

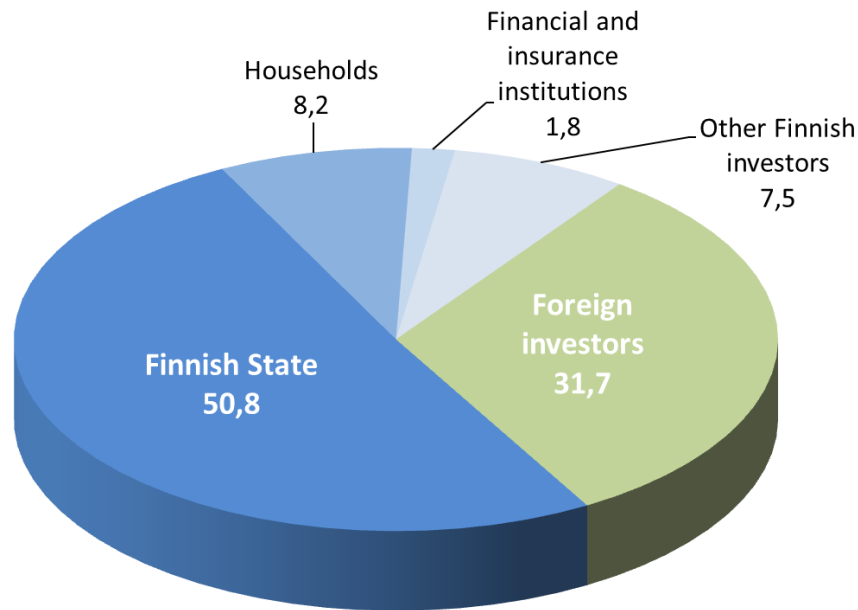
Safe and reliable operation of Loviisa NPP - Experiences and Future Perspectives

Satu Katajala 3 June 2015

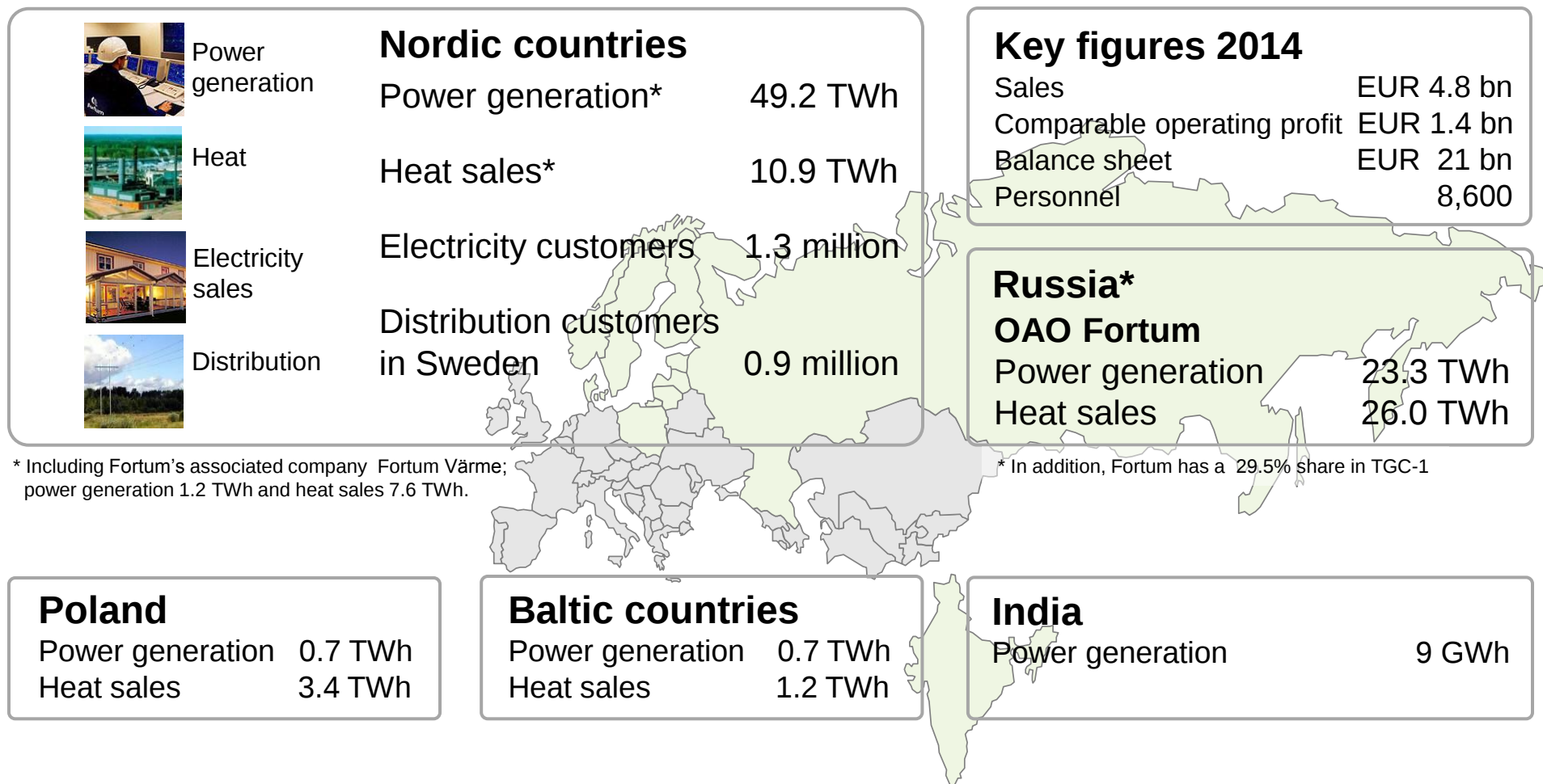
Atomexpo
Moscow

Fortum – Private company listed in the Helsinki Stock Exchange

Approximately 110,000 shareholders, market cap ~ 18 bn €

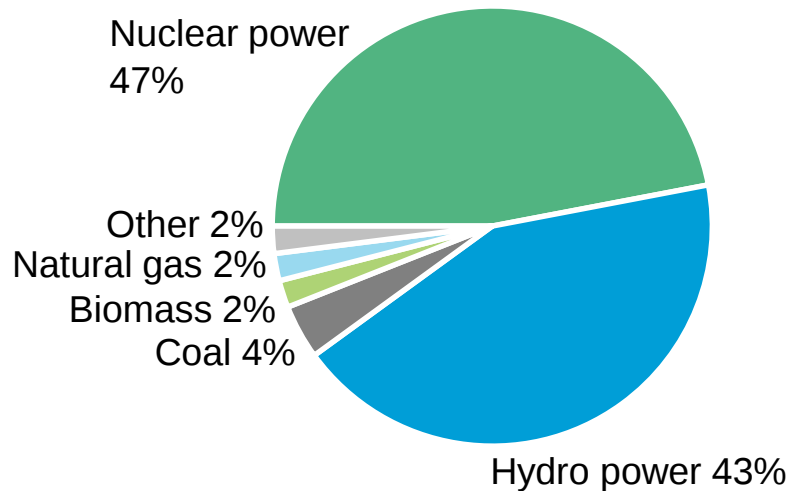


Power and heat company in the Nordic countries, Russia, Poland and the Baltics



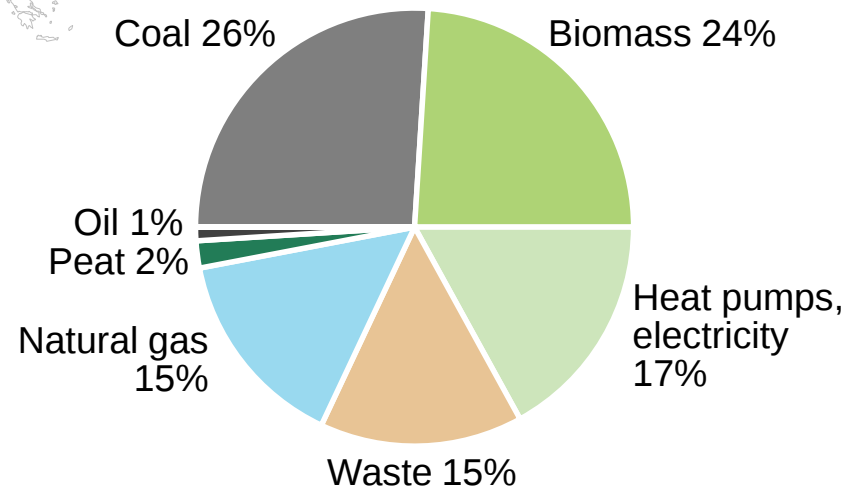
Fortum's European power generation based on hydro and nuclear power – wide flexibility in heat production

Fortum's European power generation in 2014



European generation 51.3 TWh
(Generation capacity 10,478 MW)

Fortum's European heat production in 2014



European production 15.7 TWh
(Production capacity 7,572 MW)

Incl. Fortum's associated company Fortum Värme; power generation 1.2 TWh (capacity 627 MW) and heat production 7.5 TWh (capacity 3,636 MW).

Fortum is a strong and respected nuclear actor



Loviisa

Two units

2 496 MW = 992 MW

Fortum's ownership 100%



Olkiluoto

Two units, third under construction

$880 + 880 \text{ MW} = 1,760 \text{ MW}$

Under construction 1,600 MW

Fortum's share: 27% (468 MW)



Oskarshamn

Three units

$473 + 638 + 1,400 = 2,511 \text{ MW}$

Fortum's share: 43% (1,089 MW)



Forsmark

Three units

$984 + 1,120 + 1,170 = 3,274 \text{ MW}$

Fortum's share: 22% (720 MW)

Steady and reliable electricity production with nuclear power

Steady and reliable
base production of
electricity

Domestically produced
electricity without subsidies
from tax revenue



CO2-free mitigates climate change.
And has no sulphur, nitrogen or
particle emissions



1/3
of Finnish
electricity
production



Safety is the foundation
of all operations

Loviisa power plant

- Loviisa power plant has two VVER pressurised water reactors with a capacity of 2 x 496 MW
- Loviisa 1 was commissioned in 1977 and Loviisa 2 in 1980
- Planned service life of the power plant units is 50 years
- Annual production in 2014 totalled 7.88 TWh, i.e. about 12% of Finland's electricity production
- Power plant continuously employs about 500 Fortum employees and 100 subcontractors



The amount of electricity generated at the Loviisa power plant is almost equivalent to the total electricity consumption of the cities of Helsinki, Espoo and Vantaa.

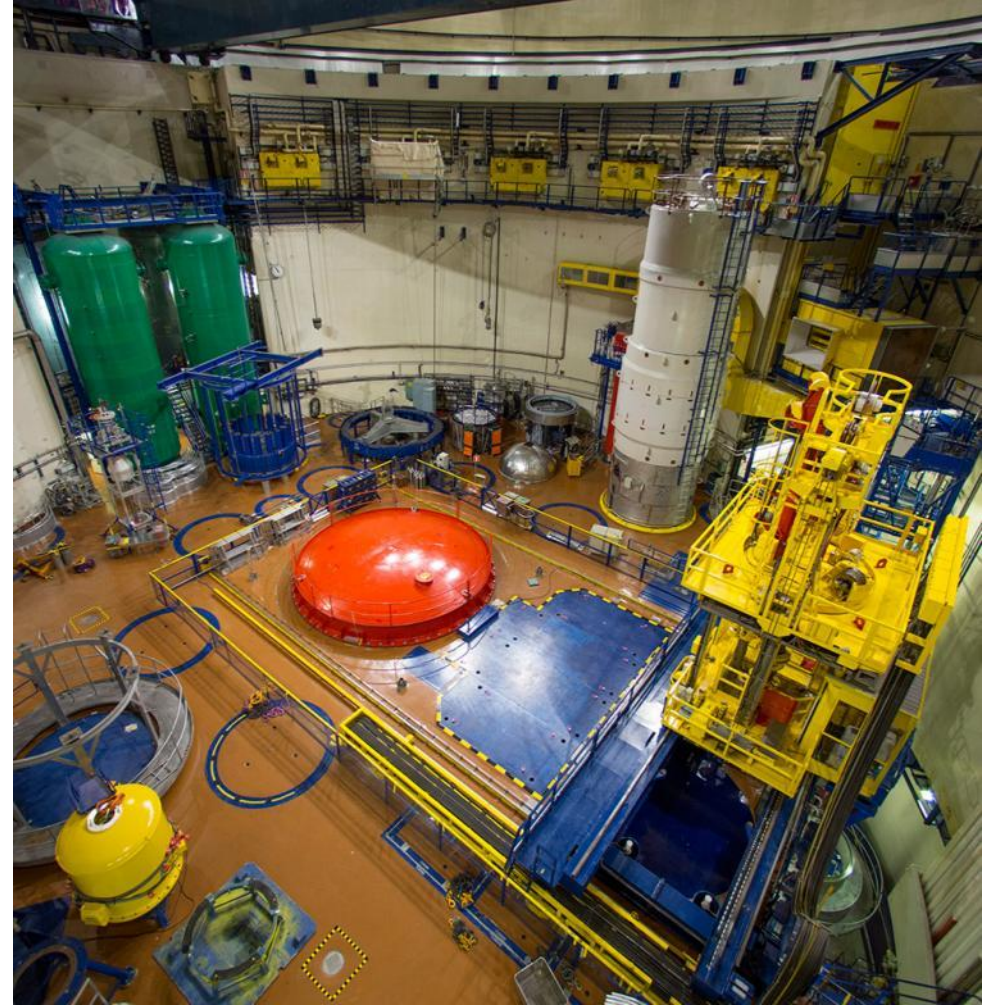
Unique Finnish nuclear power plant

- The decisions to build Finland's first nuclear power plant in Loviisa were made in the 1960s
- Imatran Voima (former Fortum) was responsible for the project
- Construction took 10 years
- Loviisa power plant units were built to meet the most advanced Western safety requirements at the time
- Technical solutions originate from Russia, the United States, Germany and Finland – resulted in the “first and only Finnish NPP”



Loviisa power plant has been continuously developed

- Loviisa 1 started electricity production in 1977 and Loviisa 2 in 1980
- After commissioning of the plants, their safety and availability has been continuously improved through multiple upgrade projects
- Continuous improvement of safety has been the guideline throughout the years in the development of the Loviisa units



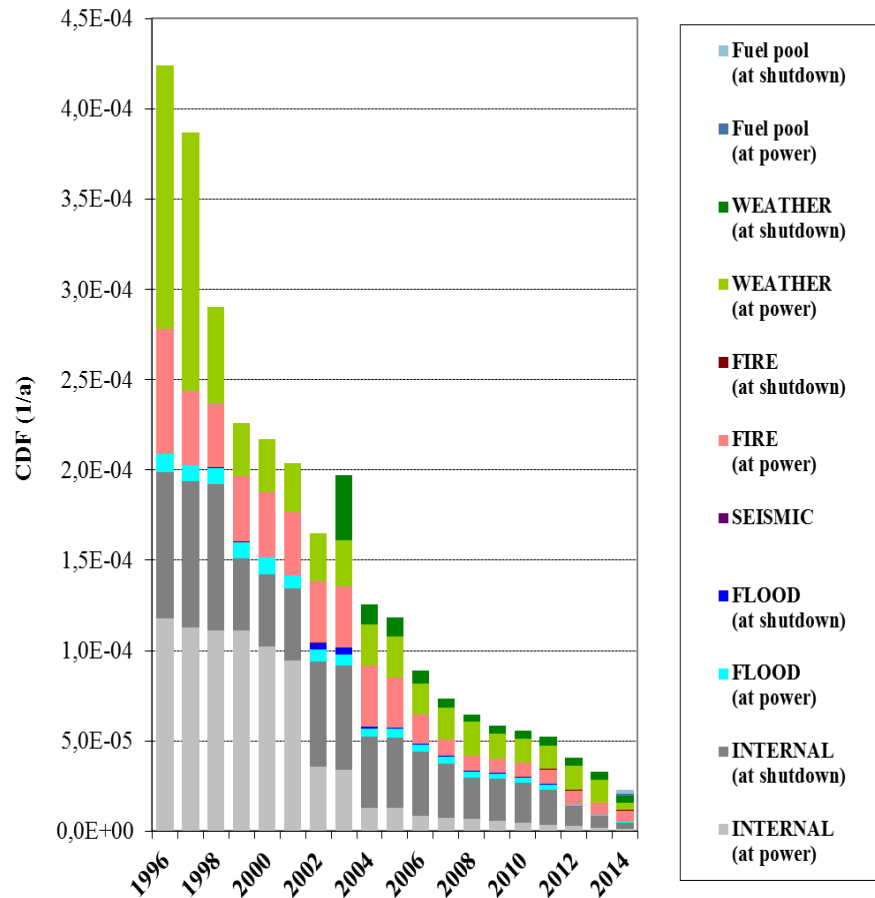
Loviisa power plant is safe

- Loviisa power plant's technical safety is among the best in the world
- A well-designed power plant constructed with high-quality standards
- The power plant's safety functions have been systematically developed through the years
- Safety is maintained with a good operating culture, structural solutions and by constantly analysing risks



Fortum has a long term systematical safety improvement process with a “grading approach” in place

Loviisa 1 Risk distribution



New Cooling Towers

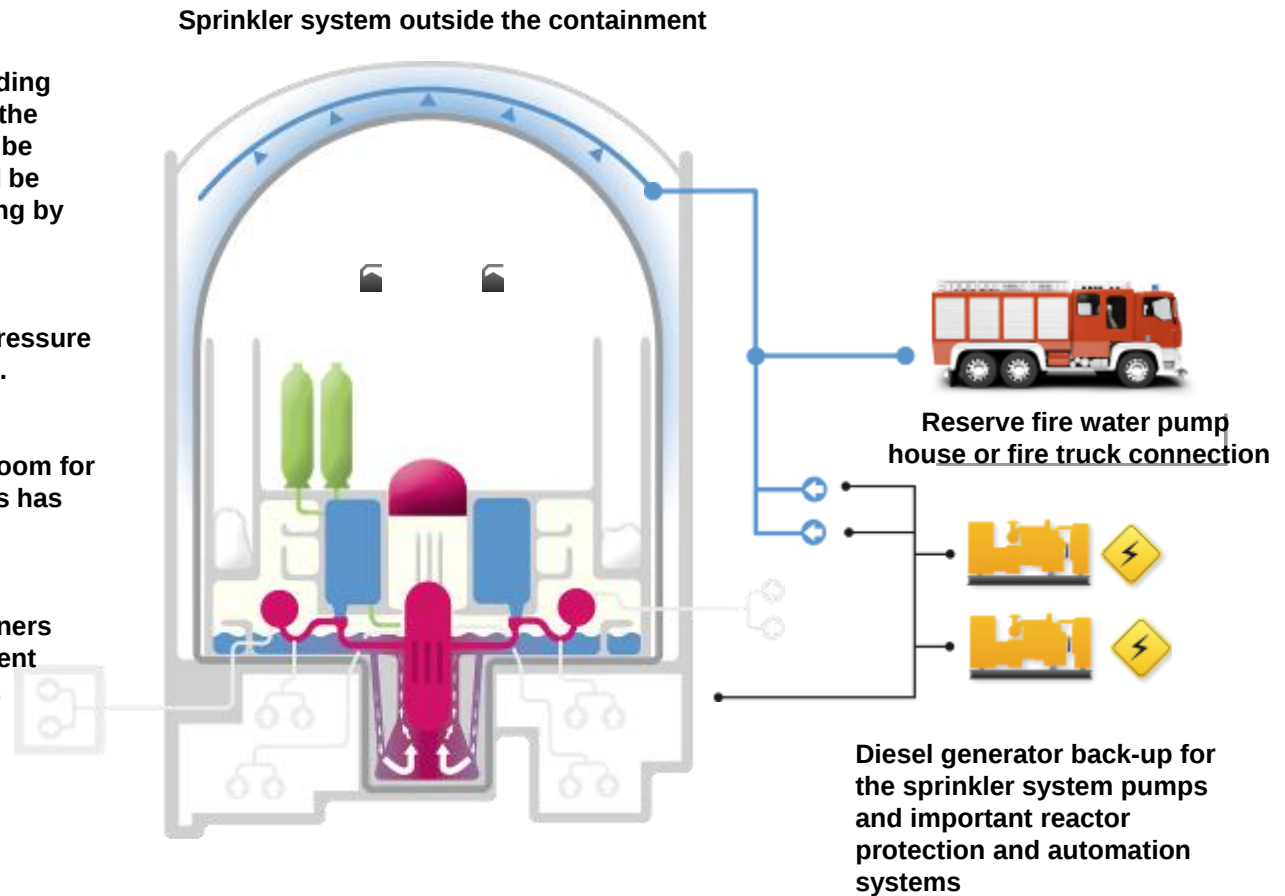
Loviisa NPP is one of the first existing plant's where a SAM strategy was implemented

If all cooling systems and electricity feeding have been lost and fuel has melted into the reactor, the reactor pressure vessel will be cooled with natural circulation. Heat will be transferred from the containment building by cooling the containment externally.

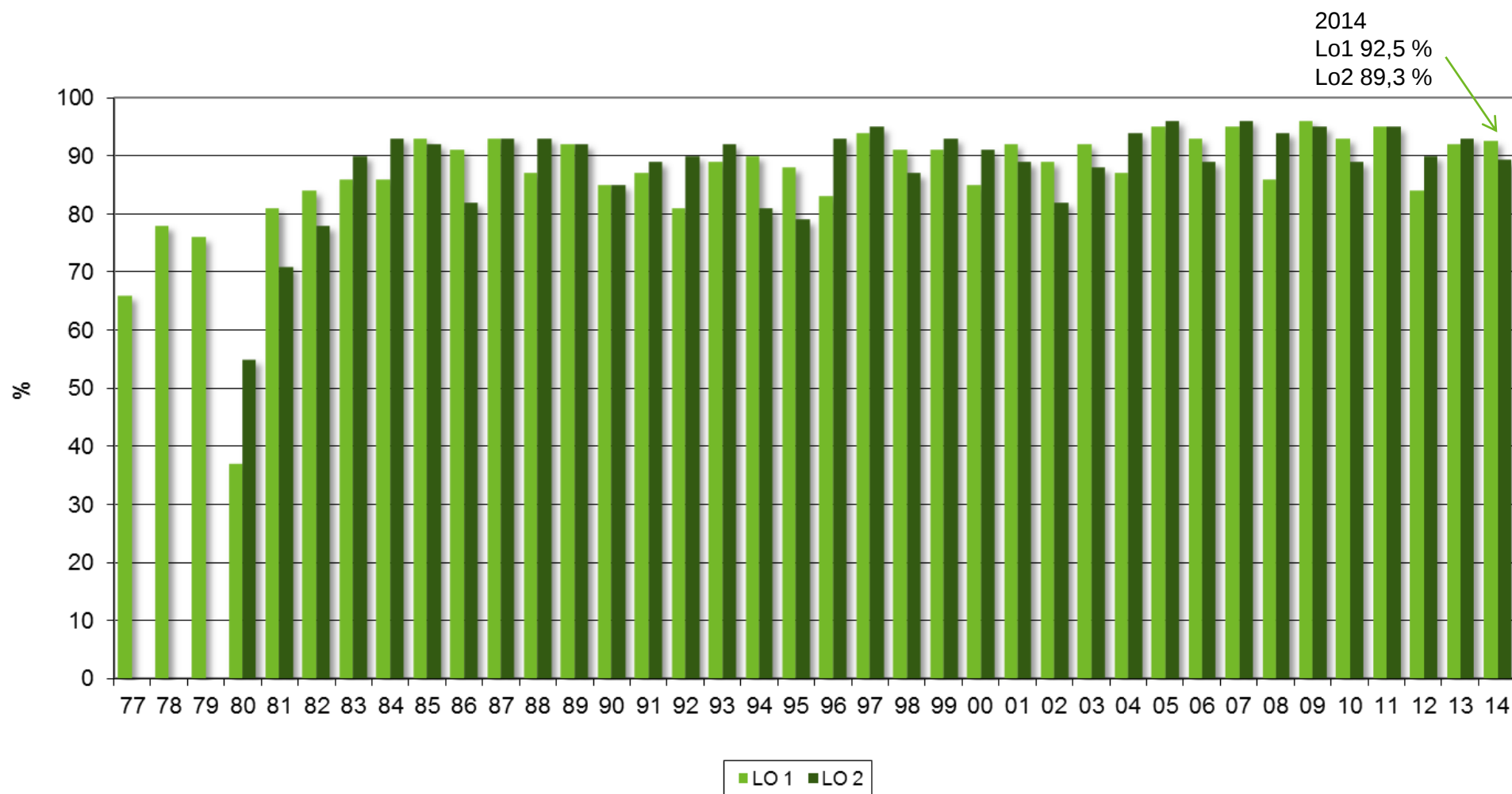
This arrangement aims at keeping the pressure vessel and the containment undamaged.

A separate radiation-protected control room for management of severe reactor accidents has been constructed at the plant.

Hydrogen burners and passive recombiners have been installed inside the containment building to prevent hydrogen explosion.



Loviisa NPP's availability 1977–2014



We are continuously developing the Loviisa power plant: investments of approx. EUR 80 million in 2014



Modernisation of turbines and reheaters

Implementation during 2014–2017. Increases the plant's electricity production capacity by a total of 29 MW.



Automation modernisation

The modernisation of systems related to the safety of both units will be implemented during 2016–2019. Ensures safe and reliable electricity production until expiration of the existing operating licences.



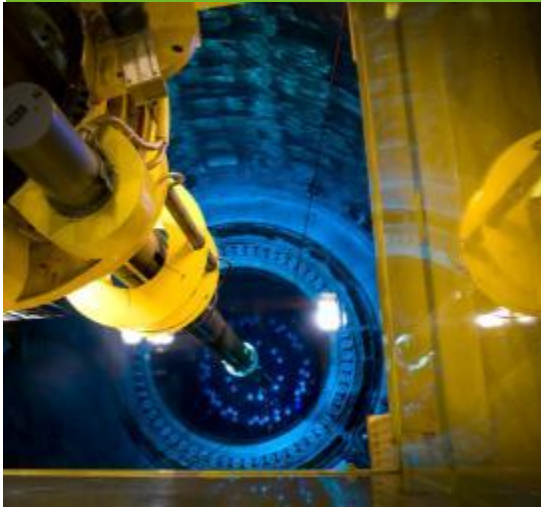
Cooling system independent of seawater

Air-cooled system secures the removal of the plant units' decay heat in situations where the normal seawater cooling isn't available for some exceptional reason.

Biggest investment projects in Loviisa power plant's history will be implemented in the upcoming years.

Spent fuel management is one major concern for the general public – how do we deal with this?

Spent fuel is removed from the reactor



LOVIISA

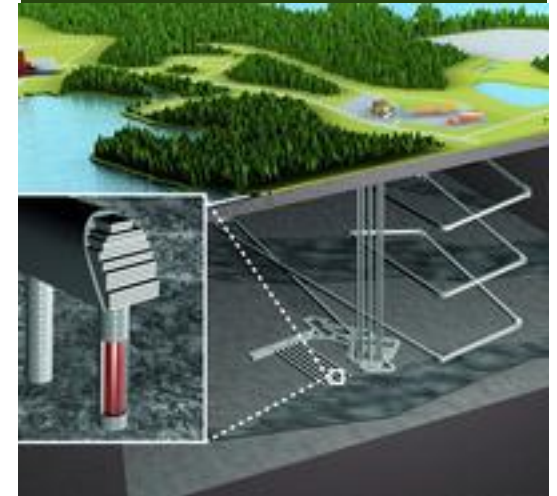
Interim storage in water pools for at least 20 years



Transportation



Encapsulated and disposed of in a final repository at a depth of 500 m



POSIVA, Olkiluoto

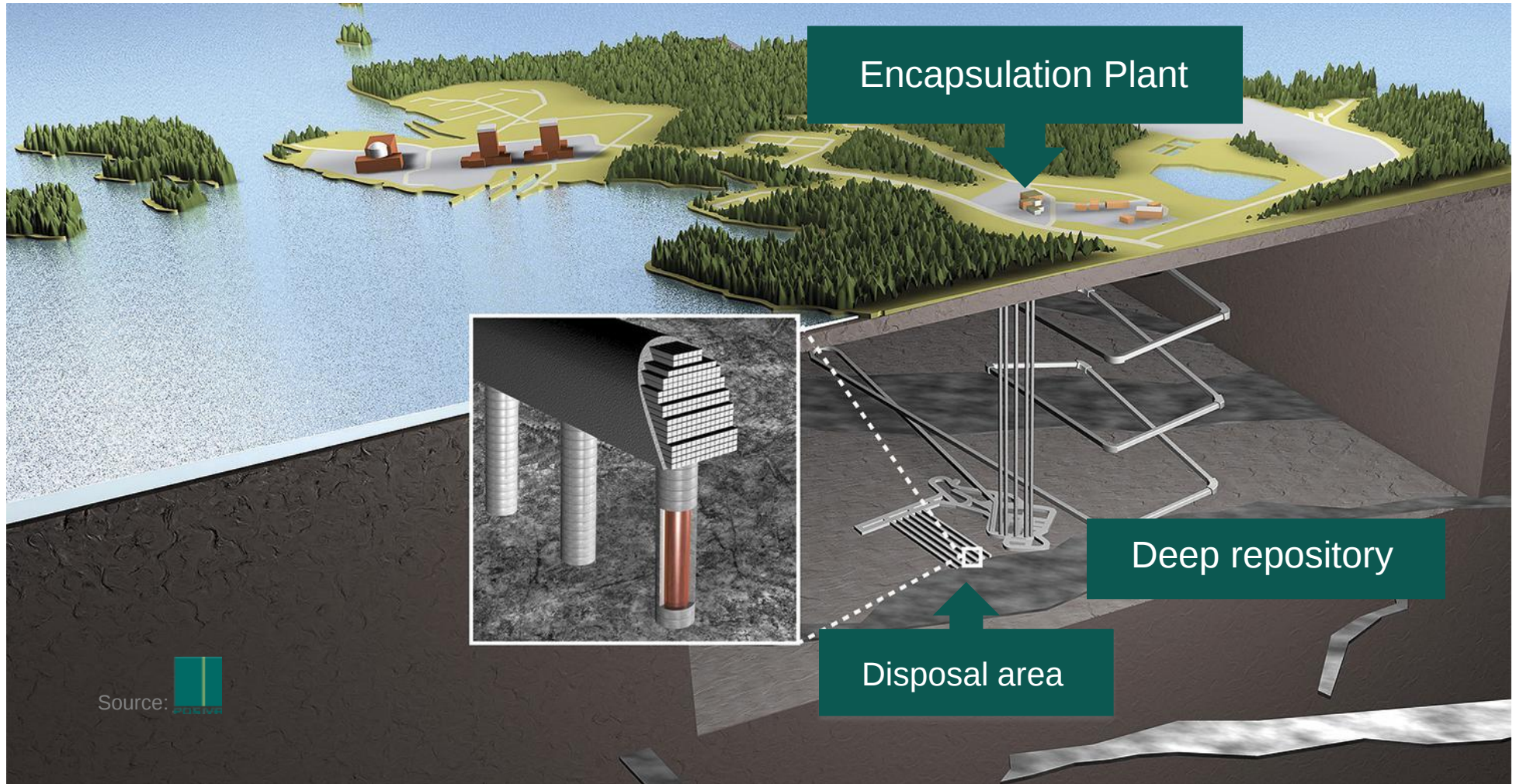
Storage of Loviisa's low-level and intermediate-level waste



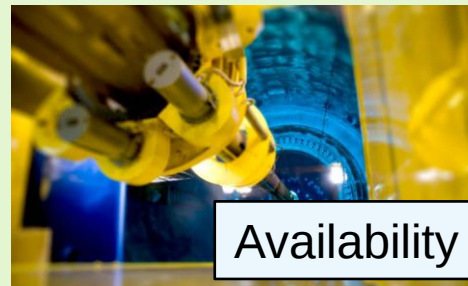
Interim storage of high-level waste at Loviisa



Final disposal of spent nuclear fuel



The Nuclear Business Environment is challenging in Europe



But we will manage it, with a better approach



Source: <http://kilplased.ee/fi/holmolaissadut>

A man wearing a yellow hard hat with a headlamp, safety glasses, and a white protective suit is operating a yellow machine in a factory. He is wearing a communication system with a microphone. The background is a blurred industrial setting with yellow and blue structures.

Thank you!