

# TEOLLISUUDEN VOIMA OYJ CREDIT INVESTOR PRESENTATION 30 SEPTEMBER 2024



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# AGENDA

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**TVO IN BRIEF**

**OPERATING MODEL OF TVO**

**SUSTAINABILITY**

**ELECTRICITY MARKET IN FINLAND**

**OL1 AND OL2**

**OL3 EPR PROJECT**

**NUCLEAR WASTE MANAGEMENT**

**FINANCING UPDATE**



# TVO IN BRIEF

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# TVO – AN EXPERIENCED PIONEER

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- Non-listed public limited liability company producing electricity to its shareholders at cost price (the “Mankala principle”)
- TVO operates three out of Finland’s five nuclear power plant units on the Olkiluoto island in southwest Finland (“OL1-3”). The newest and largest unit, OL3, started its commercial operations in May 2023. 
- Annual production 24.6 TWh (OL1/OL2 14.3 TWh + OL3 10.4 TWh), approximately 30% of the total electricity consumption (80 TWh\*) in Finland (2023)
- Annual turnover EUR 876 million (2023)
- Approximately 1 000 employees
- Ratings:
  - BBB- (stable outlook) by Fitch
  - Baa3 (stable outlook) by Moody’s
  - BBB- (stable outlook) by S&P
- ESG Risk Rating of 20.5 by Sustainalytics, the low-end of the Medium risk category
- Green Bond Framework established in June 2023

\*) Finnish Energy, Energy Year 2023 (Jan 2024)  
Source: TVO, TVO annual report 2023



# OVERVIEW OF UNITS



## **Olkiluoto 1 (OL1) and Olkiluoto 2 (OL2)**

- OL1 890 MW, OL2 890 MW (BWR\*), Westinghouse Atom
- Commercial operation since 1979 and 1982
- Modernisation and upgrade in several stages from 660 MW to 890 MW

## **Olkiluoto 3 (OL3)**

- 1,570 MW (PWR\*), AREVA-Siemens Consortium
- Provisional Takeover 18 April 2023
- Commercial operation of the plant started on 1 May 2023.

## **Posiva Oy (Subsidiary, 60%)**

- Responsible for the final disposal of spent nuclear fuel produced by its shareholders, TVO and Fortum (40% ownership through its subsidiary Fortum Power and Heat Oy)

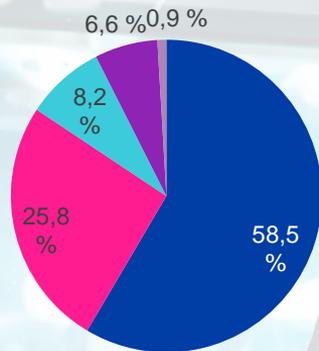
\*)  
BWR: Boiling water reactor  
PWR: Pressurized water reactor



# TVO OWNERSHIP STRUCTURE



Dec 31, 2023



- Pohjolan Voima Oyj (PVO), 58.5%
- Fortum Power and Heat Oy, 25.8%
- Oy Mankala Ab, 8.2%
- EPV Energia Oy, 6.6%
- Kemira Oy, 0.9%

## Main shareholders of PVO (Jun 30, 2023):

- UPM Energy Oy\*: 48.04%
  - Stora Enso Oyj (Baa3, NR, BBB-): 15.71%
- } forestry companies

## Shareholder of Fortum Power and Heat Oy:

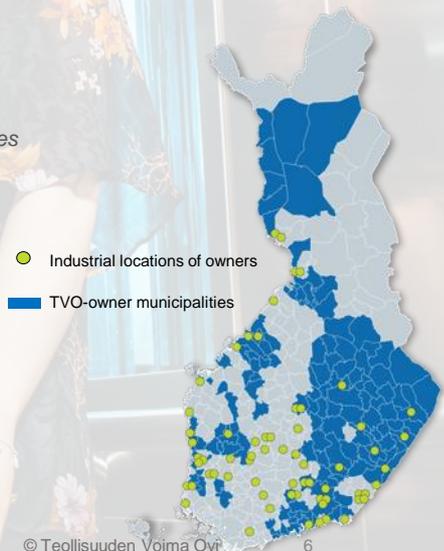
- Fortum Oy (NR, BBB, BBB): 100%

TVO's shareholders are Finnish industrial and energy companies - the latter are owned by 131 municipalities

energy companies

chemicals company

Underlying shareholders by sector	
Industrial companies	47%
Municipalities	27%
Fortum	26%



\*) UPM Energy Oy is the subsidiary of UPM-Kymmene Oy, rated Baa1 by Moody's and BBB+ by S&P

# TVO KEY INDICATORS 2019–2023

	2023	2022	2021	2020	2019
<b>Electricity delivered (GWh)</b>					
OL1/OL2	14 273	14 440	14 414	14 563	14 729
OL3	10 361	1 876			
Total	24 634	16 316			
<b>Load factor (%)</b>					
OL1	95.4	89.1	95.1	93.7	96.9
OL2	88.3	96.8	90.4	93.3	92.7
Investments (M€)	449	339	220	56 (***)	369
OL1/OL2 combined production cost (€/MWh) (*)	23	24	19	17	15
Average market price (€/MWh) (**)	57.4	153.5	72.2	28.0	44.0
<b>OL1/OL2 value creation for shareholders (M€) (****)</b>	<b>491</b>	<b>1 870</b>	<b>767</b>	<b>160</b>	<b>427</b>



\*) Including electricity transmission costs, rounded to nearest

Integer. Source: TVO annual reports

\*\*\*) Annual Nord Pool weighted average of Finnish base load daily prices

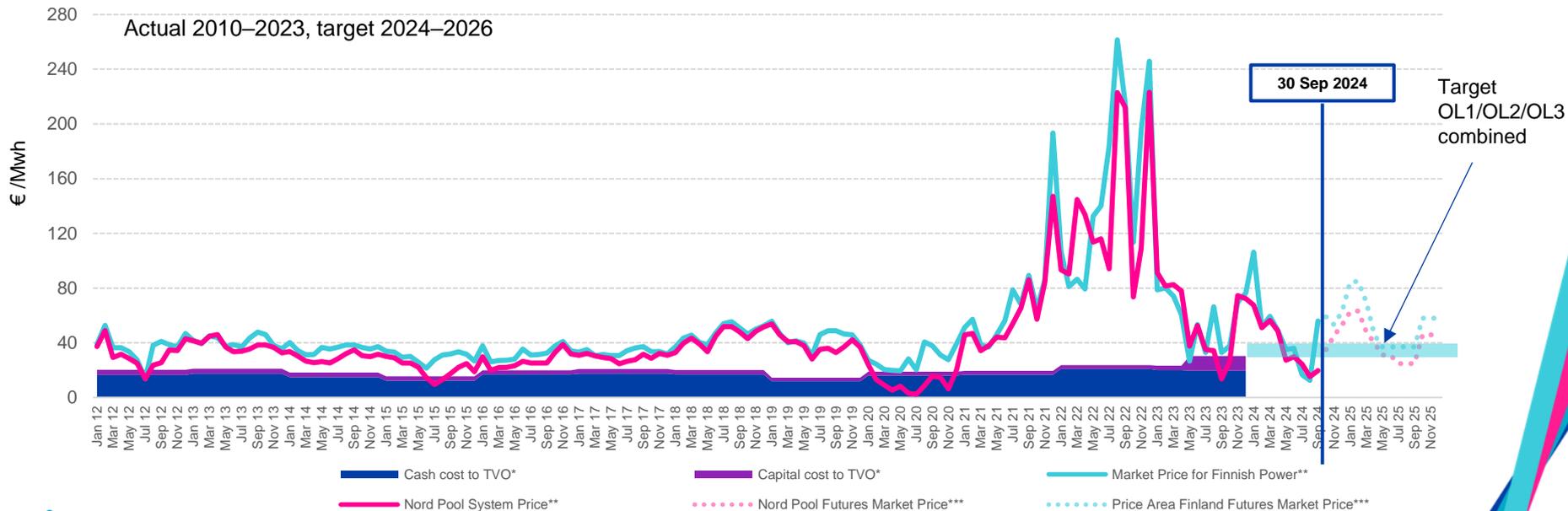
\*\*\*\*) Net of OL3 capex and GSA penalties

\*\*\*\*\*) Calculated simply as (average market price - OL1/OL2 combined production cost) \* OL1/OL2 electricity delivered. Actual shareholder position may vary from this.

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# TVO CREATES VALUE TO OWNERS BY PRODUCING STABLE AND LOW-COST POWER

TVO's historical cost of nuclear power has been stable and below the market price



\*) Source: TVO annual reports

\*\*) Source: [www.nordpoolspot.com](http://www.nordpoolspot.com)

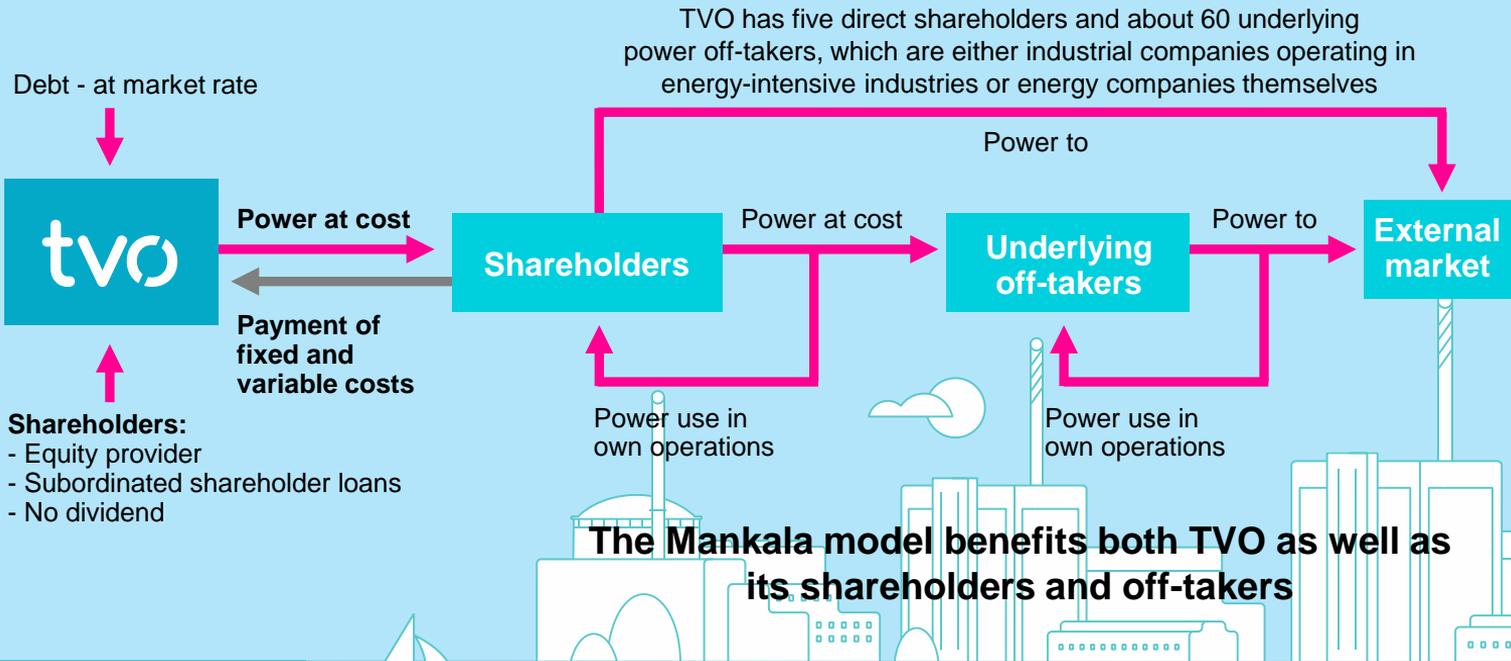
\*\*\*) Source: [www.nasdaqomx.com](http://www.nasdaqomx.com), 2 Oct 2024



# OPERATING MODEL OF TVO

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# TVO'S OPERATING MODEL



- Shareholders:**
- Equity provider
  - Subordinated shareholder loans
  - No dividend

- The Mankala principle is a peculiarity of Finnish energy production stemming back to the 1960s

- It entails an operation where several companies jointly establish a not-for-profit limited company, operating at cost-price, for a common purpose

- The model enables its owners to undertake substantial investments, such as the construction of a nuclear power plant

**The Mankala model benefits both TVO as well as its shareholders and off-takers**

Approximately one half of all electricity produced in Finland is produced under the Mankala principle

# TVO'S OPERATING MODEL



- TVO is run according to **the Mankala Principle**, which is a unique model widely applied in the Finnish energy industry, whereby the electricity produced is sold to the owners at cost-price
  - Different share classes give access to the output of TVO's different assets proportionally to a shareholder's stake
  - TVO invoices fixed costs one month in advance, minimising its liquidity and working capital needs, variable costs are invoiced monthly based on electricity consumed by each shareholder
  - Due to the not-for-profit operating model, traditional leverage or coverage ratios are of less relevance for TVO
- Shareholders are **severally responsible** for the annual costs of the respective asset as **defined in the articles of association** of TVO
  - TVO is a limited liability company, and its shareholders have no personal liability for the indebtedness of TVO
  - The shareholders are not liable for any other costs than those defined in the articles of association, unless otherwise agreed in writing
  - Only the company has the sole right to call upon the responsibility of the shareholders
- In the event that a shareholder does not make its payments, TVO has the right to sell the non-paying shareholder's electricity to other shareholders or to third parties at market price
- Existing shareholders have a right of first refusal to buy shares that may be offered for sale



# SUSTAINABILITY

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# SUSTAINABILITY ROADMAP 2030

- The TVO Group develops sustainability in its operations with [the Sustainability Roadmap 2030](#), which sets targets and KPIs for the Group's material sustainability topics. The targets also support the UN SDGs.
- Since February 2024, TVO is committed to UN Global Compact corporate sustainability initiative



## ENVIRONMENT & CLIMATE

- Climate-friendly electricity production
- Responsible nuclear waste management
- Emissions
- Biodiversity
- Circular economy
- Energy efficiency



## HIGH-CLASS SAFETY CULTURE

- Safety culture
- Occupational health & safety
- Radiation protection
- Plant safety



## ADDED ECONOMIC VALUE

- Customer-oriented & competitive activities
- Nuclear power as a desired production method
- Funds ready for final disposal



## WELL-BEING OF EMPLOYEES & STRONG NETWORKS

- Occupational health
- High-class expertise
- Professional development
- Employer role
- Responsible supply chain
- Stakeholder cooperation



## TRAILBLAZER IN THE NUCLEAR INDUSTRY & FINAL DISPOSAL

- Research & development
- Reliable use of the plant units
- Increasing final disposal expertise



# FOCUS ON CLIMATE & ENVIRONMENT

- The TVO Group's most significant sustainability impacts relate to climate-friendly electricity production, responsible final disposal of spent nuclear fuel, and biodiversity.



- ✓ **Climate-friendly electricity production:** The emissions generated by nuclear power are low: throughout the lifecycle, the emissions remain at the same level as for renewable sources of energy.
- ✓ **Final disposal of spent nuclear fuel:** TVO's subsidiary, Posiva, is the first in the world to start the final disposal of spent nuclear fuel in the mid-2020s.
- ✓ **Impact on biodiversity:** The concentration of energy production to a small geographic area minimises the environmental impact and allows the preservation of other areas in their natural state.

# EU TAXONOMY

- On 6 July 2022, the European Parliament accepted nuclear power and natural gas to be included in the EU Taxonomy on sustainable finance in accordance with the European Commission's proposal
- The inclusion of nuclear power in the EU Taxonomy means that it will be classified as an environmentally sustainable investment
- The proposal entered into effect as of 1 January 2023

## TVO's EU Taxonomy Key Performance Indicators 2023\*

	Total EUR 1,000	Taxonomy- aligned %	Non- taxonomy eligible %
Turnover	876,204	99,6%	0,4%
Operating expenditure	177,234	100%	0%
Capital expenditure	460,614	100%	0%

# TVO'S GREEN BOND FRAMEWORK ESTABLISHED IN JUNE 2023

## Use of Proceeds: Eligible green projects under the Framework

Green project category and EU Taxonomy activities*	Eligibility criteria	SDG contribution
<p><b>Nuclear power generation</b></p> <p>4.27 Construction and safe operation of new nuclear power plants, for the generation of electricity or heat, including for hydrogen production, using best-available technologies</p> <p>4.28 Electricity generation from nuclear energy in existing installations</p>	<p><b>Investments in new build projects and existing works including:</b></p> <ul style="list-style-type: none"> <li>• Projects authorized no later than 2045 by the competent authorities for the construction and safe operation of nuclear with Best Available Technologies.</li> <li>• Projects authorized no later than 2040 by the competent authorities to extend the operating life of existing reactors</li> </ul>	   

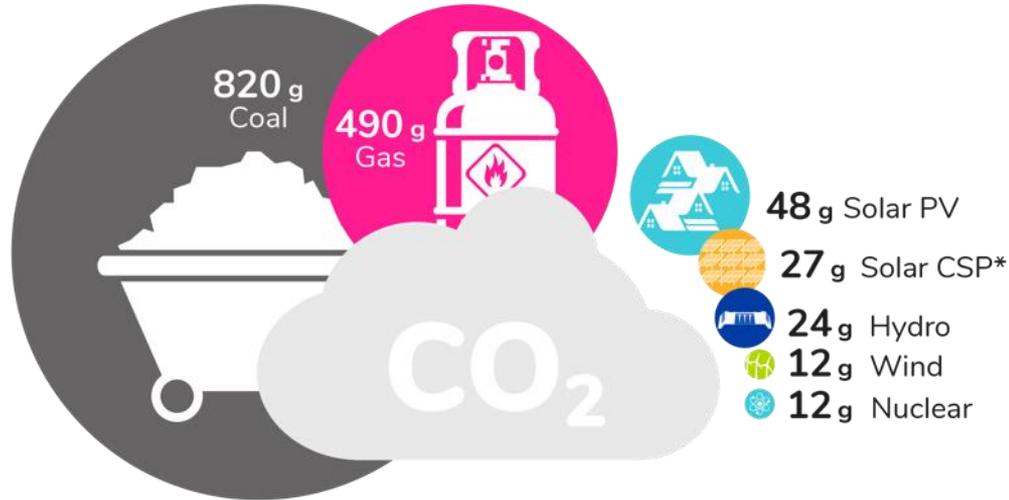
## Second Party Opinion from ISS Corporate Solutions (ICS):

- ✓ **First EU Taxonomy aligned framework out of Finland:** ICS finds TVO's nuclear power generation project category including EU taxonomy economic activities 4.27 Construction and safe operation of new nuclear power plants, for the generation of electricity or heat, including for hydrogen production, using best-available technologies, and 4.28 Electricity generation from nuclear energy in existing installations to be aligned with the taxonomy
- ✓ **Aligned with the ICMA Green Bond Principles (GBP):** ICS also concludes that TVO has defined a formal concept for its Green Bonds regarding Use of Proceeds, Project Evaluation and Selection Process, Management of Proceeds and Reporting in line with the ICMA GBPs

*"The key sustainability objectives and the rationale for issuing Green Bonds are clearly described by the Issuer. The project category financed is in line with the sustainability objectives of the Issuer"*

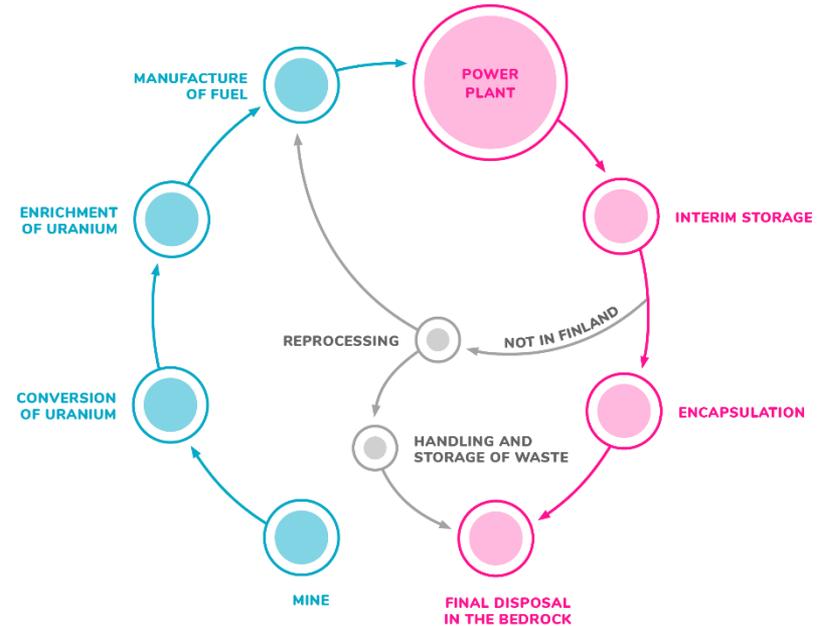
# CO<sub>2</sub> EMISSIONS OF DIFFERENT PRODUCTION MODES DURING THEIR LIFECYCLE

Amount of carbon dioxide produced per 1 kWh of energy underlines the sustainability advantages of nuclear:



# CIRCULATION OF URANIUM

- The procurement of nuclear fuel involves the purchase of raw uranium, uranium enrichment services and nuclear fuel manufacture
- TVO procures its fuel mainly through a decentralized supply chain and only receives the final product, which has been sufficiently enriched to be used as a fuel
- The procurement operations are based on long-term contracts with leading suppliers
- Most of the uranium procured by TVO stems from Australia, Canada and Kazakhstan and the fuel elements ordered by the company are constructed and assembled in Germany, Spain or Sweden





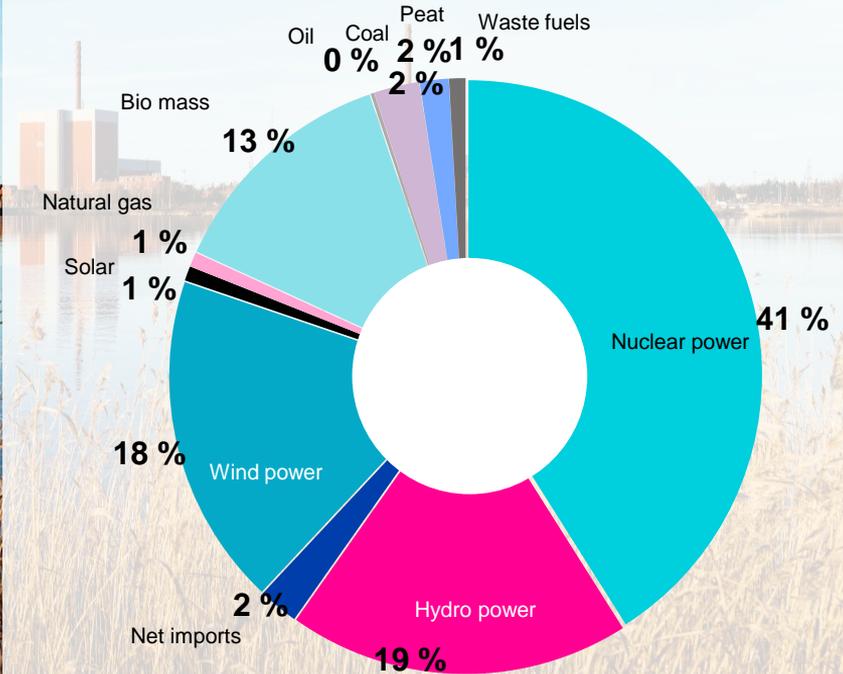
# ELECTRICITY MARKET IN FINLAND

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# ELECTRICITY SUPPLY

by energy sources 2023 (80 TWh)

Balanced sources of CO2 free production (94% of domestic production), imports mainly covered with completion of OL3 power plant unit

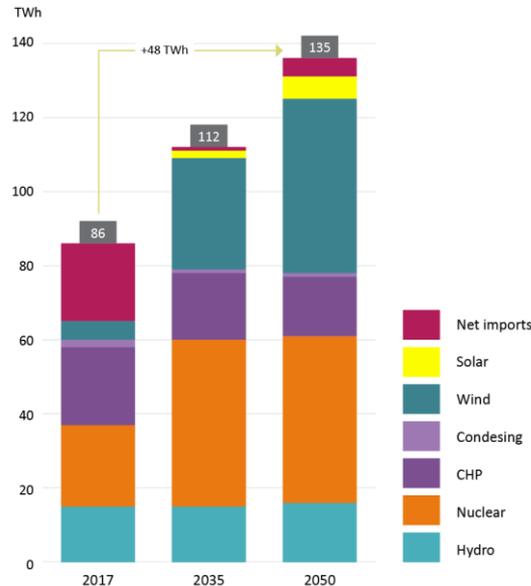


Source: Finnish Energy, Energy Year 2023 (Jan 2024), illustration TVO

# EMISSION-FREE ELECTRICITY IN FOCUS

## Scenario of strong electrification in Finland, Finnish Energy

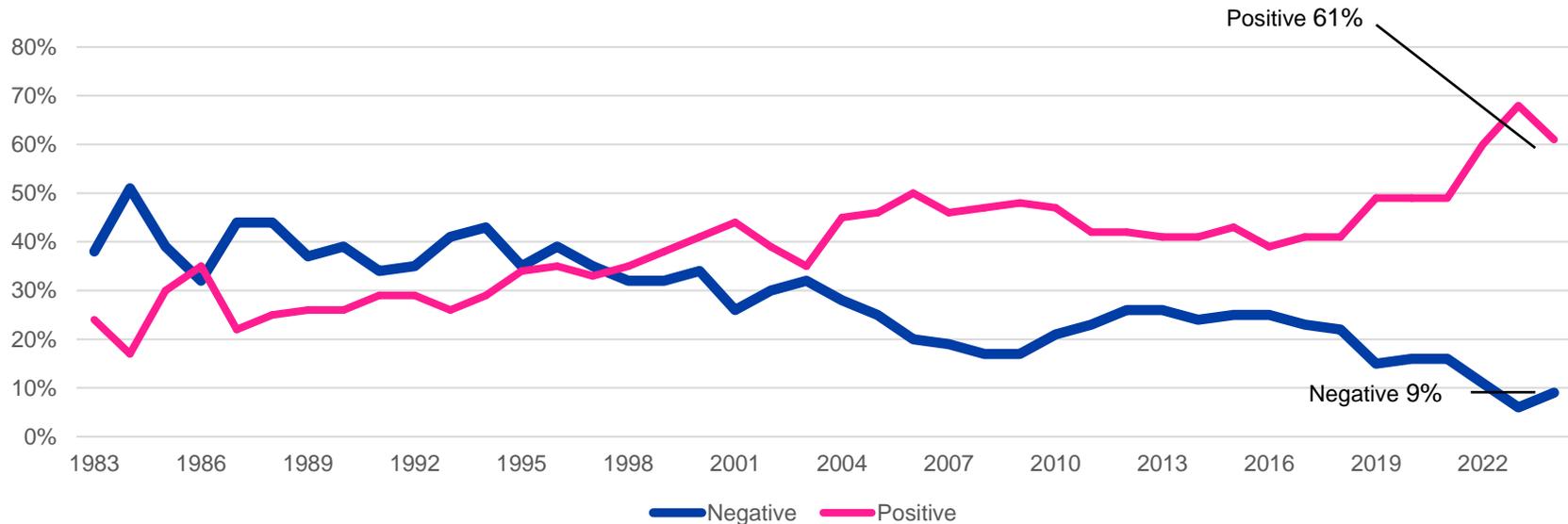
The energy sector is meeting the growing demand for electricity on market terms. Steering of emissions trading safeguards investments in cleaner electricity generation.



- The expansion and strengthening of emissions trading is the most important instrument for 2030 and beyond
- No need for instruments that overlap with emissions trading, for example, those based on national taxation
- Functioning of the electricity market must be promoted with pan-European legislation
- Public funding should be aimed at energy demonstration and pilot projects

# DEVELOPMENT OF NUCLEAR POWER ACCEPTANCE, FINLAND, 1983–2024

## Public support exists for nuclear power





# OL1 AND OL2

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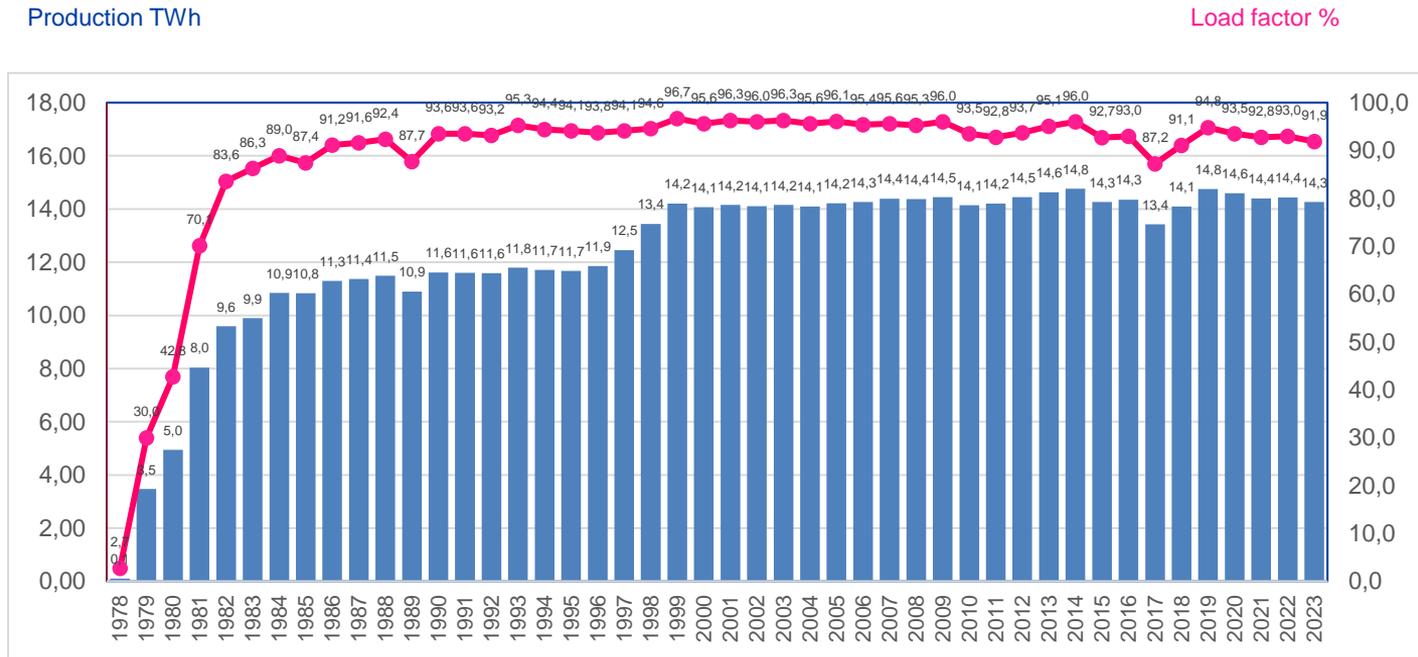
# OL1 AND OL2 PRINCIPLES FOR DEVELOPMENT

- Long-term capacity factors rank among the global top
- Annual combined production over 14 TWh
- Plant units continually maintained and developed to improve the reliability and safety of the units
- Operating license until 2038
- An environmental impact assessment procedure (EIA) has been initiated concerning the possible operating license extension and potential power uprating of OL1 and OL2 plant units.



# STRONG TRACK RECORD OF OL1 AND OL2

- OL1 and OL2 plants have regularly achieved load factors among the highest within their global peer group
- High load factors indicate stability and safety of operations
- Consistently (>20 years) high stability also spreads fixed costs over a maximum volume of output





OL3

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# OL3

- Operating licence granted March 2019
- Fuel Loading in March 2021, completed
- Start-up of the reactor in December 2021
- Start of electricity production in March 2022
- TVO submitted on 20 April to the OL3 plant supplier the Provisional Takeover Certificate
- Commercial operation of the plant started on 1 May 2023
- Operating license until 2038
- The first annual outage for OL3 was completed on May 2024



# OL3 SETTLEMENT AGREEMENT

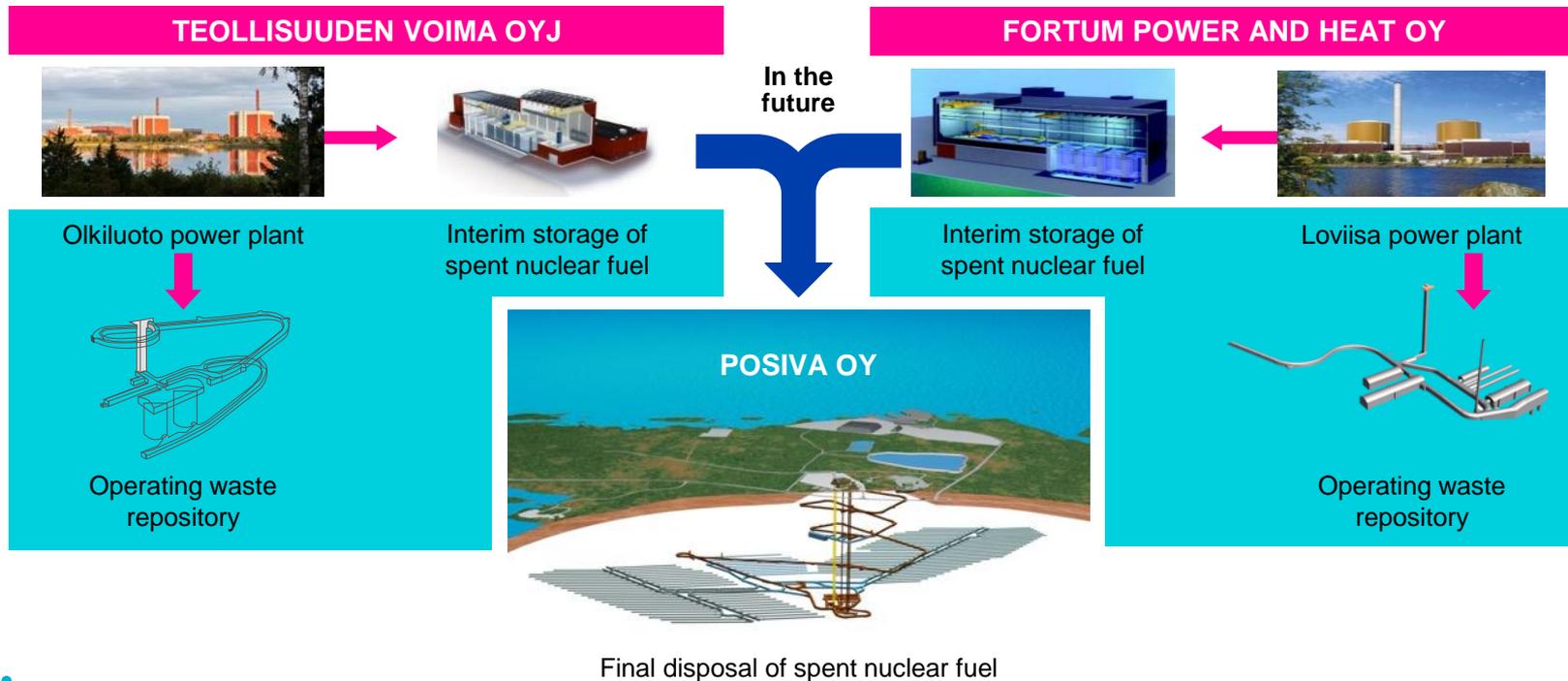
- In 2018, TVO signed a Global Settlement Agreement (GSA) with the OL3 plant supplier consortium Areva-Siemens to address the delays and cost overruns related to the OL3 project and in order to ensure its completion
- The GSA was amended in June 2021
  - The Areva companies' trust mechanism, established in the GSA, was to remain and was further replenished by Areva with approximately EUR 600 million as of the beginning of January 2021
  - The parties were to cover their own costs for the period between July 2021 and 28 February 2022
  - As the OL3 project was not completed by the end of February 2022, the **Supplier shall pay to TVO an additional delay compensation** until 30 September 2022. The amount of the additional compensation, **EUR 56.7 million, is expected to be paid in connection of final takeover in April 2025.**
  - The penalty amount of EUR 400 million agreed in the GSA 2018 was paid in two instalments: 1) ~EUR 200 million that has been executed in connection with the GSA amendment becoming effective, 2) The remaining ~EUR 200 million was paid in connection with the last OL3 project milestone payment in May 2023.
  - The **turnkey principle** of the OL3 plant contract and the joint and several liability of the supplier consortium companies **remains in full force**



# NUCLEAR WASTE MANAGEMENT

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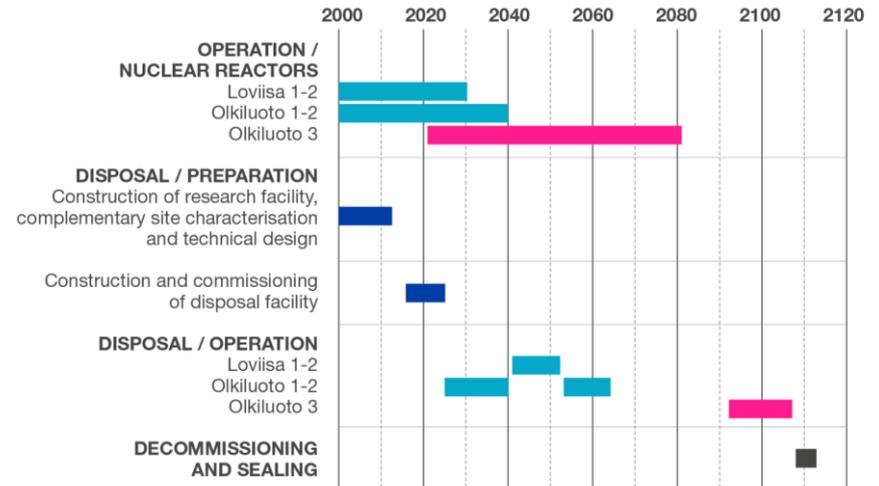
# IMPLEMENTATION OF SPENT FUEL DISPOSAL



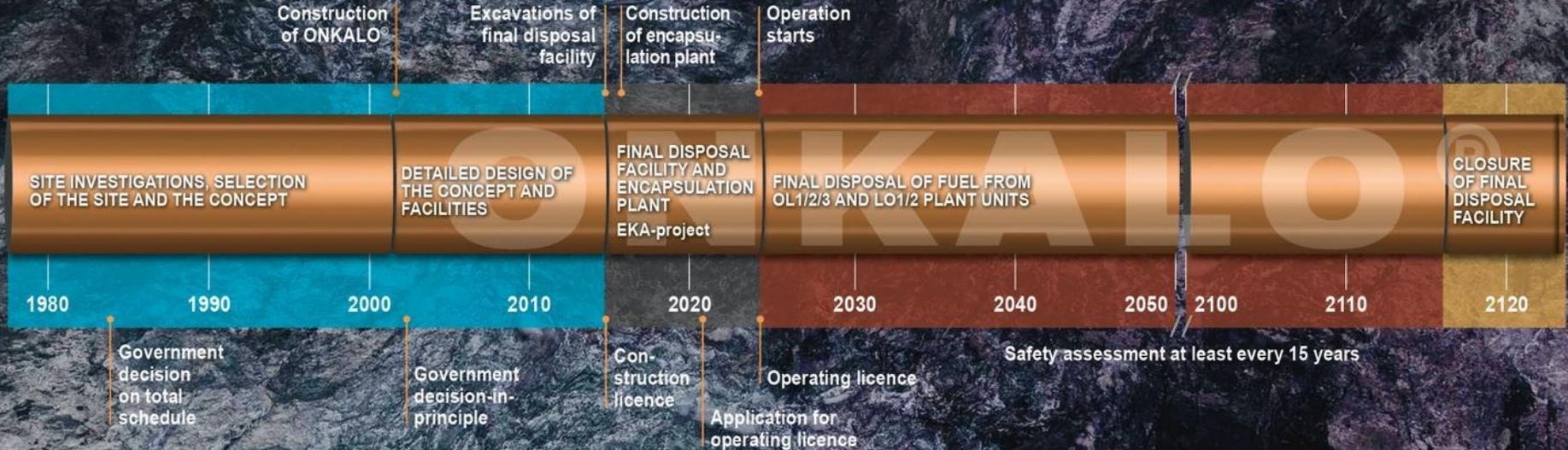
# SPENT FUEL DISPOSAL AND ITS TIMETABLE

- Unlike most other nuclear power producing countries, Finland has made a political decision about the final disposal of spent fuel and nuclear waste - Olkiluoto was selected as the site for this purpose
- Funds have been collected for future costs out of the price for nuclear electricity to the State Nuclear Waste Management Fund
- The Joint Venture Posiva was granted construction licence for the final disposal facility of spent nuclear fuel in **November 2015**
- Excavation work for the first tunnels for the final disposal facility started in **December 2016**.
- The final disposal project has advanced to the building phase of the encapsulation plant and the underground final disposal repository. The facility is expected to be taken into use in mid 2020's.
- The start of the joint functional test (practicing final disposal using non-irradiated dummy fuel elements), is expected to take place late 2024
- Posiva submitted the application for the operating licence for the encapsulation and final disposal facility to the Ministry of Economic Affairs and Employment of Finland in **December 2021**

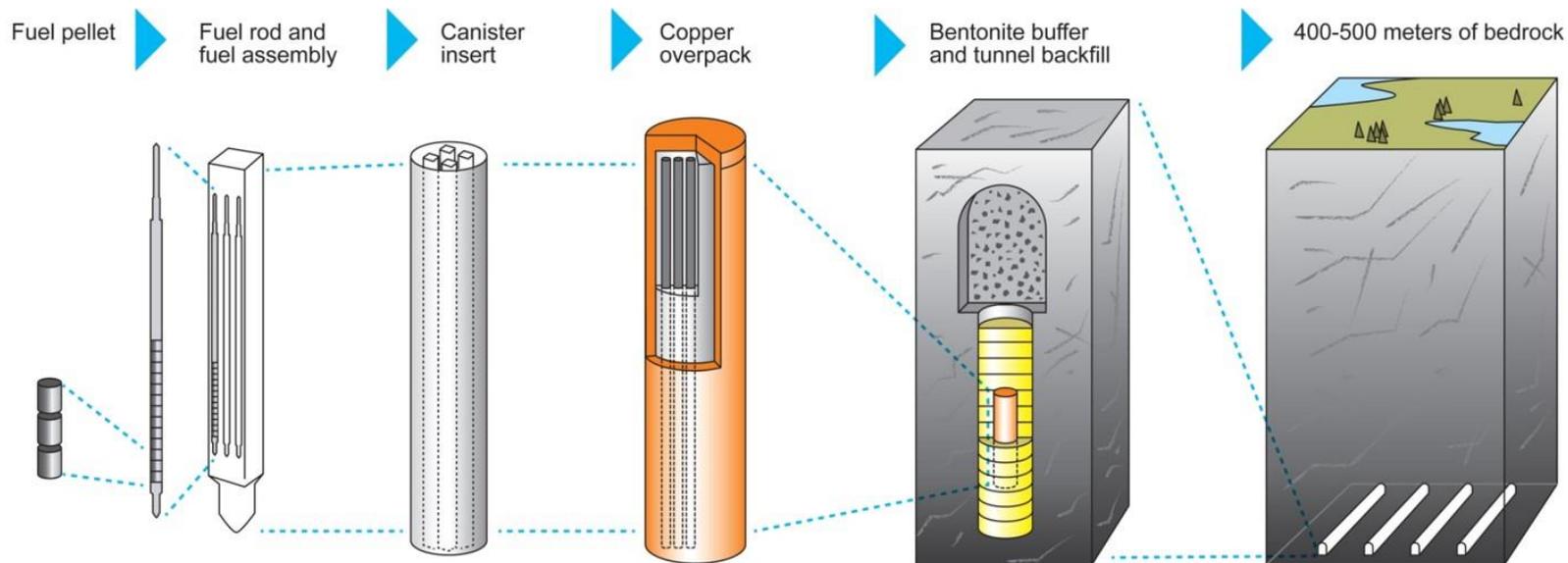
Schedule of spent fuel disposal



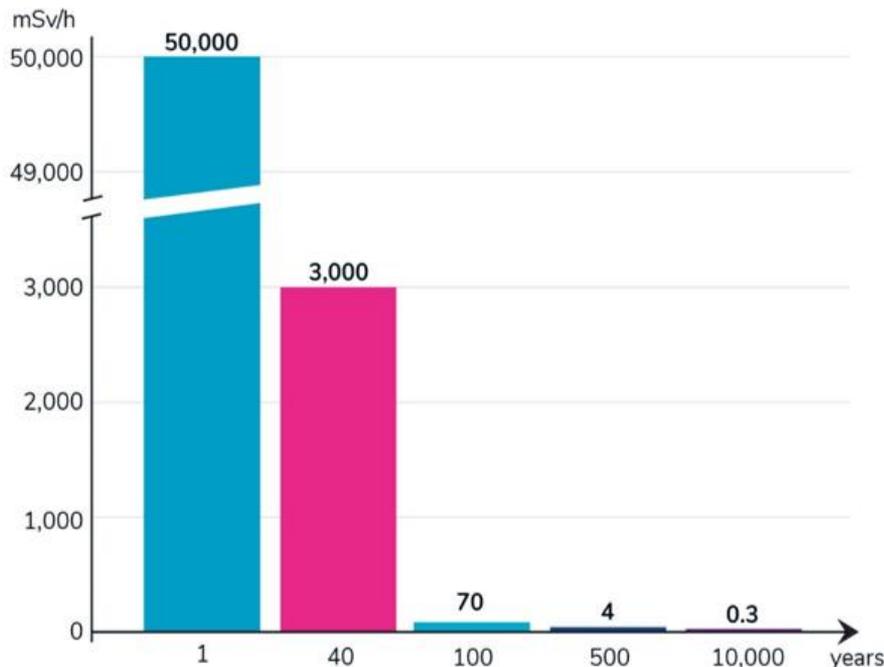
# SCHEDULE FOR FINAL DISPOSAL OF SPENT FUEL



# MULTI-BARRIER PRINCIPLE OF FINAL DISPOSAL



# RADIATION LEVEL OF SPENT NUCLEAR FUEL ON FUEL ASSEMBLY SURFACE WITHOUT PROTECTIVE CLADDING



## 1 year / 50,000 mSv/h:

The radiation level of a fuel assembly removed from the reactor decreases by almost one hundredth in one year.

## 40 years / 3,000 mSv/h:

A single exposure to 1,000 mSv/h causes radiation illness, and exposure to 8,000 mSv/h results in death.

## 100 years / 70 mSv/h:

The cumulative dose rate limit of employees carrying out radiation work is 100 mSv/h over five years.

## 500 years / 4 mSv/h:

The average radiation dose of Finnish people is about 4 mSv in one year.

## 10,000 years / 0.3 mSv/h:

The radiation dose from a mammography examination is approximately 0.3 mSv.

# ALL NECESSARY NUCLEAR WASTE MANAGEMENT IN OLKILUOTO

## Spent fuel interim storage facility

Cooling of fuel assemblies removed from the reactor building in water pools excavated in rock

## Decommissioning waste repository

Space reservation for decommissioning waste

## Operating waste repository – VLJ

Final disposal of intermediate and low-level waste

## Spent nuclear fuel repository

The underground research facility ONKALO®

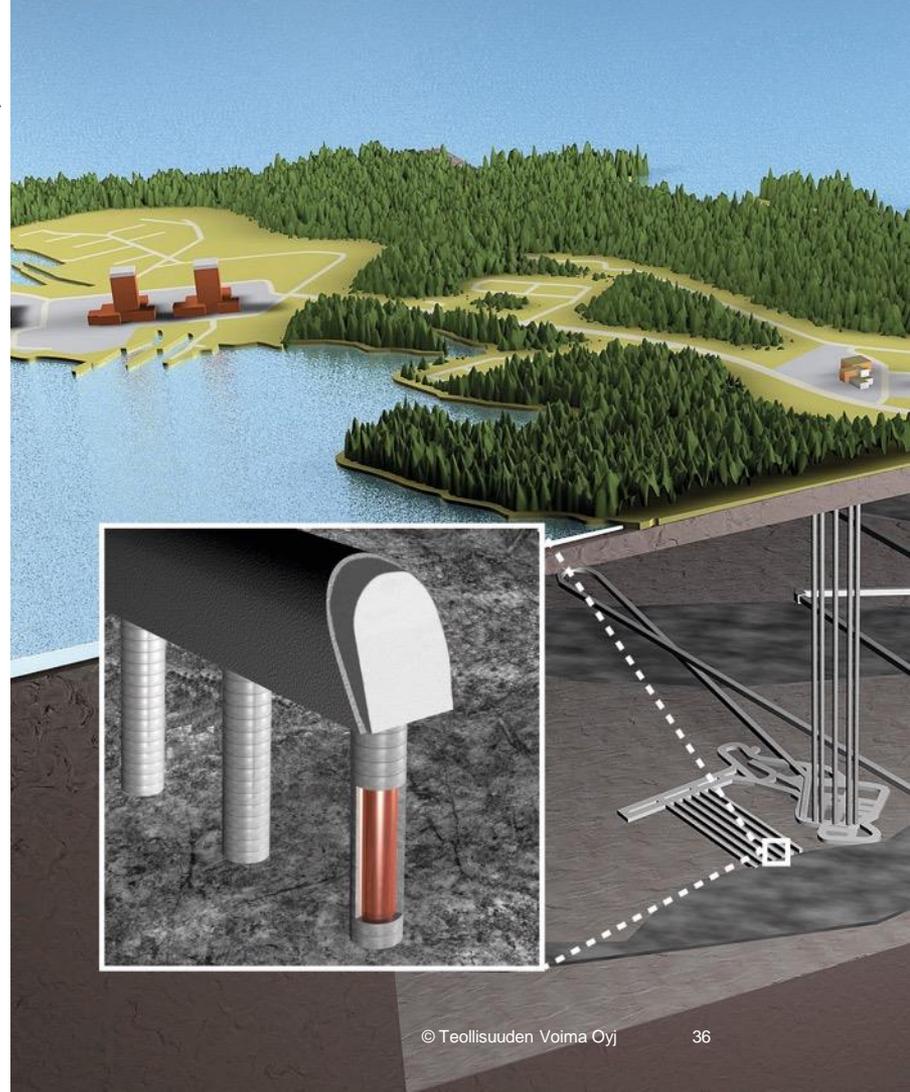
# FINANCING OF NUCLEAR WASTE MANAGEMENT

## The Finnish State Nuclear Waste Management Fund

- A guarantee fund towards all future nuclear waste management costs
- The Finnish Government annually assesses TVO's liability for future nuclear waste management costs as well as the funding target
- TVO's contribution is assessed by the Fund

## Financing of the Fund

- TVO's annual operational costs as well as its share of Posiva's costs are charged in the annual electricity cost
- The annual incremental increase of the Fund's resources is covered by earned interest of the Fund and TVO's waste management contribution to the Fund
- According to new legislation, applicable from 2022, company borrowing is limited to 60% of the fund balance and broader investments are allowed
- The Fund has started investing based on the new legislation during summer of 2022.





# FINANCIAL UPDATE

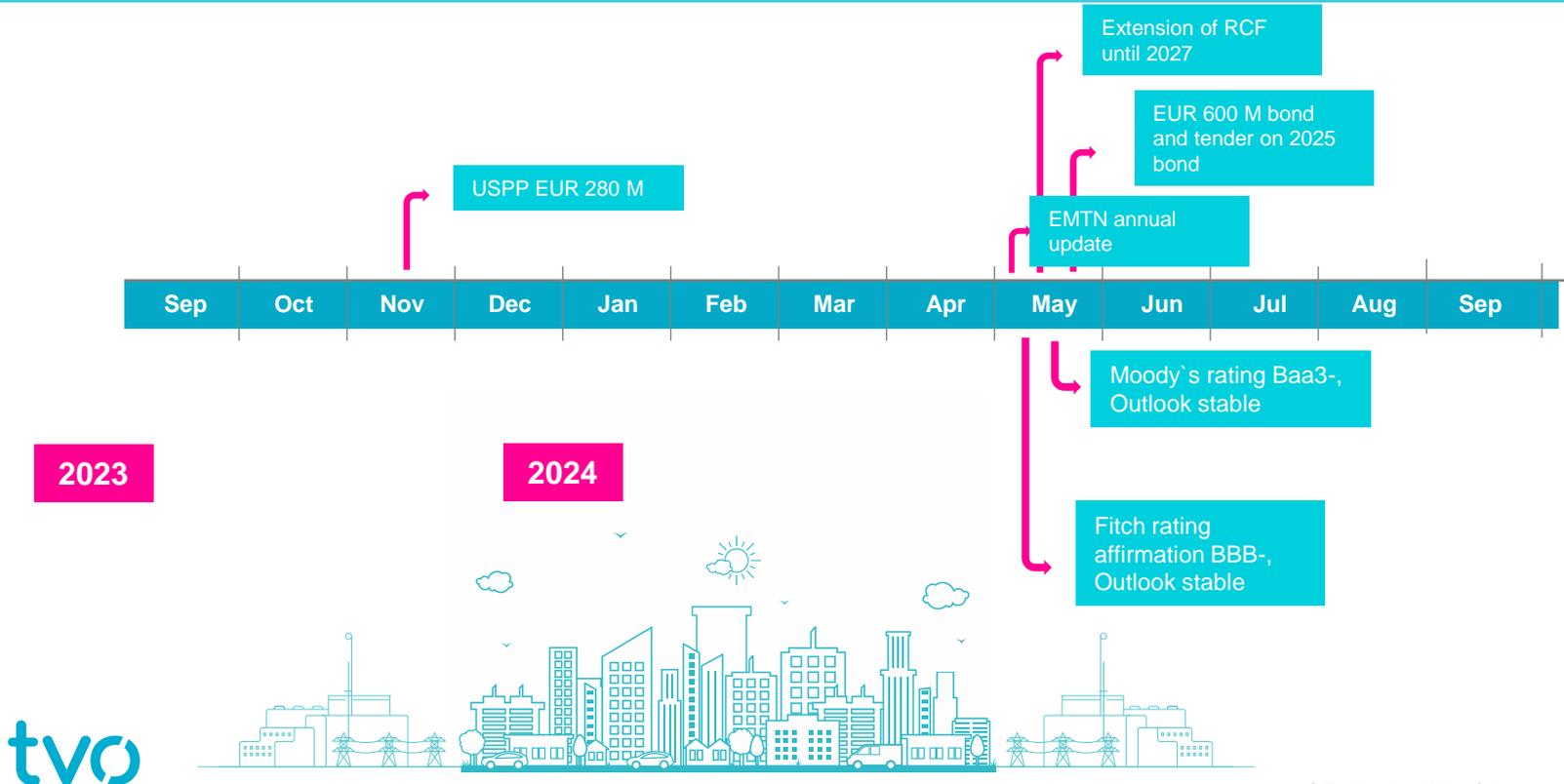
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# FINANCIAL SITUATION DEVELOPING AS PLANNED, LIQUIDITY REMAINS STRONG

- The long-term goal of the Company is to maintain an equity ratio of at least 25 percent (31.4% at the end of Q3/2024 with a covenant level at 25%)
- TVO operates in both the domestic money market and the international capital markets
  - EUR 5.0 billion Euro Medium Term Note programme (EMTN) listed on the Luxembourg Stock Exchange
  - EUR 1.0 billion domestic commercial paper programme
- Credit facilities
  - EUR 1.0 billion syndicated revolving credit facility, maturing June 2027 (from 2026 until 2027, the amount of the facility will be approximately EUR 890 million)

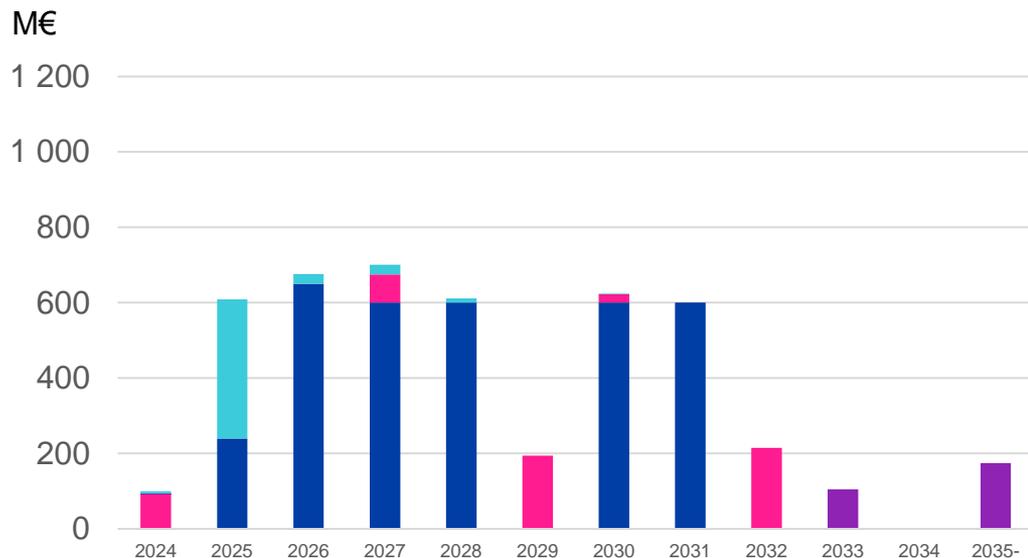
Credit ratings		
	Long-term	Outlook
<b>Moody's Investor Services</b>	Baa3	Stable
<b>S&amp;P Global Ratings</b>	BBB-	Stable
<b>Fitch Ratings</b>	BBB-	Stable
<b>Japan Credit Rating Agency</b>	A+	Stable

# TVO'S RECENT FINANCIAL ACTIVITIES



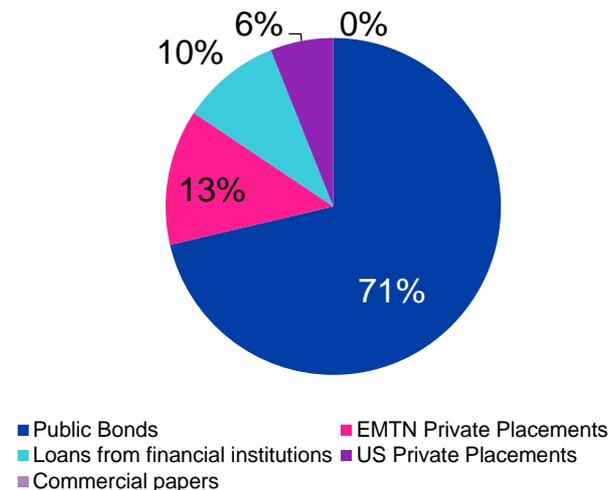
# DEBT MATURITY PROFILE, GROUP

## Well spread maturity profile and diversified funding sources

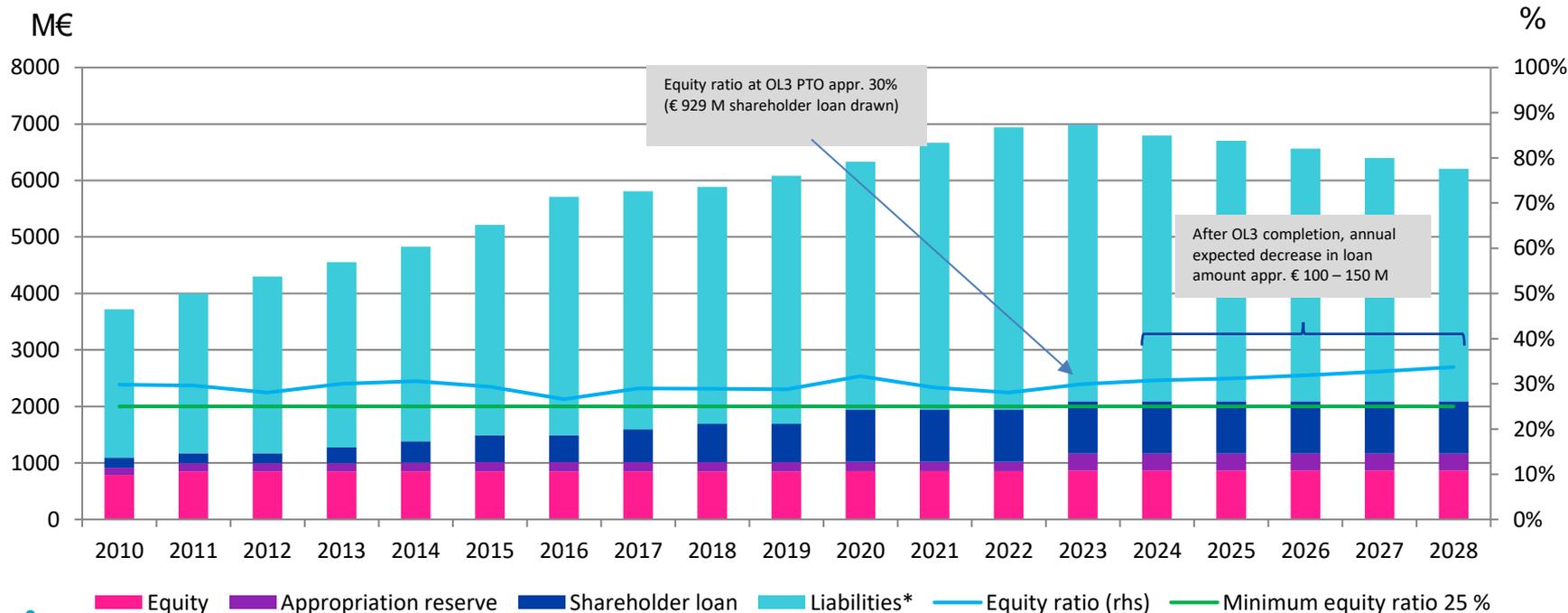


Debt structure 30.9.2024  
Loan amount € 4,611 M

In addition, the Group has subordinated shareholder loans (hybrid equity) totalling € 929 M.



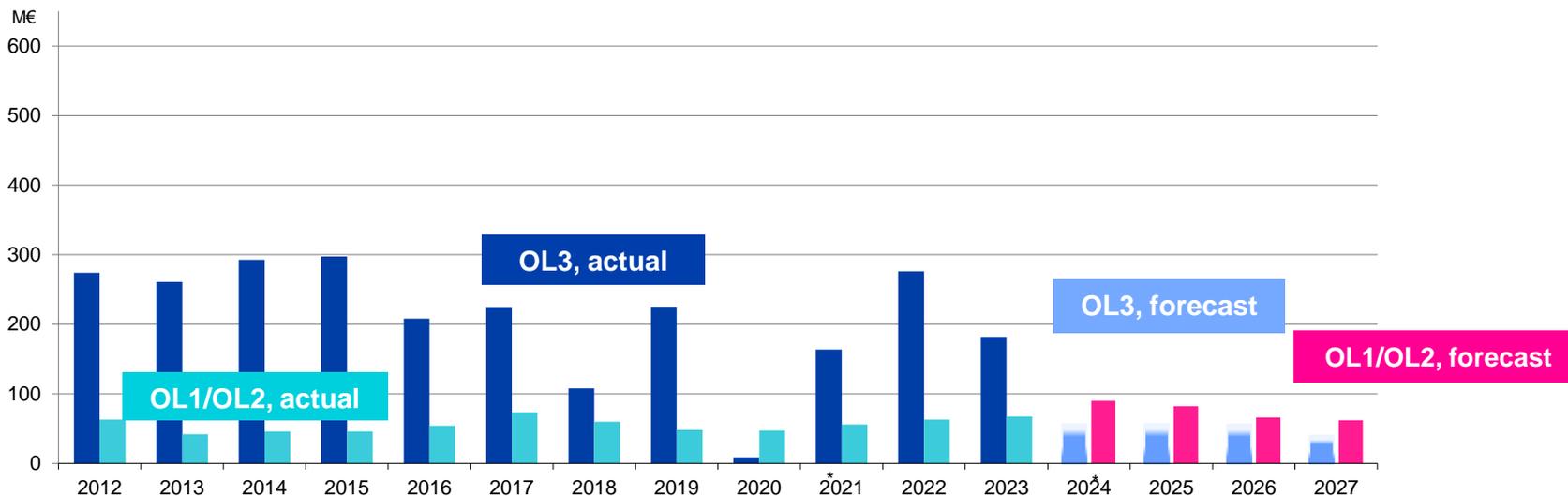
# TVO BALANCE SHEET AND EQUITY RATIO (FAS), ILLUSTRATIVE



\*) Excluding loan from the Finnish State Nuclear Waste Management Fund  
 Note: 2014 – 2023 based on audited information, 2024 onwards as company target levels

# CAPEX CASH FLOW PROGRAM OL1/OL2/OL3

Capex expected to be more moderate in the years to come upon the completion of OL3



Note: Total investment for TVO in the OL3 project was approximately EUR 5.8 billion. EUR 250.0 million of nuclear fuel originally included in the plant investment was transferred to operating-time fuel (inventories) when the OL3 plant unit entered commercial operation.

\*) Years 2020 and 2023 OL3 capex cash flow including GSA compensations.

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