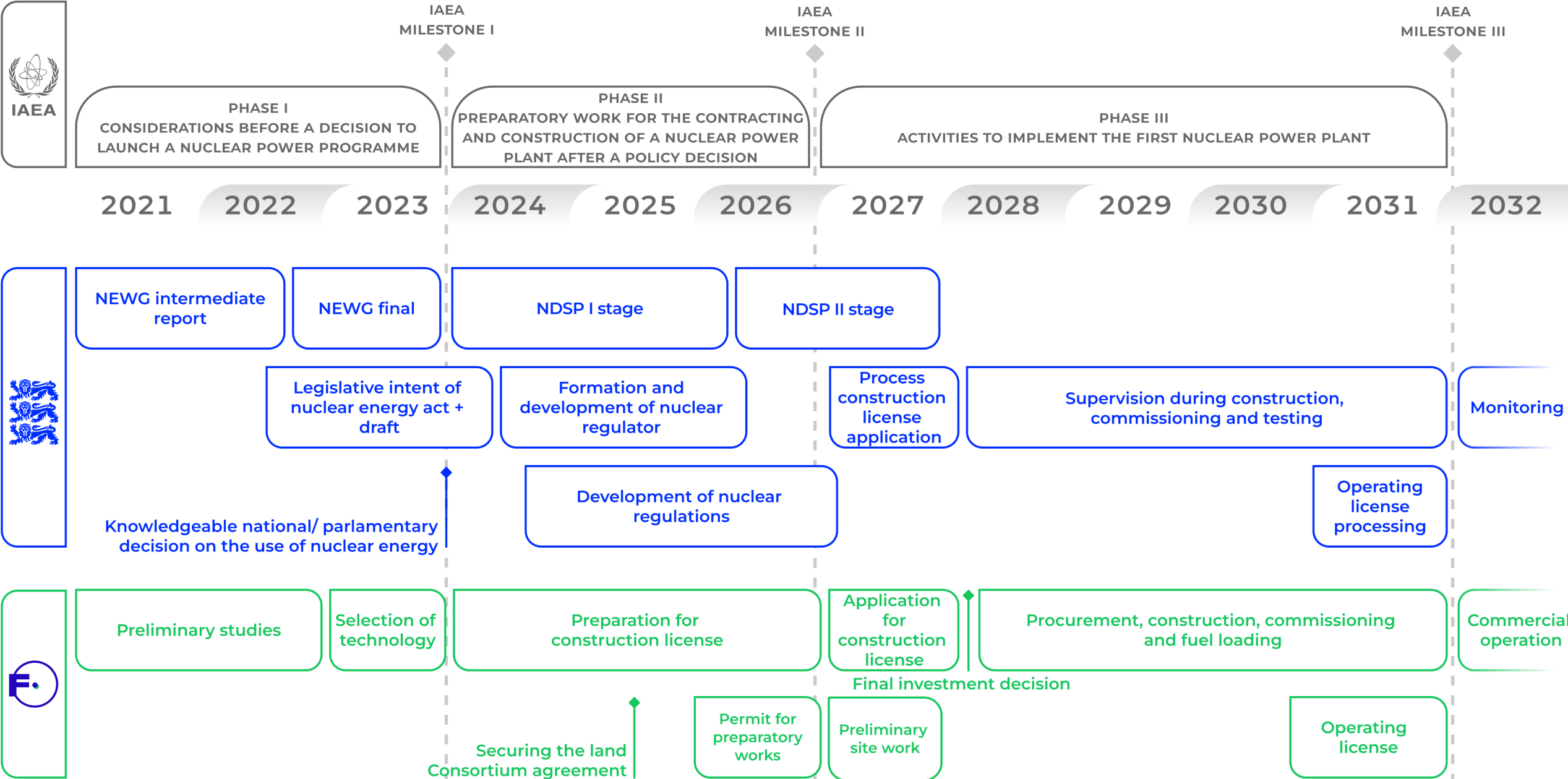
## PARTNERS



## ADVISORY BOARD

S. Liive, M. Müntel, L. Oviir, B. Linde (VF)





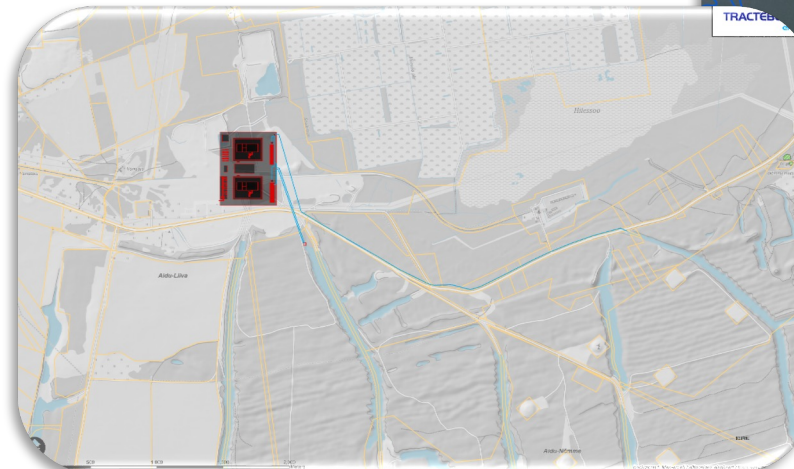
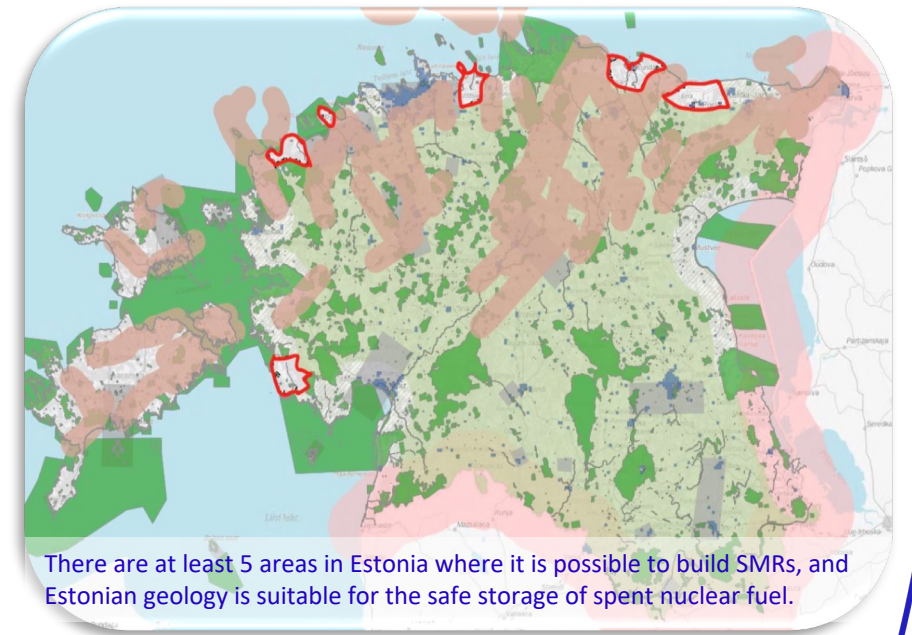
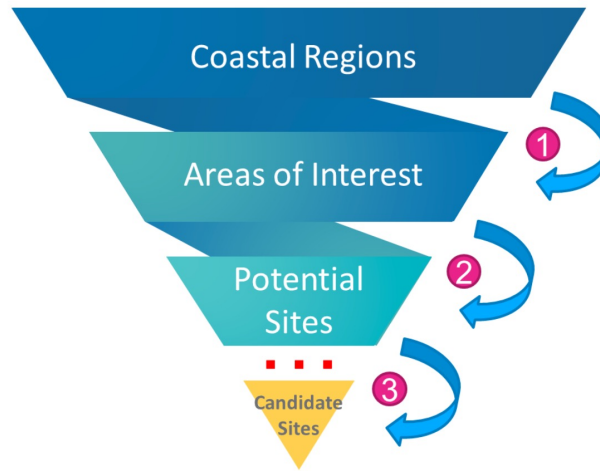
# Site.

- Studies

- Site screening
- Cooling solutions
- Geotechnical survey
- EIA program
- External hazards

- Two potential candidates identified

- Letipea – Kunda
- Lügänuuse – Aidu

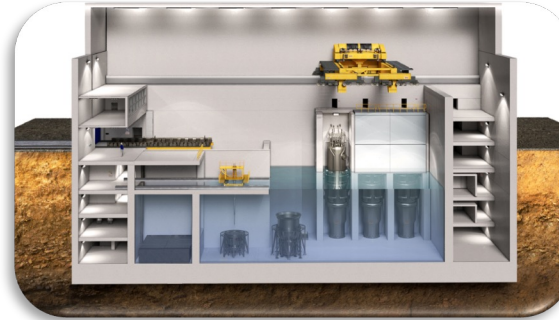




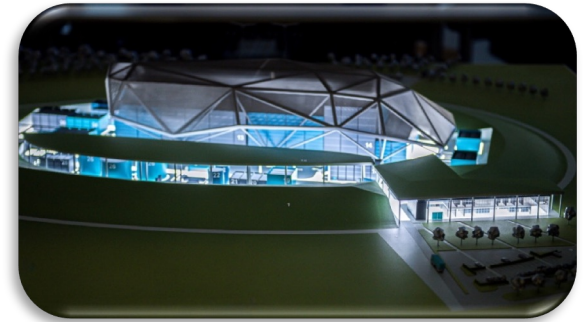
# Technology. Small nuclear.

- SMR technology selection criteria
  - Deployment schedule
  - Supplier technical capability and capacity
  - Commercial and financial Terms
  - Supply chain capacity, preparedness and localization
- Process
  - RfP: Sept 15-Dec 15
  - Decision by early 2023.
- Waste management
  - LLW-ILW: near plant final disposal
  - HLW: Deep borehole disposal

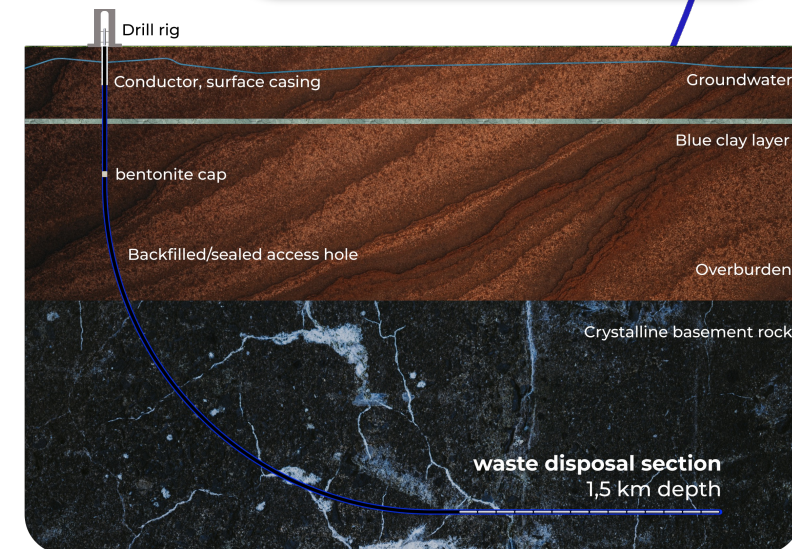
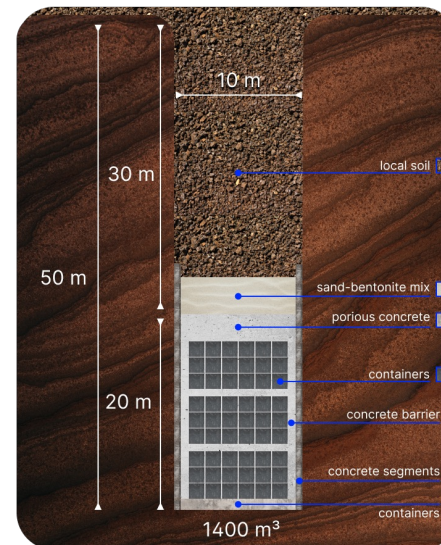
NuScale VOYGR



Rolls-Royce SMR

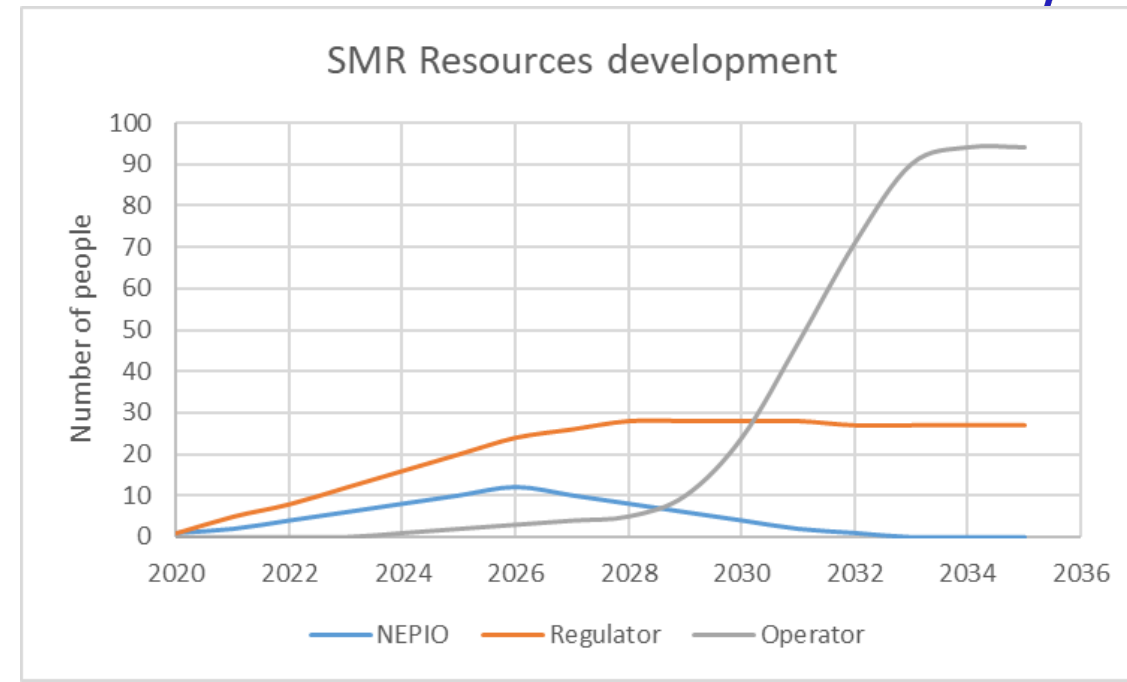
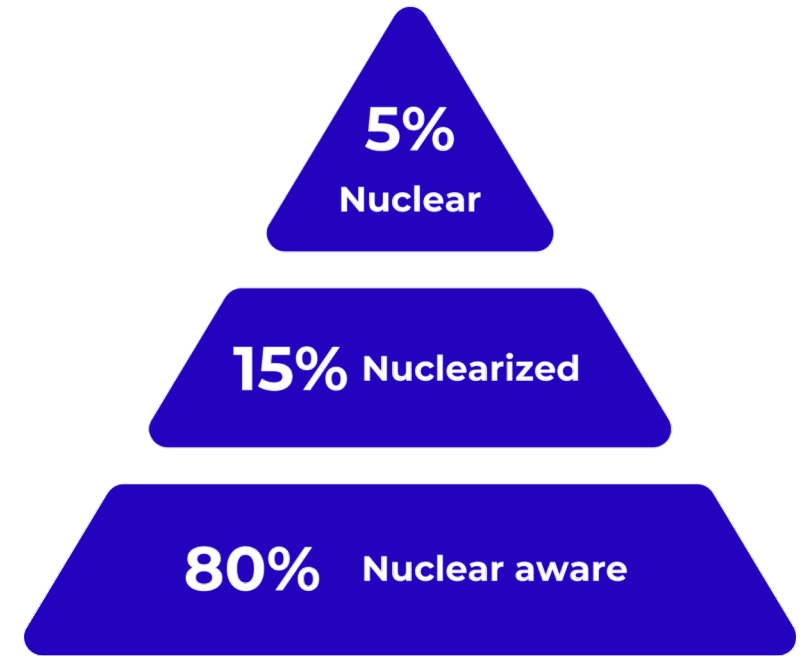


GEH BWRX-300

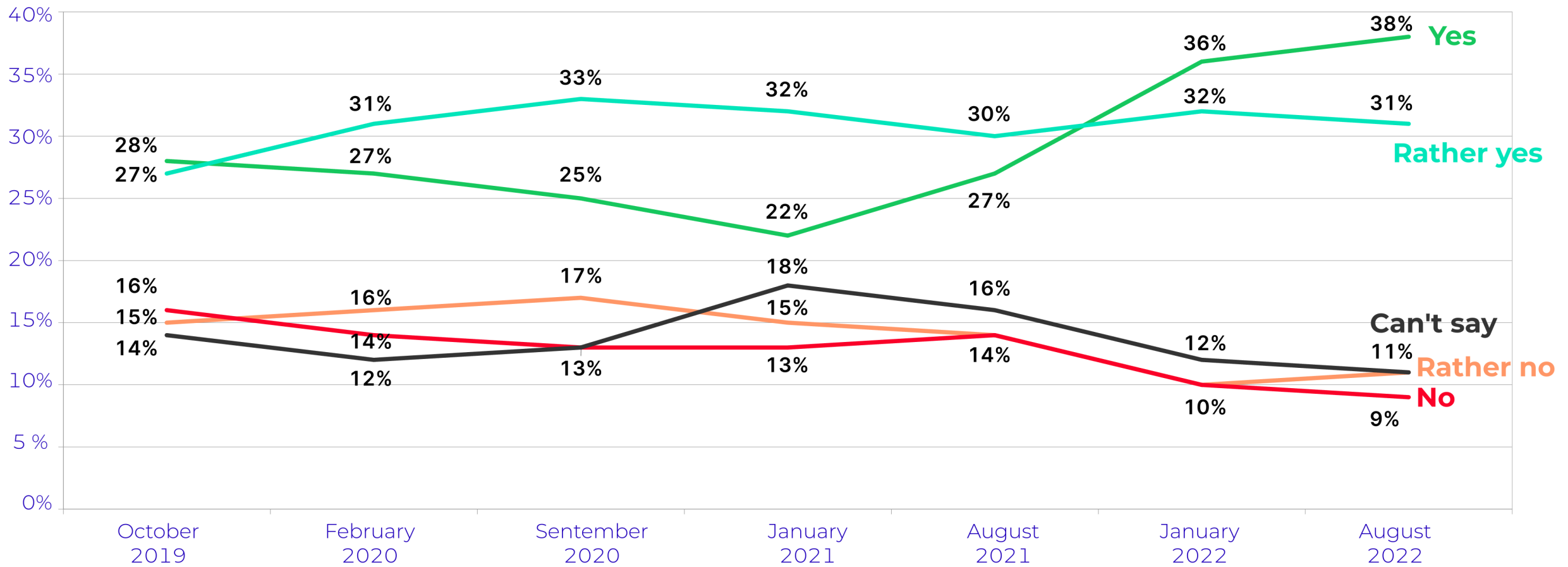


# People. Mostly conventional industry competences

- **5% Nuclear** – those with a deep and specific academic competence in nuclear such as reactor design
- **15% Nuclearized** – those with longer nuclear experience or longer training such as plant operation and maintenance personnel, process engineers
- **80% Nuclear aware** – those who only need shorter training which includes most on site staff that are not directly involved in operation of the plant



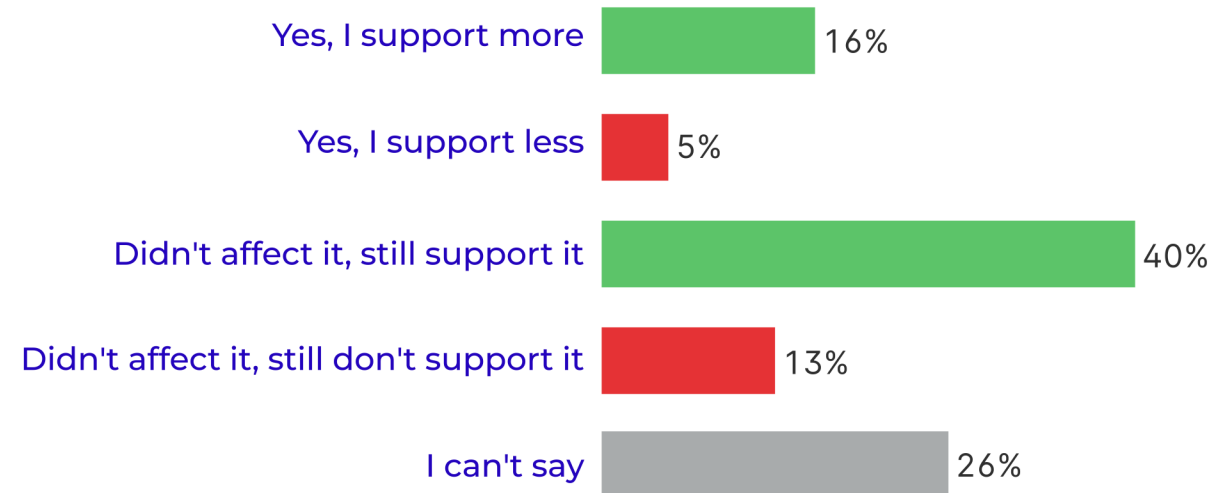
## SUPPORT OF SMR IN ESTONIA (AUGUST 2022)





## Impact of the war in Ukraine on perception of the construction of the small reactor in Estonia

Did the war in Ukraine affect your attitude toward building a small reactor in Estonia? One answer



**FERMI.**