FERMI ENERGIA-
FIRST EU SMR DEPLOYMENT

Kalev Kallemets
CEO, Co-Founder

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Enrico Fermi- leader of 1st world nuclear reactor CP-1

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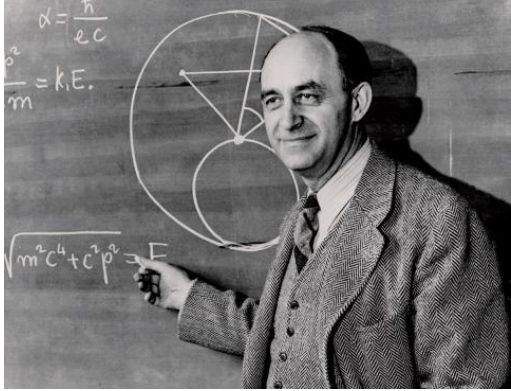


Founders:

Kalev Kallemets, Ph.D.	CEO
Sandor Liive, M.A.	Chairman of the Board
Henri Ormus, M.Sc.	Chief Nuclear Officer
Marti Jeltsov, Ph.D.	Head of Technology & Research
Kaspar Kööp, Ph.D.	
Mait Müntel, Ph.D.	Board member
Merja Pukari, Ph.D.	

Rainer Küngas, Ph.D.	hydrogen and CO2 utilisation expert (Haldor Topsoe)
Helen Cook	legal partner
Allan Vrager	heat and power systems engineer
Mihkel Loide	head of communications

MOU partners:

fortum VATTENFALL TRACTEBEL ENGIE

FERMI.

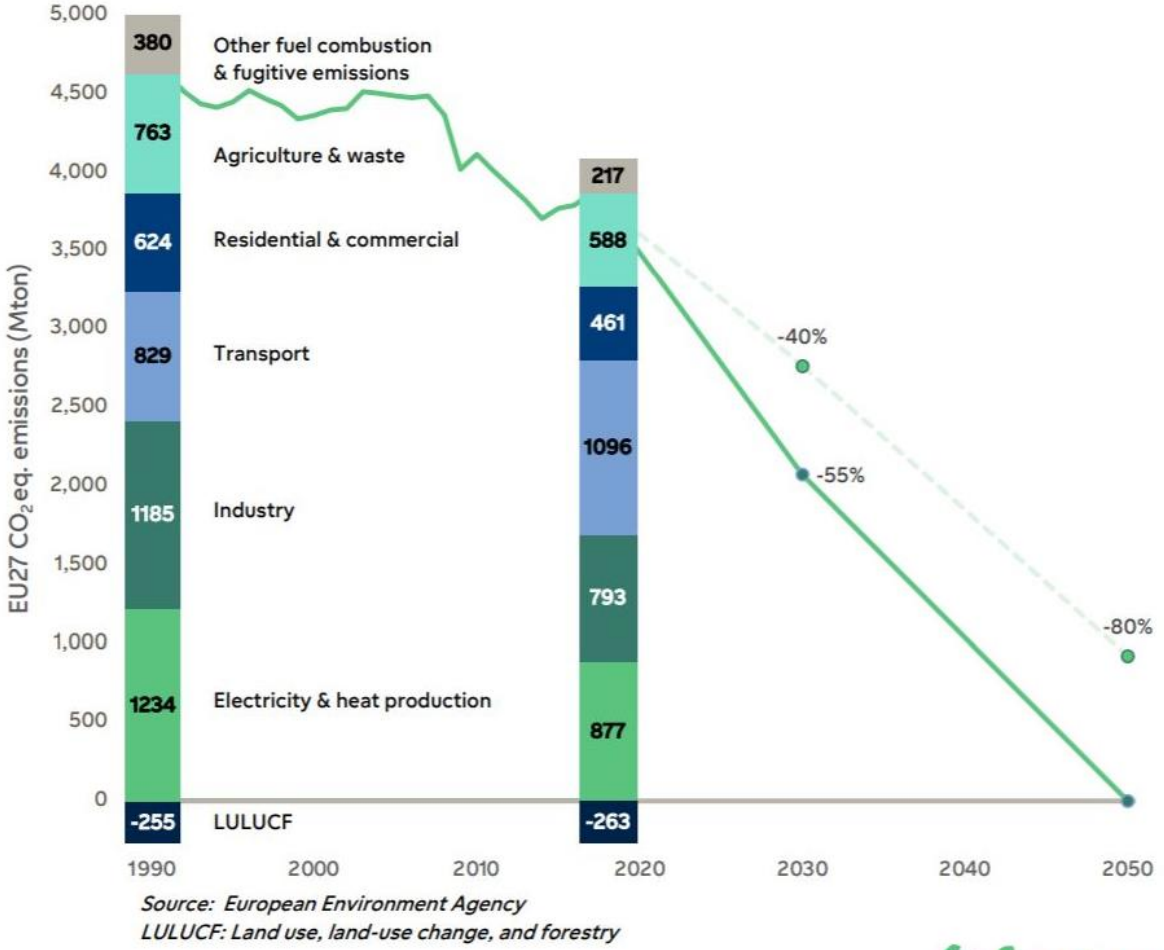
EU policy
carbon neutrality 2050

EU carbon price to average EUR 39/t next year – analysts

CO_2 7 HOURS AGO

(Montel) EU carbon prices will average around EUR 39/t next year, as the market reacts to a shrinkage in overall...

Read more



Source: European Environment Agency
LULUCF: Land use, land-use change, and forestry

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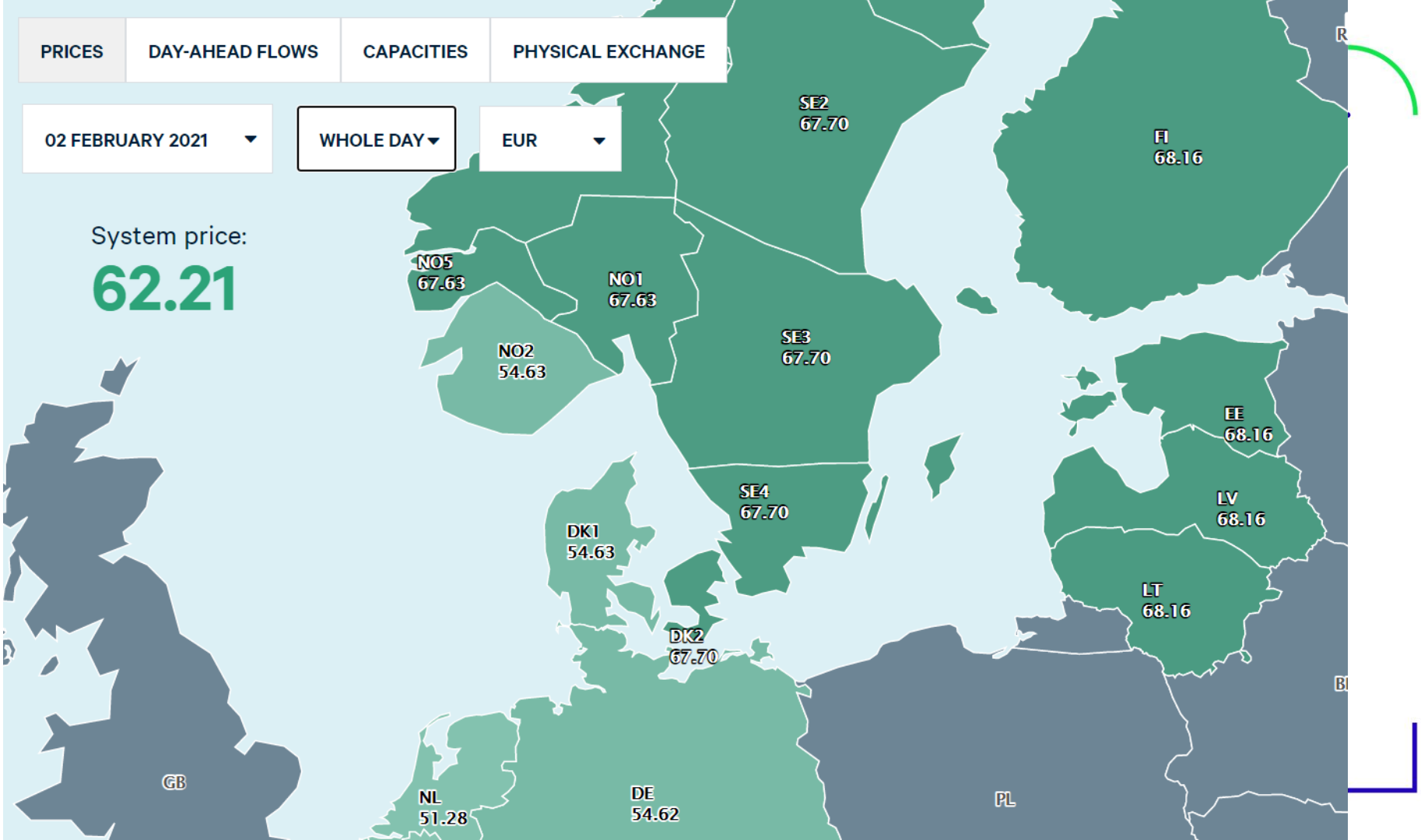
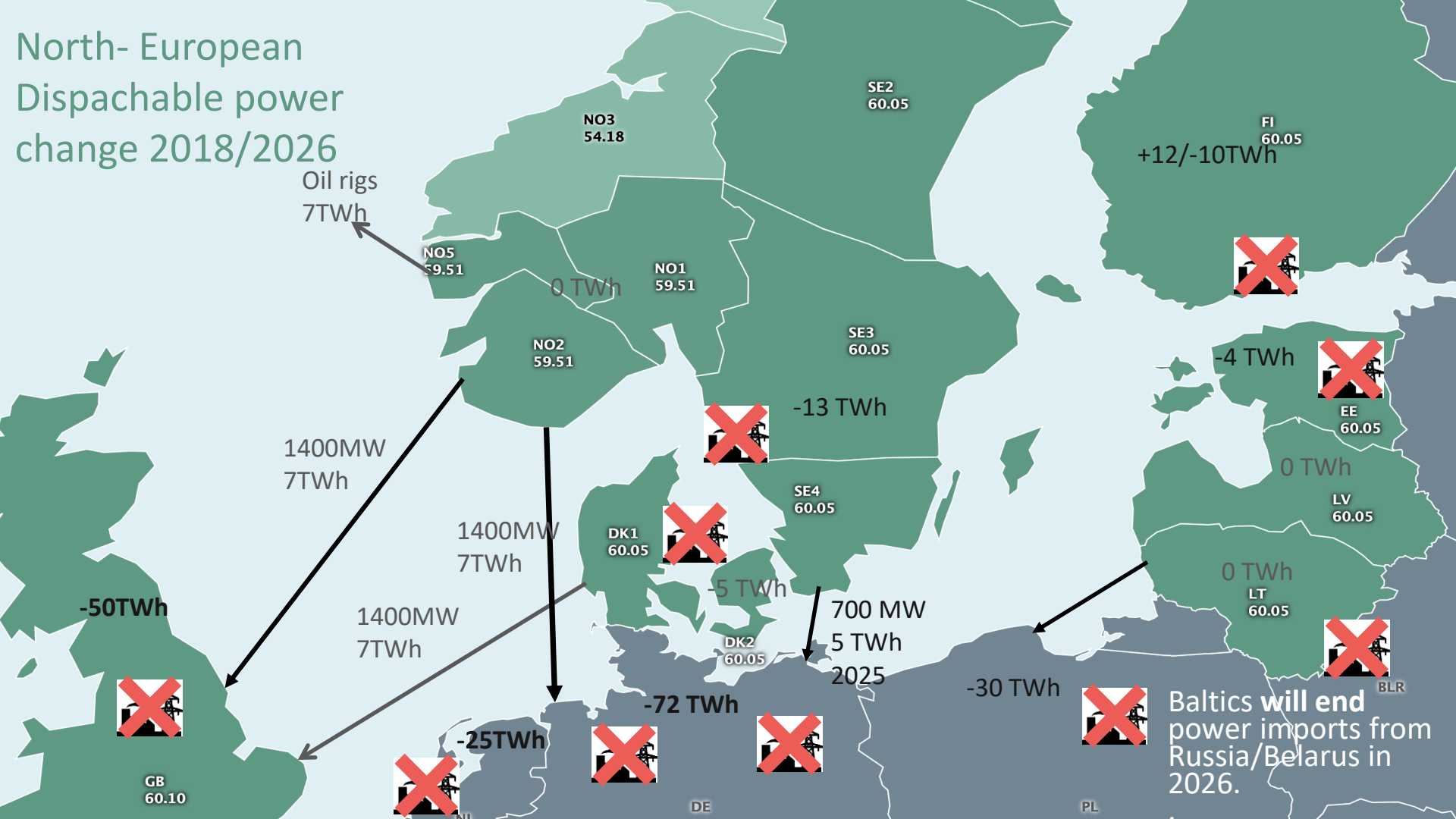
For a cleaner world


PRICES
DAY-AHEAD FLOWS
CAPACITIES
PHYSICAL EXCHANGE
02 FEBRUARY 2021
WHOLE DAY
EUR
System price:
62.21
SE2
67.70
FI
68.16
NO5
67.63
NO1
67.63
NO2
54.63
SE3
67.70
EE
68.16
SE4
67.70
LV
68.16
DK1
54.63
LT
68.16
DK2
67.70
GB
NL
51.28
DE
54.62
PL


North- European
Dispachable power
change 2018/2026
Oil rigs
7TWh
NO3
54.18
SE2
60.05
FI
60.05
+12/-10TWh
NO5
59.51
NO1
59.51
0 TWh
NO2
59.51
SE3
60.05
-4 TWh
EE
60.05
-13 TWh
1400MW
7TWh
SE4
60.05
0 TWh
LV
60.05
1400MW
7TWh
DK1
60.05
-5 TWh
0 TWh
LT
60.05
-50TWh
1400MW
7TWh
DK2
60.05
700 MW
5 TWh
2025
-30 TWh
BLR
-72 TWh
-25TWh
GB
60.10
DE
PL
Baltics will end
power imports from
Russia/Belarus in
2026.

Electrification is the enabler for the climate neutrality, and electricity use will grow

- From 400 TWh/a to 600 TWh/a of Nordic power demand
- From 3 000 TWh/a to 6 000 TWh/a in the EU
- Most of the Nordic growth from wind power
- Flexibility must increase
- Power grids must be reinforced
- All carbon-neutral generation forms will be needed

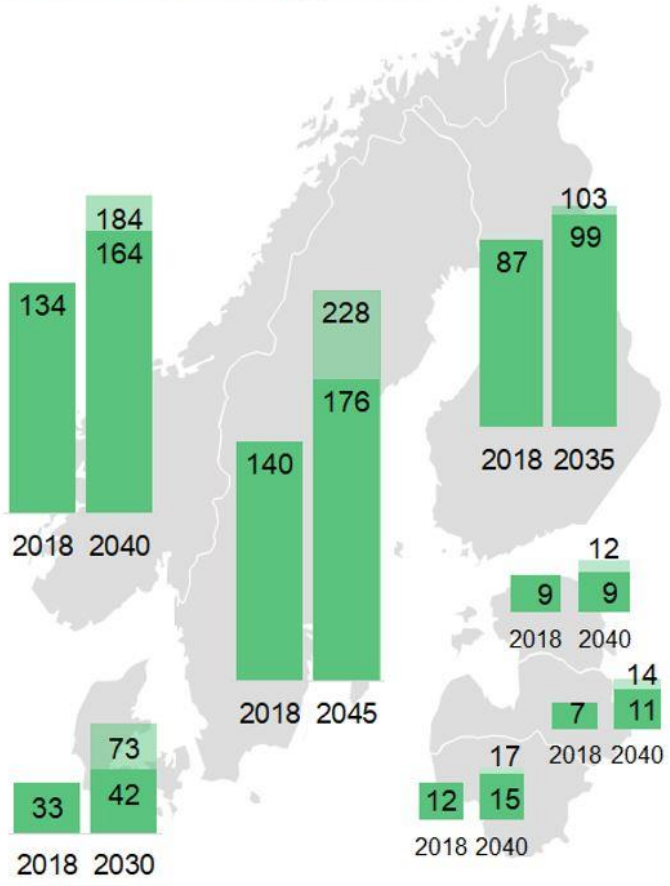
Climate targets in the Nordics

Sweden: Net zero 2045

Norway: -95% by 2050

Denmark: Net zero 2040

Finland: Carbon neutral 2035



Source: Energiföretagen, Svenskt Näringsliv, Statnett, Finnish governmet, Energinet, Danish Energy Agency, Eurelectric, ENTSO-E

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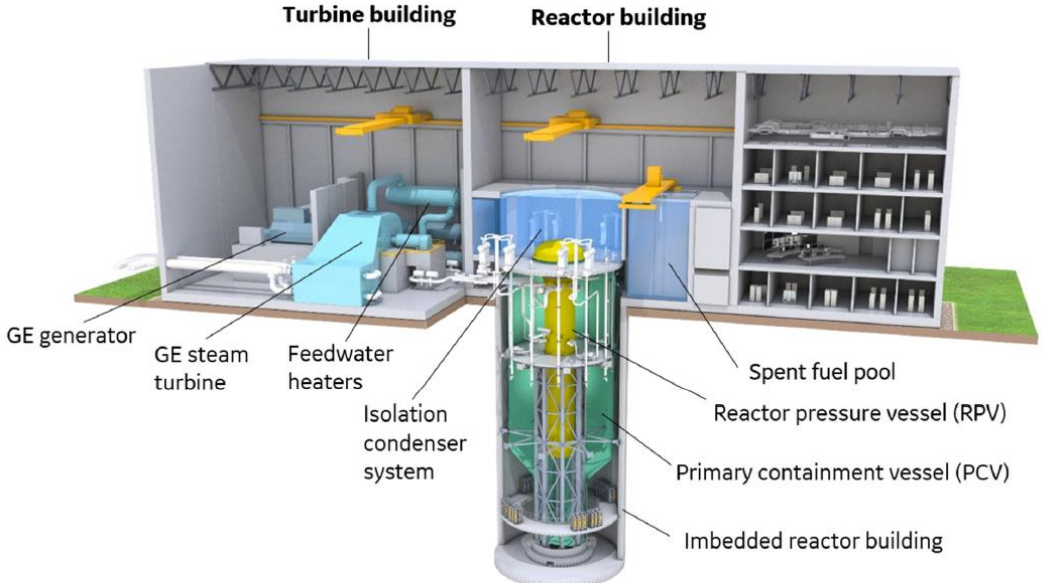

USA restoring leadership

1. ARDP $230M to SMRs to be deployed in 7 years.
2. Bipartisan support on funding, legislation, DFC financing.
3. J.Biden platform includes rejoining Paris agreement + SMRs
4. Clean US power by 2035 (!!!)
5. Many very serious and credible advanced reactor developments based on decades of nuclear R&D (USNC, Natrium, Kairos, X-100, Terrestrial)

SMR options

http://nuclearsafety.gc.ca/eng/reactors/power-plants/pre-licensing-vendor-design-review/index.cfm#p2

	reactor	capacity	FOAK
Ultrasafe Nuclear	Gas cooled	10 MWe	**2024** Canada
GE Hitachi	BWRX-300 Keevveereaktor	300 MWe	**2028** Canada?/US?
Rolls Royce	Conventional PWR	450 MWe	**2030** UK
NuScale	Integral PWR	4*77MWe= 308MWe	**2029** US

FE strategy is to learn and observe licensing, EPC contracting, supply chain, construction perfomance of each design to understand credibility of real CAPEX & LCOE. Decide **after** FOAK completion.
No rush to repeat OL3, Vogtle, HPC mistakes.

Politics

- Engagement with all political parties, minister, leading officials.
- Good public reception.
- Non-competitive relationship with national utility Eesti Energia.
- Value proposition & negotiations with site candidate municipalities.
- **Definite decision to stop oil shale power generation 2035**

Poll: Do you support SMR for security of supply of Estonia given decrease of oil shale power?
„Yes, rather yes“:

- April 2019 51%
- October 2019 54%
- February 2020 58%
- September 2020 58%
- January 2021 54%

The cabinet supports the proposal of creating a national working group of nuclear energy

Author

Government Communication Unit
press@riik.ee

5. November 2020 - 0:00

Stenbock, 5 November 2020 – At today's cabinet meeting, the government discussed the possibilities of using nuclear energy in Estonia and decided that a national working group of nuclear energy should be created to define the nation's positions towards the issue.

So far, no decisions have been made regarding the use of nuclear energy in Estonia, as thorough preparations are required prior to that. The working group will be tasked with analysing the feasibility of using nuclear energy in Estonia with the help of foreign experts and submitting their conclusions and proposals to the government. Their impact analysis on the implementation of nuclear energy will help the government make a calculated and informed decision on the matter.

"The introduction of nuclear energy after 2030 is one possible way of increasing Estonia's energy security, sustainability, and competitiveness, as well as reaching the climate goals set for 2050," said Prime Minister Jüri Ratas. "It is one of many possible solutions for producing climate-neutral energy in Estonia, which definitely deserves widespread discussions within the society and thorough analyses to

FERMI.

Procedure

1. Government committee 2020
2. Planning process initiation (2022)
3. Nuclear energy law bill (2024)
4. Nuclear energy regulator formation (2025)
5. Approval of national spatial plan by gov (2026)
6. Decision in Principle in Parliament (2027)
7. Vendor choice/ Construction license application (2028)
8. Final investment decision/EPC contract (2030?)

Energy & technology

- 2022 – first SMR license/closure of German NPPs
- 2023 – CO2 price 45€/t

- 2025 – completion of USNC MMR/ UK RR, NuScale construction start
- 2026 descyncronisation of Baltics from Russia (end of power imports)
- 2028 – OPG SMR completion/CO2 price 70€/t
- 2030 – completion of first 700MW Livonian off-shore wind park

Fermi 2020 studies

1. Prelimenary site screening in Estonia (5 site candidates) - Tractebel, Steiger
2. Study on LWR SMR construction schedulling - Vattenfall
3. SMR licencing model for deployment of country of origin Safety Assesment Report – Fortum, Helen Cook
4. Industral steam (400GWh), district heat (100GWh), direct powerline study for Kunda site
5. Scoping study of Deep Isolation in Estonian geology.
6. Research team work: Emergency Planning Zone for SMRs
7. Studies made public at 9th February 2021 Conference www.fermi.ee/conference

SMR deployment with private capital

- Combining decisionmaker expertise, ownership responsibility & private capital is good fit for market disruption (see: Ford, Apple, Tesla). If nuclear industry stagnates to 1970s, it stagnates.
- Raised capital 2019-2020: 0,5m eur Estonian and US VC
- Target 2021 capital raise 2,5 million eur for 2021-2024 execution of National Spatial Plan
- Terminal valuation of land, plan, permits, organisation: 10% of total 600MWe SMR construction CAPEX.
- Fermi Energia looks for options Joint Ventures in other EU markets to start professional SMR deployment projects.

TEEME ÄRA!
LET’S DO IT!

FERMI.