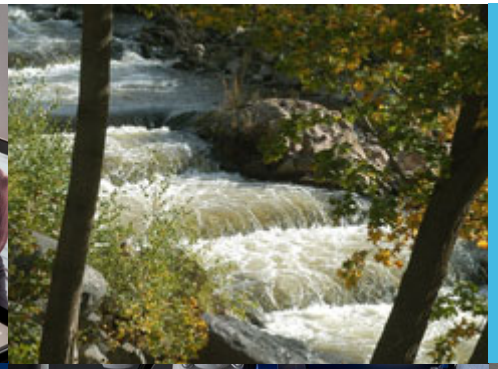
Nuclear energy at Fortum - international aspects

Olli Kymäläinen, 24 September 2015
Nuclear Society of Russia
Moscow

Next generation energy company | Fortum

Fortum in brief

Next generation energy company



Some 8,200 energy professionals

Nordic and Baltic countries, Russia, Poland

64% of power generation CO_2-free - in EU 94%

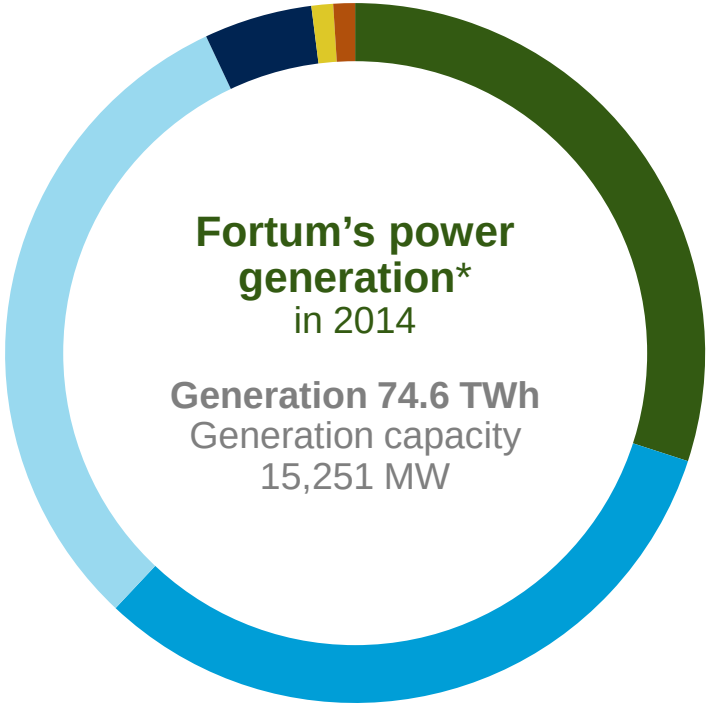
Core competences in hydro and nuclear power, combined heat and power production and in operating on energy markets

Energy-related products and expert services

1.3 million electricity sales customers

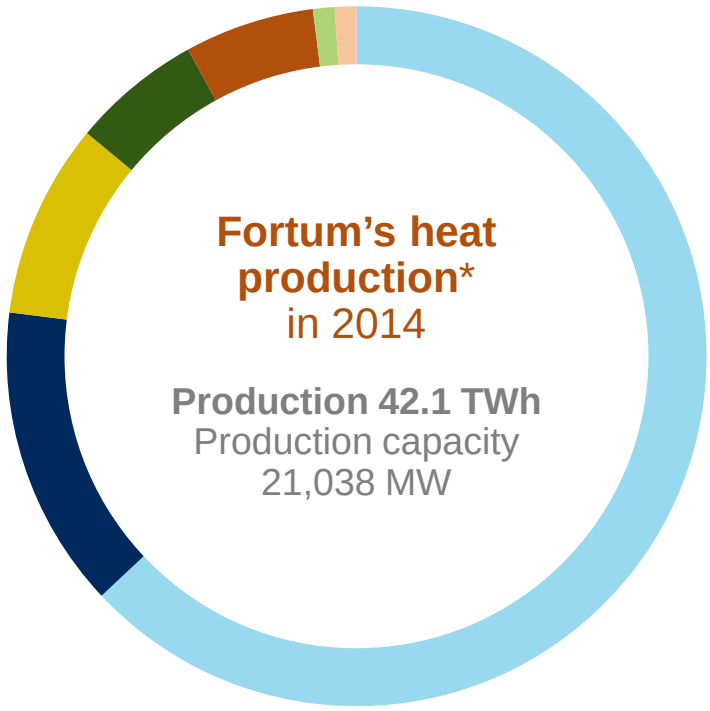
Figures: 2014

Fortum’s power and heat production by source



- Hydro power 30%
- Nuclear power 32%
- Natural gas 30%
- Coal 5%
- Biomass 2%
- Other 1%

Power generation by source



- Natural gas 63%
- Coal 14%
- Biomass 9%
- Heat pumps, electricity 6%
- Waste 6%
- Peat 1%
- Oil 1%

Heat production by source

* Figures include joint venture AB Fortum Värme samägt med Stockholms Stad

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Fortum worldwide

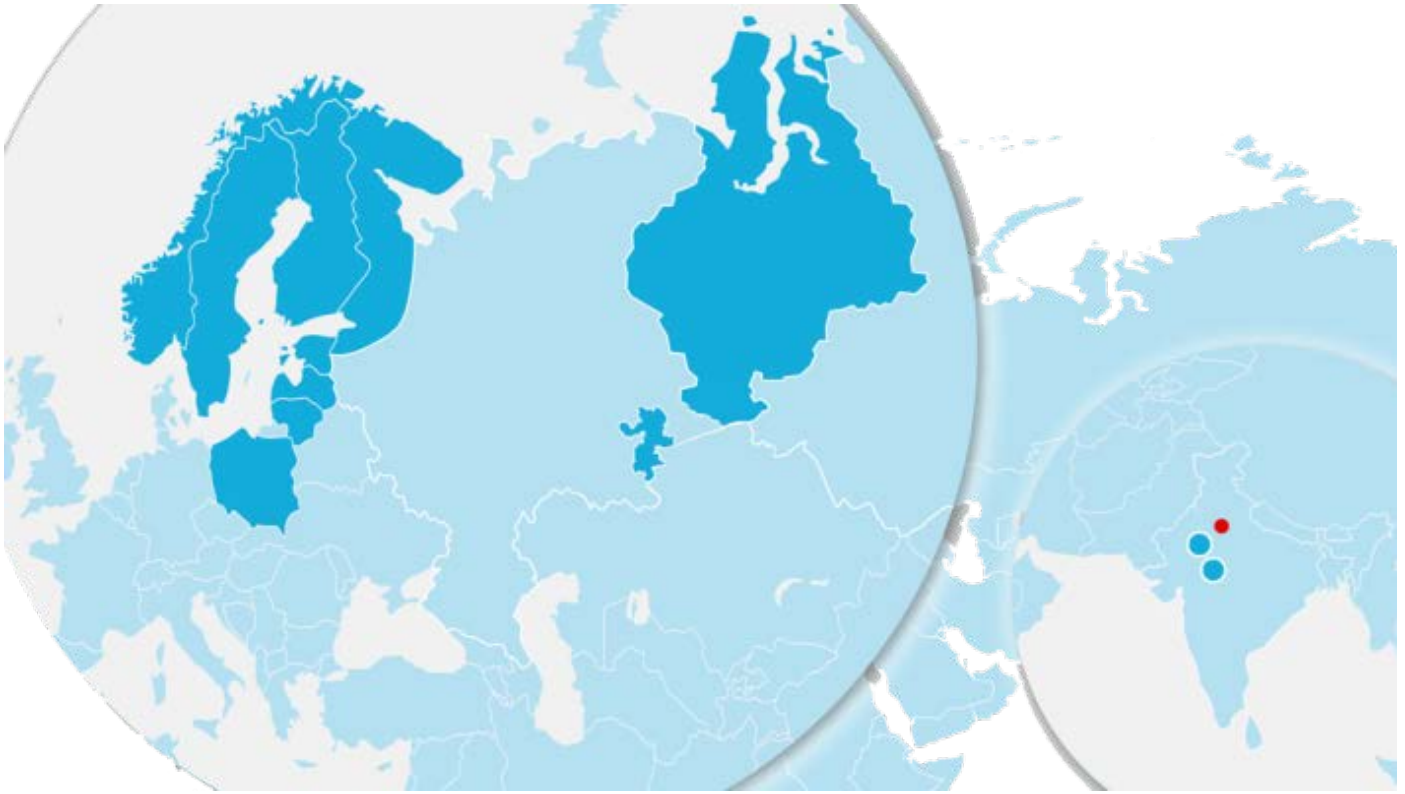
Nordic countries
- Power generation capacity 9,501 MW
  (+ Fortum Värme* 627 MW)
- Heat production capacity 1,936 MW
  (+ Fortum Värme* 3,636 MW)
- Electricity sales customers 1.3 million

Baltic countries
- Power generation capacity 92 MW
- Heat production capacity 811 MW

Poland
- Power generation capacity 257 MW
- Heat production capacity 1,189 MW

Russia
- Power generation capacity 4,758 MW
- Heat production capacity 13, 466 MW

India
Power generation capacity
15 MW



Expert services globally

Figures: 2014
*Joint venture AB Fortum Värme samägt med Stockholms Stad

Fortum’s nuclear assets in Finland and Sweden

Loviisa

Two units
2 × 496 MW = 992 MW

Fortum’s ownership 100%

Olkiluoto

Two units, third under construction

880 + 880 MW = 1,760 MW
Under construction 1,600 MW

Fortum’s share: 27% (468 MW)

Oskarshamn

Three units
473 + 638 + 1,400 = 2,511 MW

Fortum’s share: 43% (1,089 MW)

Forsmark

Three units
984 + 1,120 + 1,170 = 3,274 MW

Fortum’s share: 22% (720 MW)

Loviisa power plant

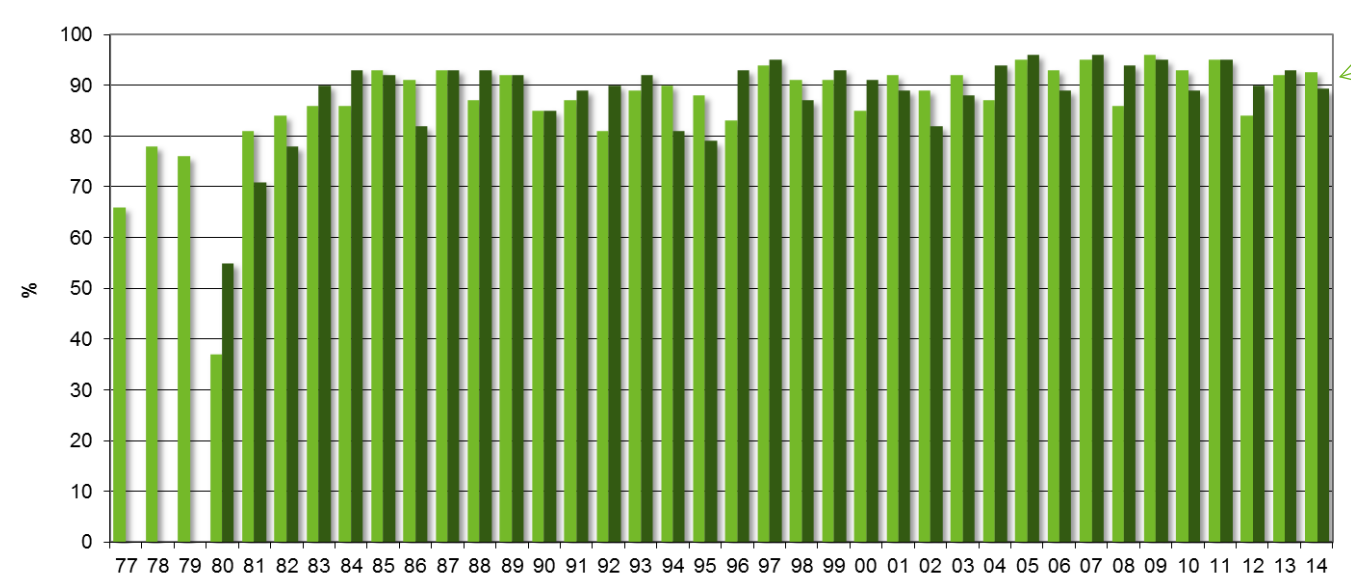
- Loviisa power plant has two VVER pressurised water reactors with a capacity of 2 x 496 MW
- Loviisa 1 was commissioned in 1977 and Loviisa 2 in 1980
- Planned service life of the power plant units is 50 years
- Annual production in 2014 totalled 7.88 TWh, i.e. about 12% of Finland's electricity production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

Loviisa 1&2 – a unique Finnish nuclear power plant based on international cooperation

- 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
- The two VVER-440 units at Loviisa were built to meet the most advanced Western safety requirements at the time
- Technical solutions originate, in addition to Russia, from the United States, Germany and Finland – resulted in the "first and only Finnish NPP"

Loviisa NPP's availability 1977–2014



2014
Lo1 92,5 %
Lo2 89,3 %

2014
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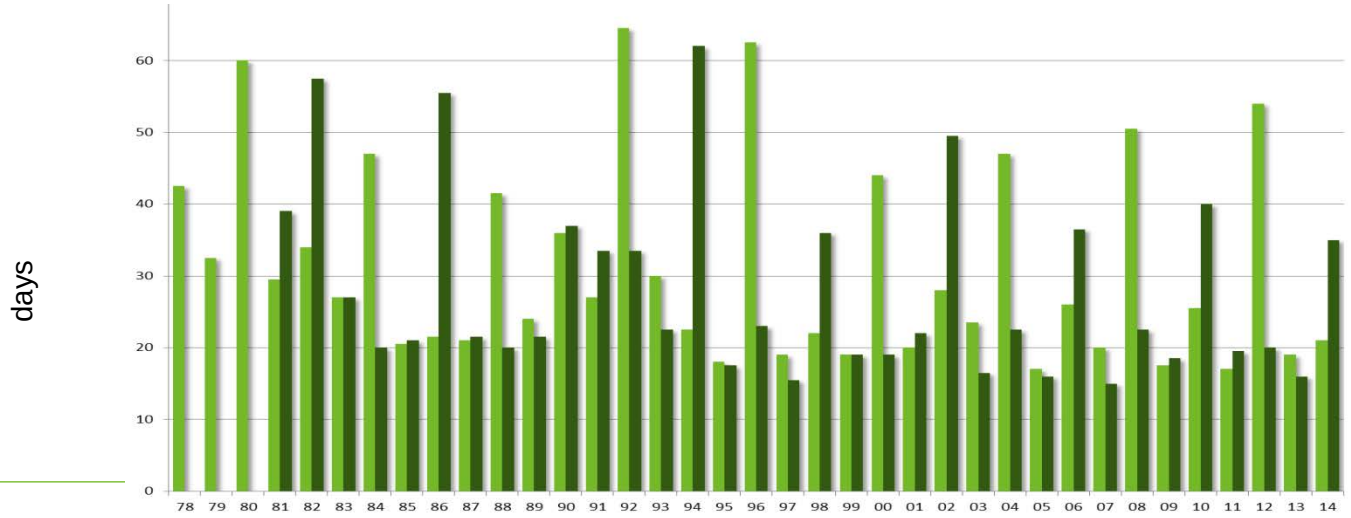
Lo2 89,3 %



The Nuclear Business Environment is challenging in Europe

Safety

Political and regulatory framework

Cost

Technology and knowhow

In the future, even deeper international cooperation is a necessity in order to keep nuclear as a viable alternative

- International cooperation in nuclear safety
  - A severe accident anywhere would impact the whole nuclear industry
  - Learning from others
    - WANO, IAEA, OECD, …
  - Safety R&D
- Nuclear technology is international
  - The number of suppliers of nuclear quality equipment is getting smaller
  - Towards global supply chains
- Harmonization of safety requirements and technical standards
  - For new NPPs, how to avoid redesigning the plant for each country?
  - Taking full benefit of serial construction learning curve would have a significant impact on cost
  - IAEA, WENRA, OECD/MDEP, EUR, WNA/Cordel, …
  - ➔ towards standard designs of new NPPs, but still far away

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