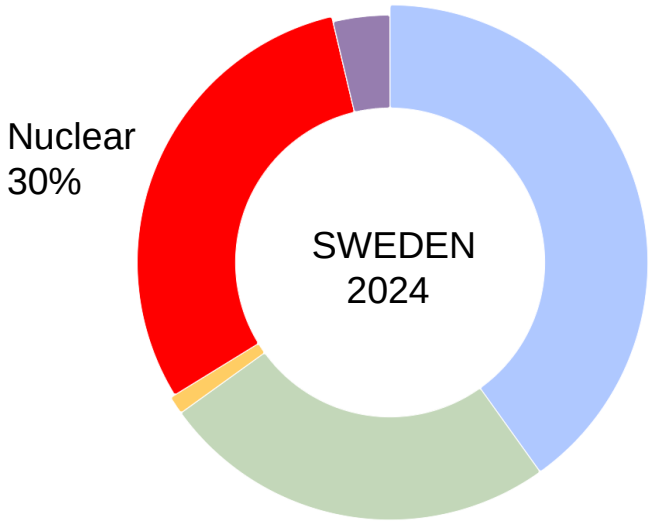
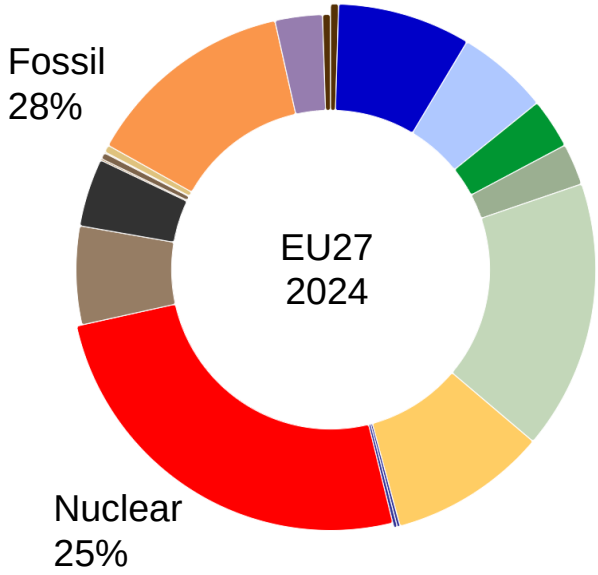
Perspectives on Nuclear Power in Sweden

Anders Johansson

Nuclear Power is Essential !





https://www.energy-charts.info/charts/energy_pie/chart.htm?l=en&c=EU&interval=year&year=2024&show_labels=0

Lise Meitner.

30 km North in the city of Kungälv

1938, taking a Christmas walk, she formed the revolutionary hypothesis that nuclear fission occurs when uranium is exposed to neutron irradiation.

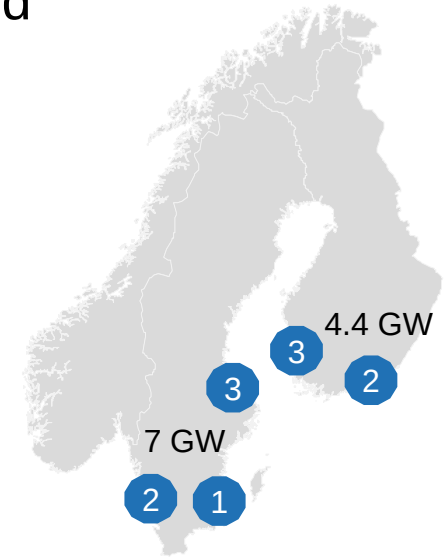
Lise Meitner worked 22 years in Sweden

80 MW_{th} District Heat and Power in a Stockholm suburb

500 km northeast - Ågesta NPP
1964 - 1974

Nordic Nuclear power
0 to 90 TWh in 22 years

1963-1985
16 reactors constructed
and put in operation



In operation

2 VVER-400

6 ABB BWR

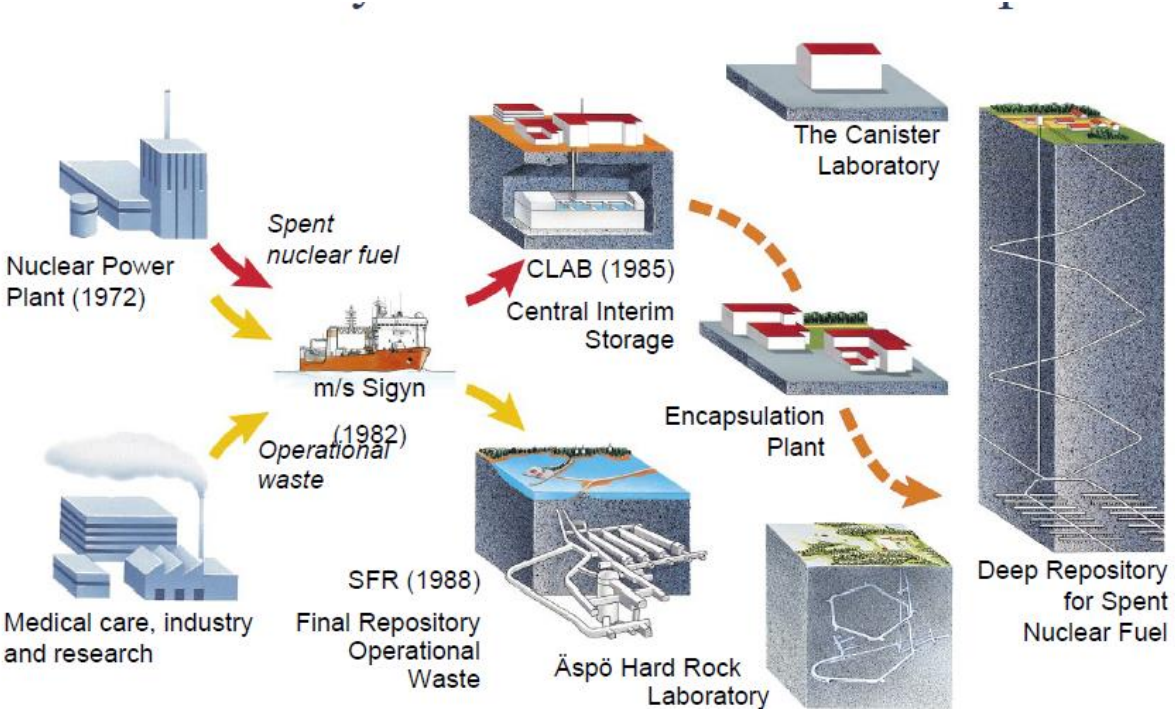
2 W-house PWR

1 EPR

VATTENFALL

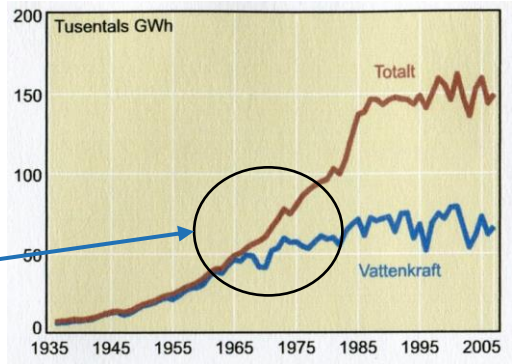
Complete backend program

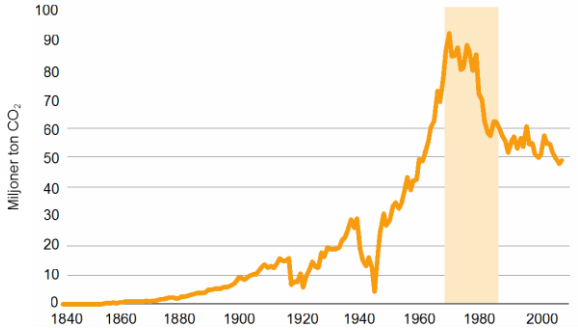
Similar in both Sweden and Finland



Shaped by long-term national decisions

1900 1970





Looking ahead – The existing Swedish Fleet – is it halfway?

Forsmark

3 BWR, 3x1100 MW

Start 1980-1985

Planned life 60 years

Ringhals

2 PWR, 2x1100 MW

Start 1980-1982

Planned life 60 years

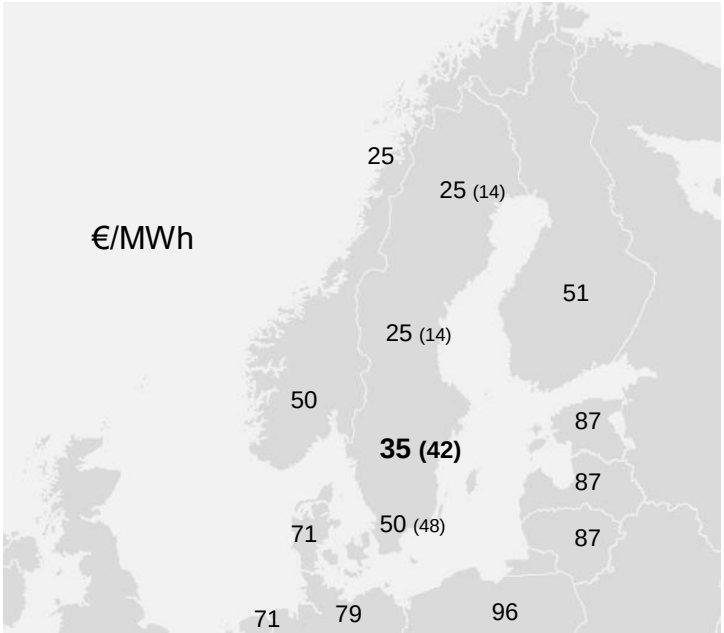
Oskarshamn

1 BWR,1450 MW

Start 1985

Planned life 60 years

Looking ahead
Market Prices vs Cost
Sustain present power plants – but not newbuild
Price volatility is challenging



Full year 2024 (Jan-Sep 2025)

Operating plants

33-40 €/MWh

15-25 €/MWh

Based on public annual reports for 2024

Looking ahead

Already utilising ‘full’ potential of hydropower Sweden

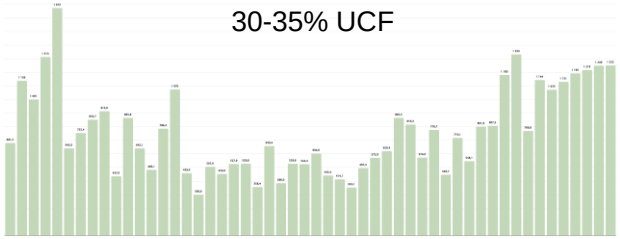
Operates between 2 – 13 GW

Potential for some power upgrades
Potential for some pump storage
No increase in energy

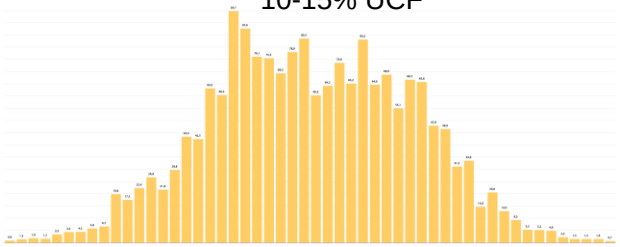
19 GW

2.5 GW

Good fit with demand
30-35% UCF



Poor fit with demand
10-15% UCF

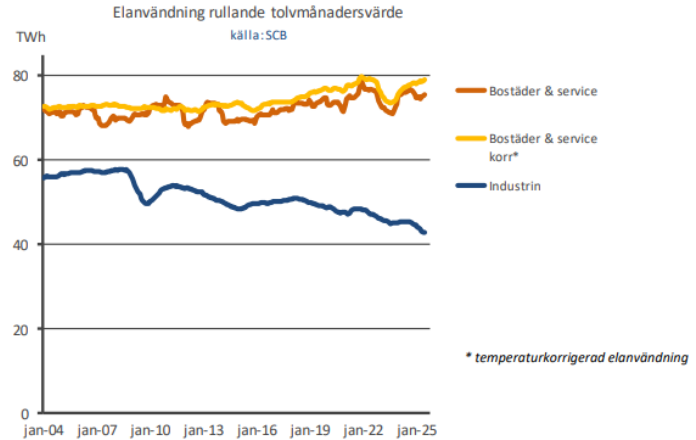


Looking ahead

Electrification

How, when and where?

65% or 165% more* electric power consumption?



133 TWh consumption
33 TWh export

*) The Swedish energy agency scenarios until 2050 (Published March 2025)

Looking ahead
Nuclear in Sweden

Kärnfull Next and others

Government Roadmap for new nuclear

2.5 GW – 2035
10 GW – 2045

Financial model, Risk charring
Adapt laws and regulations
Promote industry/local awareness

Vattenfall – investigating newbuild

Shortlisted two SMR
Public consultation initiated at Väröhalvön
Final investment decision expected 2029

‘SMR Campuses’
Potential sites identified
Interacts with municipalities
District heat reactors

BLYKALLA

Looking ahead

New build at Värö peninsula

BWR 300 MWe 5 reactors

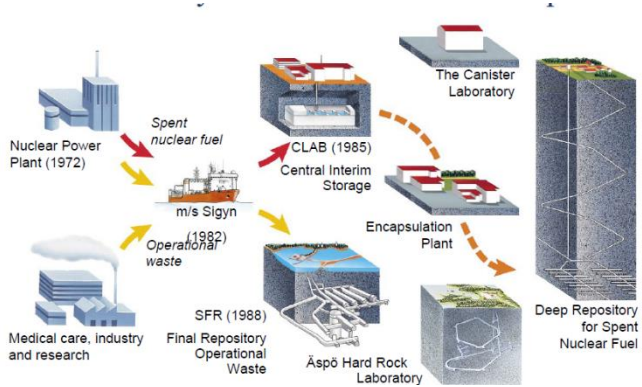
Natural circulation

PWR 470 MWe 3 reactors

Boron-free operation

https://group.vattenfall.com/se/nyheter-och-press/nyheter/2025/vattenfall-har-valt-leverantorer-pa-resan-mot-ny-karnkraft

Summing Up



BLYKALLA