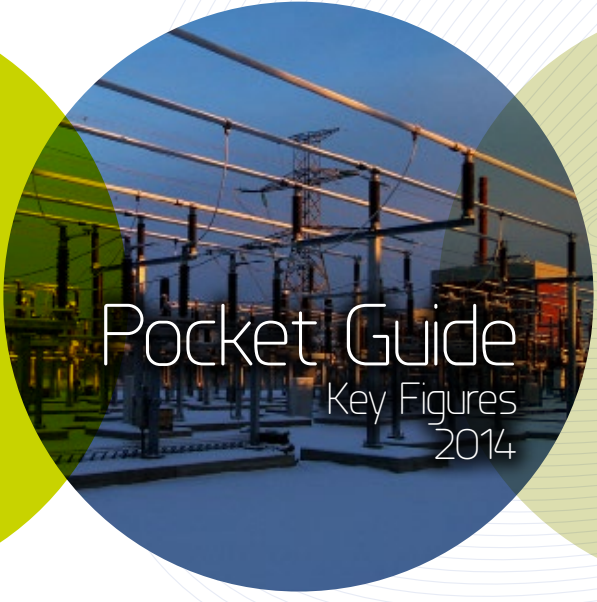
TVO



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Teollisuuden Voima Oyj

Company

Founded in 1969, Teollisuuden Voima Oyj (TVO) is an unlisted public company that supplies electricity for its shareholders at cost price. In 2014, the electricity supplied by TVO accounted for 18.2% of the total electricity consumption in Finland.

TVO's nuclear power plant units Olkiluoto 1 and Olkiluoto 2 (OL1 and OL2) are located in Olkiluoto, Eurajoki. A new plant unit, Olkiluoto 3 (OL3), is currently under construction. TVO also owns a one megawatt (MW) wind power plant and is a shareholder (45%) in the Meri-Pori coal-fired power plant.

Posiva Oy is an expert organization established in 1995 that is responsible for the disposal of spent nuclear fuel, research associated with disposal, and other expert tasks within its scope of operations. Posiva is owned by TVO (60%) and Fortum Power and Heat Oy (40%).

The TVO Group also includes TVO Nuclear Services Oy (TVONS) which markets and sells TVO's nuclear power services related to efficient operations, nuclear safety, nuclear waste management and maintenance services.

TVO's majority shareholder is Pohjolan Voima Oy. Other shareholder companies are listed in the following table.

COMPANY SHAREHOLDERS AND HOLDINGS DECEMBER 31, 2014

Holding %	A series	B series	C series	Total
EPV Energia Oy	6.5	6.6	6.5	6.5
Fortum Power and Heat Oy	26.6	25.0	26.6	25.8
Karhu Voima Oy	0.1	0.1	0.1	0.1
Kemira Oyj	1.9	–	1.9	1.0
Oy Mankala Ab	8.1	8.1	8.1	8.1
Pohjolan Voima Oy	56.8	60.2	56.8	58.5
	100%	100%	100%	100%

Series A entitles holders to the electricity produced by the current nuclear power plant units, OL1 and OL2. Series B entitles holders to the electricity to be produced by the new nuclear power plant unit, OL3. Series C entitles holders to the TVO share of the electricity produced by the Meri-Pori coal-fired power plant.

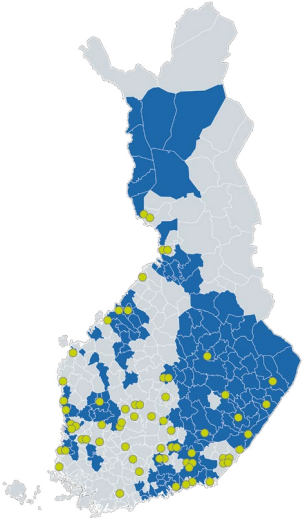
Through its direct owners, TVO's nuclear power brings well-being to nearly 134 municipalities. These municipalities are shareholders in the 65 energy companies that serve as a route for distributing electricity from Olkiluoto throughout Finland.

Industrial shareholders of TVO

- Kemira Oyj (inc. pension foundation)
- Kumera Oy
- Metsä Fibre
- M-real Oyj
- Myllykoski Oyj
- Outokumpu Oyj
- Rautaruukki Oyj
- Stora Enso Oyj
- UPM-Kymmene Oyj
- Yara Suomi Oy (inc. pension foundation)

Electricity and energy company shareholders in TVO

- Pohjois-Karjalan Sähkö
- Etelä-Savon Energia
- Savon Voima
- Alajärven Sähkö
- Järviseudun Sähkövoima
- Lehtimäen Sähkö
- Korpelan Voima
- Kokkolan Energia
- Kruunupyyn kunta
- Pietarsaaren kaupunki
- Seinäjoen Energia
- Nykarleby Kraftverk
- Vaasan Sähkö
- Vetelin Sähkölaitos
- Vimpelin Voima
- Hiirikosken Energia
- Ääneseudun Energia
- Iin Energia
- Oulun Seudun Sähkö
- Oulun Energia
- Rovakaira
- Torniojokilaakson Sähkö
- Helsingin Energia
- Vantaan Energia
- Kymenlaakson Sähkö
- Keravan Energia
- Mäntsälän Sähkö
- Nurmijärven Sähkö
- Porvoon Energia
- Sallila Energia
- Paneliankosken Voima
- Lammaisten Sähkö
- Leppäkosken Sähkö
- Vatajankosken Sähkö
- Lankosken Sähkö
- Pori Energia
- Rauman Energia
- Kymenlaakson Sähkö
- Suur-Savon Sähkö
- Lahti Energia
- Haminan Energia
- Kaakon Energia
- Imatran Seudun Sähkö
- KSS Energia



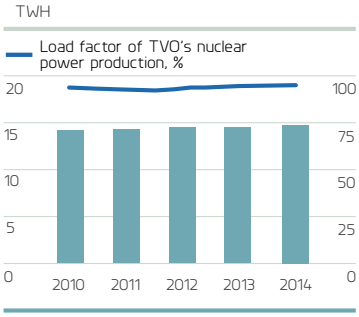
FINANCIAL KEY FIGURES (M€)

COMPANY'S FINANCIAL STATEMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE FINNISH ACCOUNTING STANDARDS (FAS).

	2013	2014
Turnover	363	325
Fuel costs	73	66
Nuclear waste management costs	89	51
Investments	303	339
Equity	858	858
Non-current and current interest-bearing liabilities (excluding loan from VYR) [1]	3,088	3,288
Loans from equity holders of the company [2]	339	439
Loan from VYR	932	983
Balance sheet total	5,572	5,879
Equity ratio (%)	29.4	30.0
Average number of personnel	890	858

1) The Finnish State Nuclear Waste Management Fund (VYR)
2) Subordinated loans

TVO'S ELECTRICITY PRODUCTION



Olkiluoto nuclear power plant

Olkiluoto nuclear power plant comprises the OL1 and OL2 power plant units, which were started up in commercial operation in 1979 and 1982, respectively. The OL3 plant unit is currently under construction near the two existing plant units.

The net output of the OL1 and OL2 plant units is 880 MW. They were supplied by the Swedish company AB ASEA-ATOM (today Westinghouse Electric Company). OL3 is supplied under a turnkey contract by a Consortium formed by AREVA NP GmbH, AREVA NP SAS and Siemens AG. The output of OL3 is 1,600 MW.

A repository for low and intermediate level operating waste as well as an interim storage for spent nuclear fuel are also found on the power plant site. The final disposal site for spent nuclear fuel operated by Posiva Oy is located in the centre of the Island of Olkiluoto.

Production

In 2014, Olkiluoto nuclear power plant produced 14.76 terawatt hours (TWh) of electricity. The excellent production figures in 2014 are based on the exceptionally small number of production disruptions.

OL1 produced 7.27 TWh of electricity and boasted a load factor of 94.5 percent. The production of OL2 was 7.5 TWh and the load factor 97.4 percent. The production figure for OL1 was the highest ever in the history of the plant unit.

Meri-Pori and wind power

TVO's share of the electricity produced at Meri-Pori coal-fired power plant was 400 gigawatt hours (GWh). The wind power plant produced 0.7 GWh and had a capacity factor of 8%.

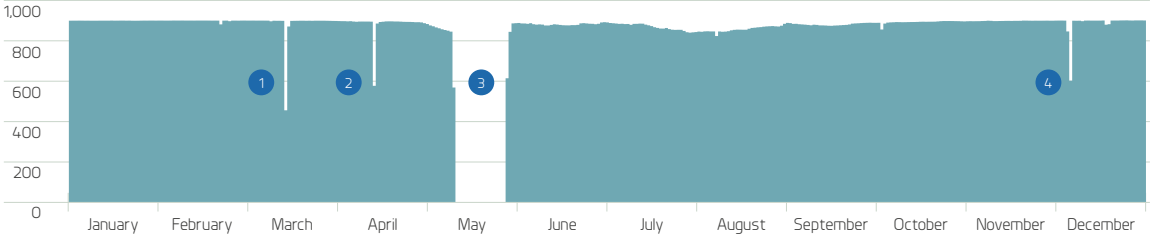
TECHNICAL DATA

OL1 / OL2		
Electric output, net	MW	880
Reactor thermal power	MW	2,500
Number of fuel assemblies		500
Total fuel amount	tU	86–90
Number of control rods		121
Reactor pressure vessel		
• inner diameter	mm	5,540
• inner height	mm	20,593
Reactor pressure	bar	70
Steam flow	kg/s	1,250
Turbine rated speed	r/min	3,000
Cooling water flow	m^3/s	38
Volume of plant buildings		
• OL1	m^3	483,000
• OL2	m^3	475,000
Containment		
• design pressure	bar	4.7
• gas volume	m^3	7,375
• water volume	m^3	2,700
OL3		
Electric output, net	MW	1,600
Reactor thermal power	MW	4,300
Number of fuel assemblies		241
Total fuel amount	tU	about 128
Number of control rods		89
Reactor pressure vessel		
• inner diameter	m	4,900
• inner height	m	12,300
Reactor pressure	bar	155
Steam flow	kg/s	2,443
Turbine rated speed	r/min	1,500
Cooling water flow	m^3/s	53
Volume of plant building	m^3	1,000,000
Containment		
• design pressure	bar	5.3
• volume	m^3	80,000

PRODUCTION IN 2014

OL1

AVERAGE OUTPUT MW

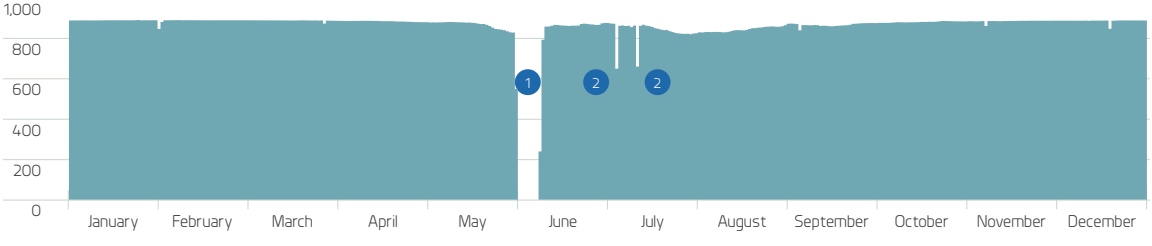


1. Repair of blowdown system valve
2. Repair of condenser seawater leak
3. Annual outage
4. Partial scram in conjunction with periodic testing

PRODUCTION IN 2014

OL2

AVERAGE OUTPUT MW



1. Annual outage
2. Replacement of generator rotor grounding carbon brushes

Nuclear waste management

Low and intermediate level operating waste

The waste generated during the operation and maintenance of the nuclear power plant is called operating waste. Operating waste is classified into low and intermediate level waste. This waste is stored in the repository for operating waste, the VLJ repository.

- The final disposal silos for low and intermediate level waste are located at a depth of 60–100 metres in the bedrock.
- The annual amount of low level waste placed in the repository is ca. 132 m³ (13 concrete boxes).
- The average annual amount of low level waste placed in the repository is 49 m³ (29 concrete boxes).
- By the end of 2014, a total of 5,898 m³ of operating waste had been placed in the VLJ repository.

Spent nuclear fuel

For the final disposal, the spent fuel placed in final disposal canisters made of copper and cast iron. The canisters are placed in holes drilled in the deposition tunnels at a depth of more than 400 metres in the bedrock of Olkiluoto.

- Every year, ca. 240 fuel assemblies are replaced in the reactors of OL1 and OL2.
- The spent fuel is cooled down for at least 40 years in the interim storage before final disposal.
- According to plans, the final disposal activities will start in the early 2020s.
  - The cost estimate of final disposal is 3,500 M€. The cost estimate includes spent fuel from power plant units operated by TVO & Fortum (OL1, OL2, OL3 and LO1, LO2)
  - The funds needed for nuclear waste management are collected in advance in the price of nuclear energy and deposited in the Finnish State Nuclear Waste Management Fund. In other words, final disposal will not cause any costs to future generations.

ONKALO
- ONKALO is a research tunnel, which will later be integrated in the final disposal facility.
- The access tunnel is ca. 5 km long, 5.5 m wide and 6.3 m high.
- The inclination of the tunnel is 1:10.

FINAL DISPOSAL FACILITY
- The total area of the underground final disposal facility is 1.5 km².
- The length of a deposition tunnel is max. 350 m, and it is 3.5 m wide and 4.4 m high (OL1–3).
- Each deposition hole is 1.75 m in diameter and 7.8 m in height (OL1–2).
- The deposition holes are spaced at intervals of ca. 9 m in the tunnel (OL1–2).
- The distance between the deposition tunnels is ca. 25 m.
- The maximum permitted water leakage rate into the deposition hole is 1 dl/min.

CANISTER
- The length of the final disposal canister varies according to the fuel assemblies: 4.75 m (OL1–2); 5.22 m (OL3); and 3.55 m (LO 1–2). All canister types are 1.05 m in diameter.
- On average, 36 canisters will be placed in the final disposal facility every year.

BENTONITE
- The deposition hole is back-filled with ca. 25 tons of bentonite (OL1–2).

RADIATION
- The radiation emitted from the canister at the time it is placed in the repository is attenuated by two metres of surrounding bentonite or rock.
- 500 years after being placed in the repository, the radiation dose emitted from the canister is 4 mSv, which is equal to the average annual radiation dose of the Finnish people.

Nuclear power plants in the world

FEBRUARY 2015

	REACTORS IN OPERATION		REACTORS UNDER CONSTRUCTION	
Country	Number of units	Total capacity MW (e)	Number of units	Total capacity MW (e)
USA	99	98,476	5	5,633
France	58	63,130	1	1,630
Japan	48	42,388	2	1,325
Russia	34	24,654	9	7,371
China	24	20,056	25	24,756
Korea Rep.	23	20,705	5	6,370
India	21	5,308	6	3,907
Canada	19	13,500		
United Kingdom	16	9,243		
Ukraine	15	13,107	2	1,900
Sweden	10	9,470		
Germany	9	12,074		
Belgium	7	5,927		
Spain	7	7,121		
Czech Rep.	6	3,904		
Switzerland	5	3,333		
Finland	4	2,752	1	1,600
Hungary	4	1,889		
Slovakia	4	1,814	2	880
Pakistan	3	690	2	630
Argentina	3	1,627	1	25
Brazil	2	1,884	1	1,245
Bulgaria	2	1,926		
Mexico	2	1,330		
Romania	2	1,300		
South Africa	2	1,860		
Iran Isl. Rep.	1	915		
Slovenia	1	688		
Netherlands	1	482		
Armenia	1	375		
United Arab Emirates			5	4,035
Belarus			2	2,218
Worldwide	439	376,960	69	66,125

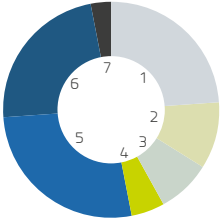
Suorce: IAEA, 24.2.2015

Electricity in Finland

In Finland, electricity consumption totalled 83.3 TWh, of which industrial consumption accounted for ca. 47%.

TOTAL ELECTRICITY CONSUMPTION IN FINLAND 2014

TOTAL 83.3 TWH



Industries 47%
1 Forest industry 24%
2 Metal industry 10%
3 Chemical industry 8%
4 Other industries 5%

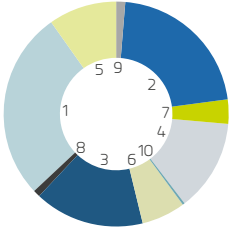
Other consumption 50%
5 Housing and agriculture 27%
6 Services and construction 23%

7 Losses 3%

Together with renewable energy sources, such as hydropower, wood and wind, nuclear energy is a production mode that does not cause any greenhousegas emissions that promote climate change.

ELECTRICITY SUPPLY BY ENERGY SOURCE 2014

TOTAL 83.3 TWH



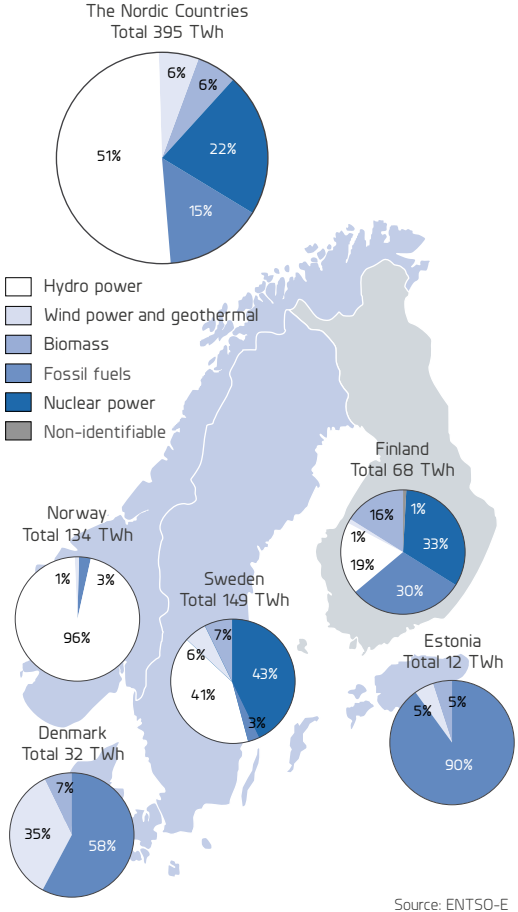
1 Nuclear energy 27.2%
2 Net import 21.6%
3 Hydropower 15.8%
4 Biomass 13.2%
5 Coal 9.8%
6 Natural gas 6.3%
7 Peat 3.5%
8 Waste 1.0%
9 Wind 1.3%
10 Oil 0.3%

Source: Finnish Energy Industries

THE NATIONAL 400 KV GRID OF FINLAND

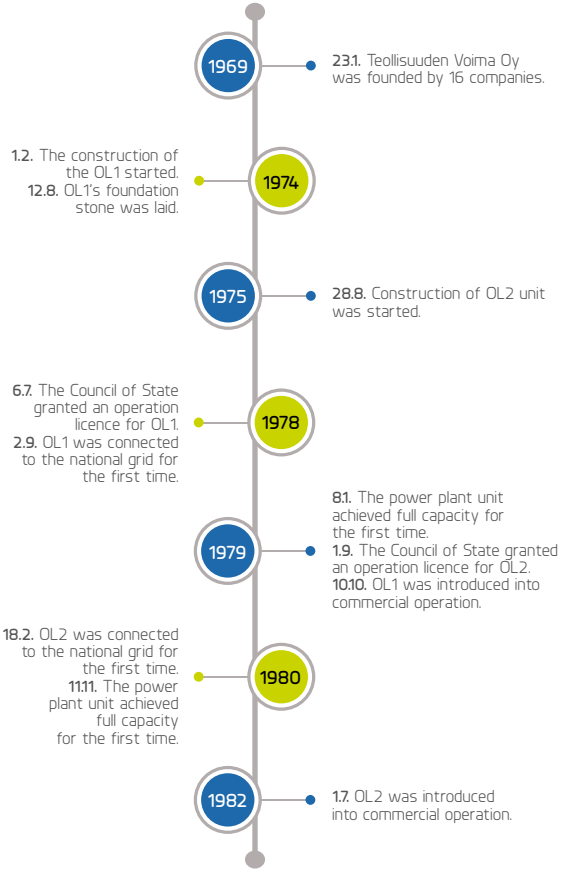
The Finnish electricity system consists of power plants, national and regional distribution grids as well as electricity consumers. Olkiluoto nuclear power plant is connected with the national grid of Fingrid Oyj by six 400 kV power lines and two 110 kV lines. The 110 kV lines go to the power station in Rauma and the 400 kV lines to Ulvila (2 lines), Huittinen, Kangasala and Rauma (2 lines).

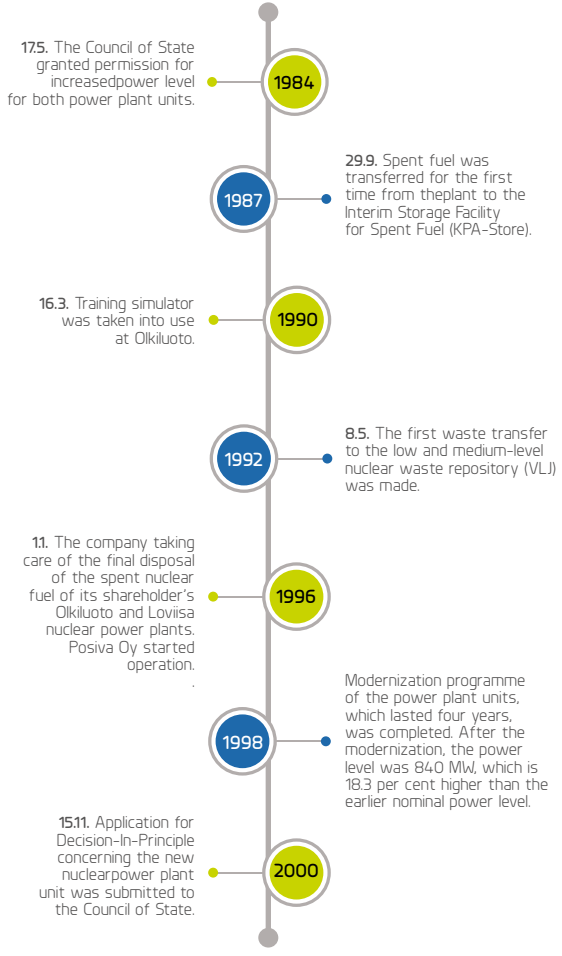
ELECTRICITY GENERATION IN THE NORDIC COUNTRIES 2013

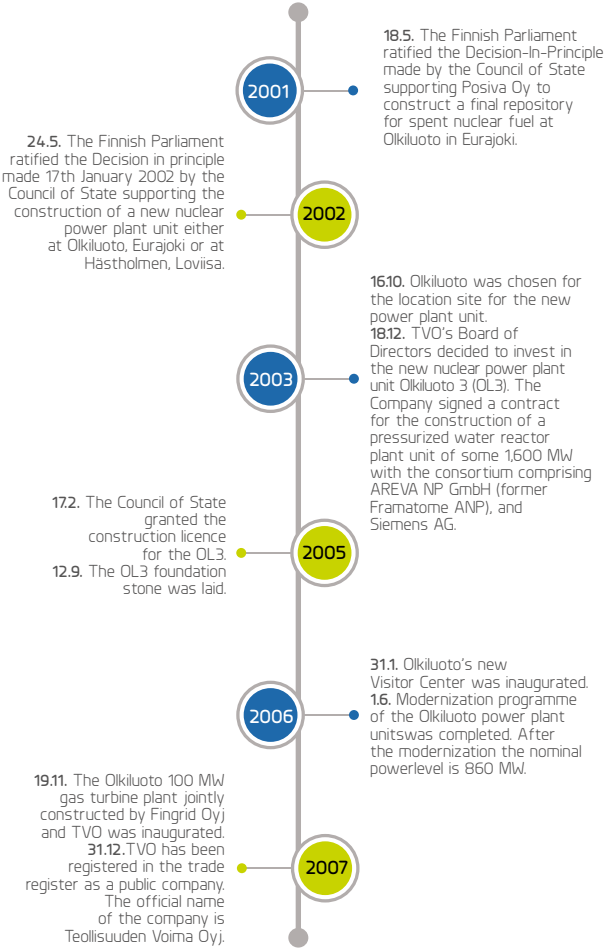


Source: ENTSO-E

The history of TVO






2001
18.5. The Finnish Parliament ratified the Decision-In-Principle made by the Council of State supporting Posiva Oy to construct a final repository for spent nuclear fuel at Olkiluoto in Eurajoki.
2002
24.5. The Finnish Parliament ratified the Decision in principle made 17th January 2002 by the Council of State supporting the construction of a new nuclear power plant unit either at Olkiluoto, Eurajoki or at Hästholmen, Loviisa.
2003
16.10. Olkiluoto was chosen for the location site for the new power plant unit.
18.12. TVO's Board of Directors decided to invest in the new nuclear power plant unit Olkiluoto 3 (OL3). The Company signed a contract for the construction of a pressurized water reactor plant unit of some 1,600 MW with the consortium comprising AREVA NP GmbH (former Framatome ANP), and Siemens AG.
2005
17.2. The Council of State granted the construction licence for the OL3.
12.9. The OL3 foundation stone was laid.
2006
31.1. Olkiluoto's new Visitor Center was inaugurated.
1.6. Modernization programme of the Olkiluoto power plant unitswas completed. After the modernization the nominal powerlevel is 860 MW.
2007
19.11. The Olkiluoto 100 MW gas turbine plant jointly constructed by Fingrid Oyj and TVO was inaugurated.
31.12. TVO has been registered in the trade register as a public company. The official name of the company is Teollisuuden Voima Oyj.
2008
25.4. TVO filed to the Government an application for a Decision-In-Principle to construct a fourth nuclear power plant unit (OL4) at Olkiluoto. Simultaneously Posiva Oy filed anapplicati on for a Decision-In-Principle to expand itsfinal repository for spent fuel of OL4.
2010
1.7. The Finnish Parliament ratified the Government's favourable Decision-In-Principle on the construction of the new Olkiluoto 4 (OL4) plant unit in Olkiluoto, Eurajoki.
2011
The largest ever annual maintenance was completed in Olkiluoto. As a result of the upgrades, the rated net electric output of the plant units was increased to 880 MW.
2012
20.4. The combined production volume for OL1 and OL2 exceeded 400 TWh.
28.12. Posiva Oy submitted construction licence application for final repository to the Government.
2013
2.9. 35 years since the first synchronization of OL1 (2.9.1978)
2014
31.12. For the second year in a row, the production result of 14.76 TWh (billion kilowatt-hours of electricity) was the best ever in the history of the power plant.

Glossary

BWR
Boiling Water Reactor
A light-water reactor in which water used as the coolant boils as it passes through the reactor core. The steam generated rotates the turbine. OL1 and OL2 are equipped with boiling water reactors.

LOAD FACTOR
The load factor is the energy produced in a year by a power plant as a percentage of the energy it would have produced had it been operating at full capacity for the entire year.

FISSION
The splitting of one heavy atomic nucleus into two or more intermediate-mass nuclei, releasing neutrons and a considerable amount of energy in the process.

GIGAWATT, GW
A unit of power. One gigawatt equals to one million kilowatts.

IAEA
International Atomic Energy Agency

MEGAWATT, MW
A unit of power. One megawatt equals to 1,000 kilowatts alias 1,000,000 watts.

PWR
Pressurized Water Reactor
A light-water reactor with such a high reactor pressure that water used as the coolant does not boil in the reactor. The hot water is conducted from the reactor to a steam generator in which the water in the secondary circuit evaporates and the steam is led to rotate the turbine. The type of the OL3 unit is known as a EPR (European Pressurized Water Reactor).

STUK
Finnish Radiation and Nuclear Safety Authority. STUK is the authority that regulates the Finnish nuclear energy sector.

TERAWATT, TW
A unit of power. One terawatt equals to one billion kilowatts.

TERAWATT-HOUR, TWH
A unit of energy. One terawatthour equals to one billion kilowatt hours.

WANO
World Association of Nuclear Operators

WNA
World Nuclear Association

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