Reconciling energy generation with water policy and environmental objectives, cross-border flow regulation with information exchange

International experience and good practice

Minna Hanski / Senior expert hydropower environment / Fortum

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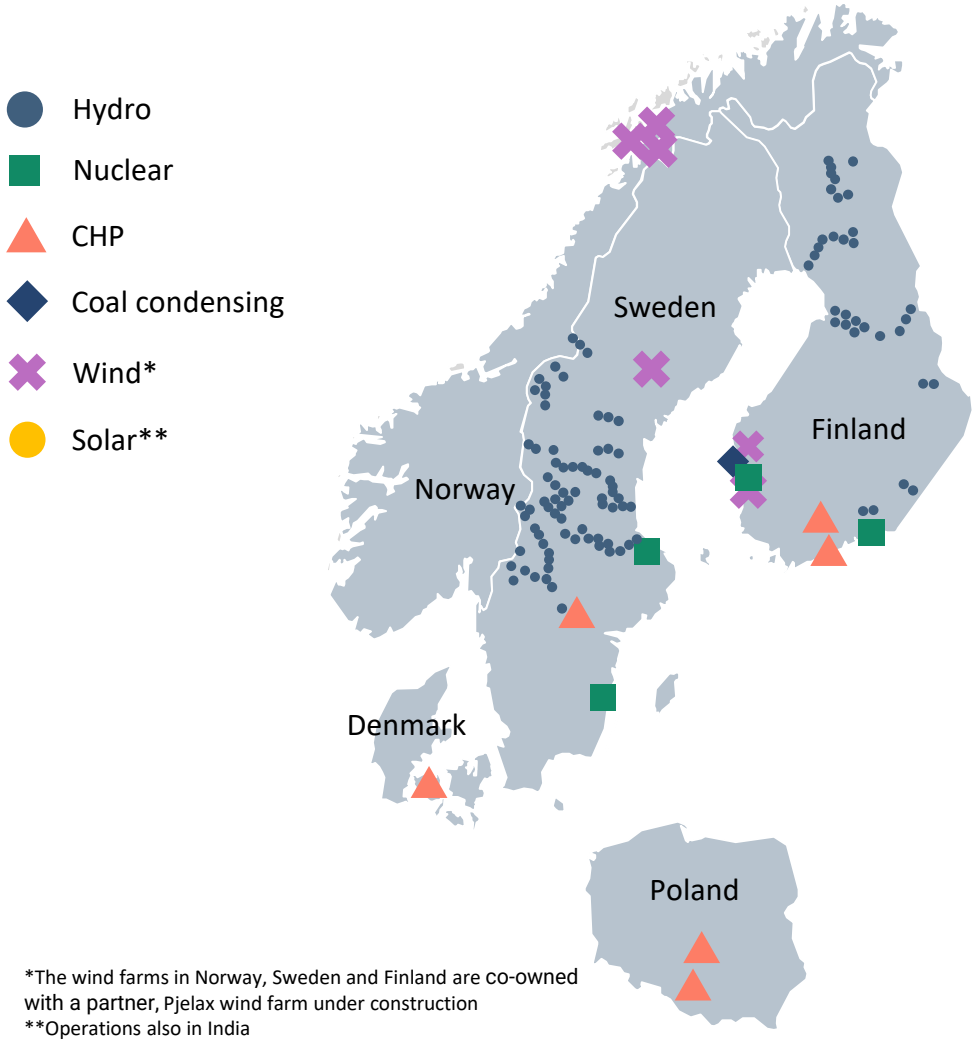
We are one of the cleanest power generators in Europe – with strong Nordic focus



*The wind farms in Norway, Sweden and Finland are co-owned with a partner, Pjelax wind farm under construction
**Operations also in India

Hydropower:

124 Hydropower plants
4,653 MW of power capacity
19.1 TWh of electricity produced
43% share of Fortum's power generation

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Voluntary and mandatory measures in hydropower

- Voluntary measures
  - Local acceptability
  - Company’s climate and biodiversity targets
  - Customer needs
- Mandatory measures
  - Hydropower permits and obligations
  - EU regulation, e.g. Water Framework Directive and Nature Directives
  - Coming: Nature Restoration Regulation

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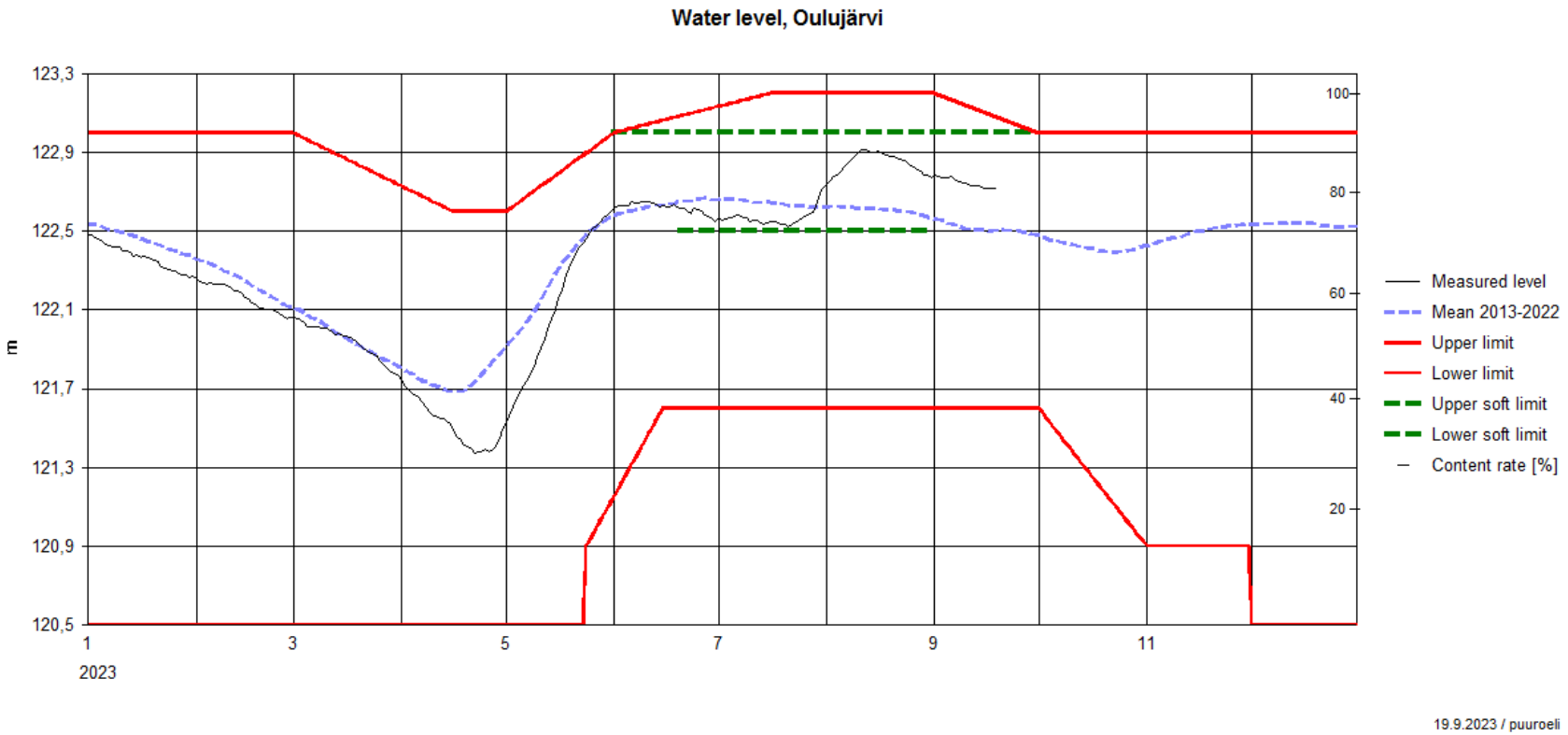
Local acceptability - recreational limits of lake Oulu regulation

- Regulation limits in permits often more flexible than limits agreed with the local people, municipalities and stekeholders.
- Case Olujärvi: ”soft limits” due to recreational needs during the summer



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Water Framework Directive Implementation

- Rivers with hydropower plants designated usually as heavily modified water bodies
- Target: good ecological potential
- Identified measures listed in River Basin Management Plans / Programmes of Measures
- E.g. upstream and downstream migration of fish, ecological flows, habitat restoration

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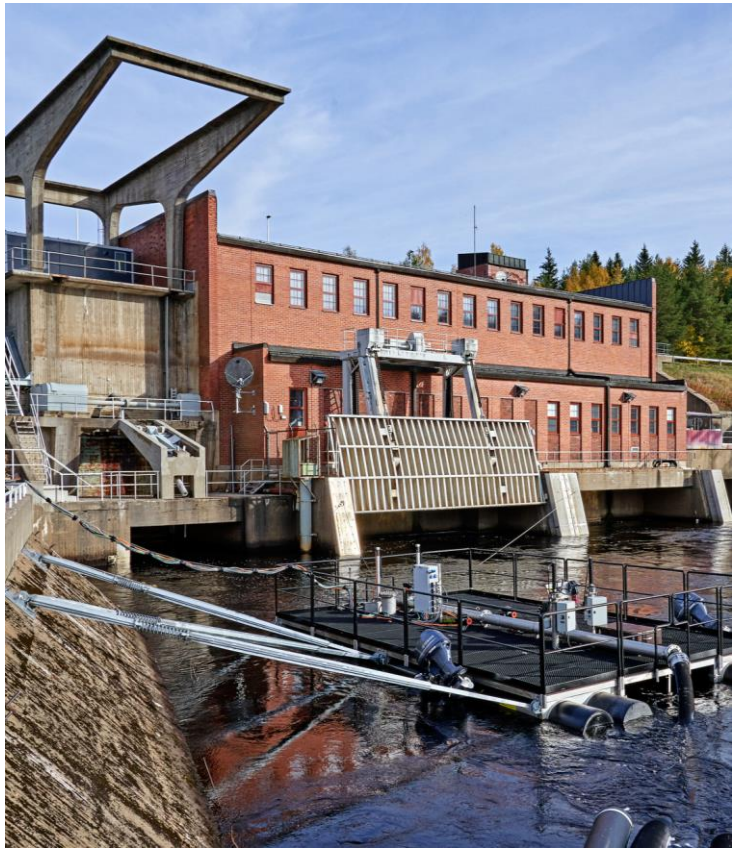
Only acceptable hydropower is sustainable hydropower

Spjutmo fishway, Sweden

Commonly used measures

- Enabling migrating fish to move up and down past the hydropower plants
- Promoting biodiversity around the hydropower plants, e,g. recreation of meadows, combatting invasive species

Leppikoski Fishheart, Finland



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Cross-border flow regulation, case Vuoksi

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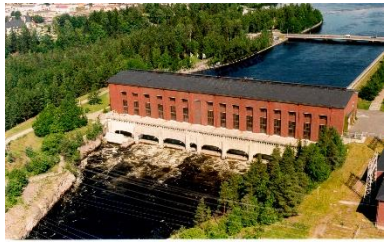
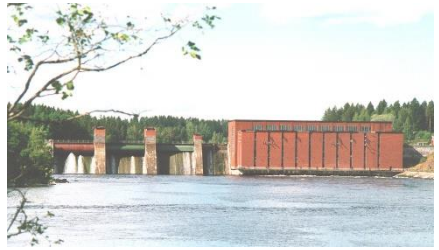
Hydropower plants in river Vuoksi

TAINIONKOSKI



IMATRA

SVETOGORSK



LESOGORSK

Mean discharge 580 m³/s

Finland **Russia**

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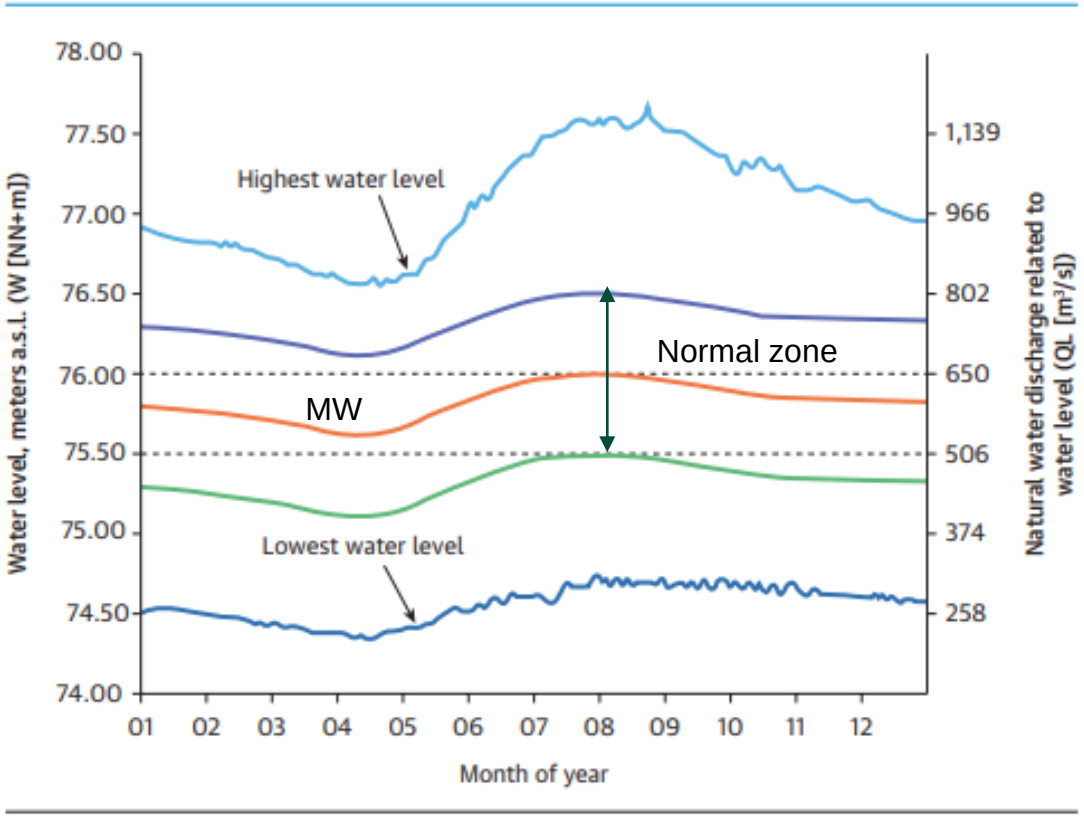
Regulatory Framework for Flow Regulation

- Finnish-Russian Agreement on the Utilisation of Transboudary Watercources in 1964
- Hydropower Agreement in 1972
  - Clear limits for the Svetogorsk HPP on the Russian side for the head water levels and regulation, to prevent losses in Finland
- Lake Saimaa and River Vuoksi Discharge Rule, accepted in 1989
  - Natural water level and discharge in normal circumstances
  - Flood and drought risk management



Source: Kaatra 2012.

Note: a.s.l = above sea level; NN = normal null; m³ = cubic meter; ml = milliliter; QL = .quantity level.

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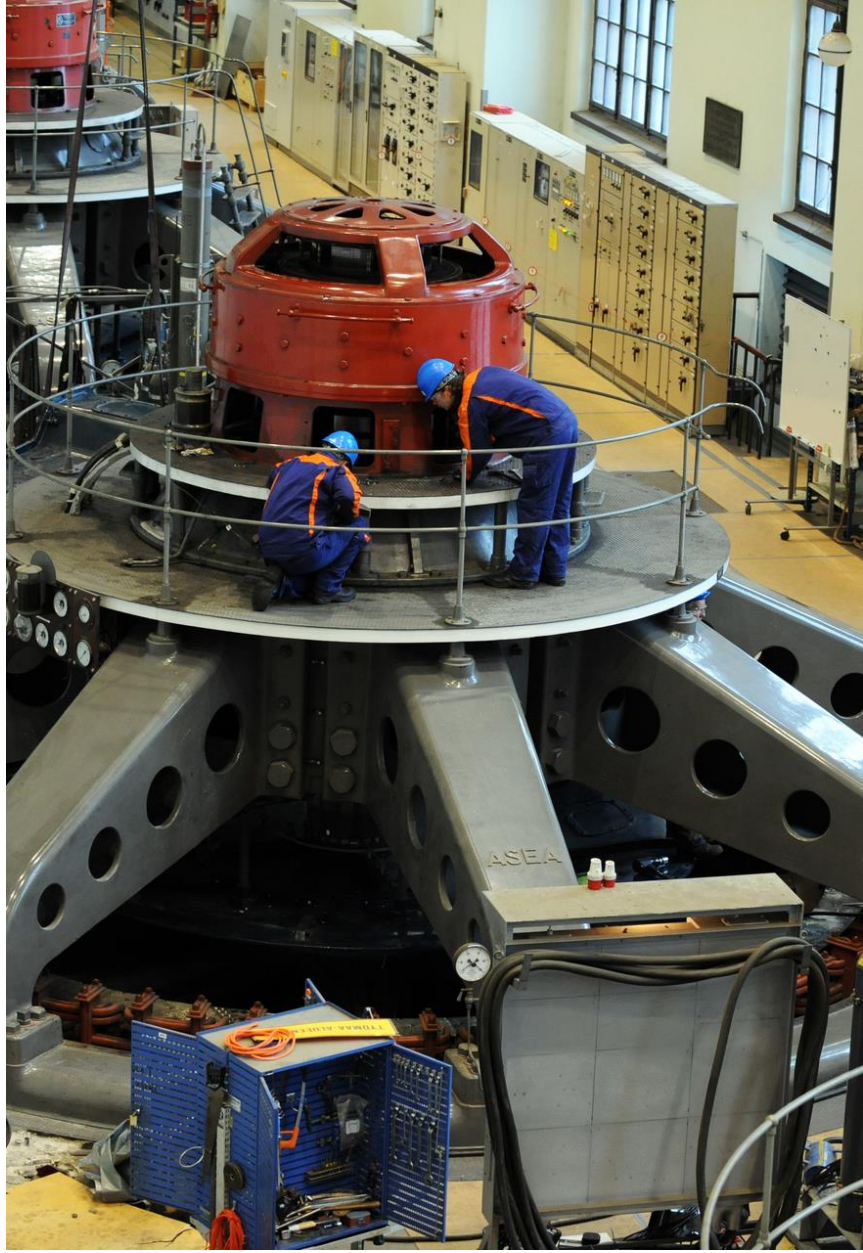
Day-to-Day Practices in Cooperation

- Cooperation procedure of Flow Regulation in the Vuoksi
  - Hydrological models updated by Finnish Environment Institute, relevant forecasts available also in Russian language, authorities monitor the water situation
  - Decision of Finnish authorities, made in co-operation with power companies, to adjust the flow in the Vuoksi upward or downward in case of flood or drought risk, to prevent any anticipated damage
  - Fortum makes intra week planning based on the weekly average discharge given by the authorities, and sends it for information to the Finnish regional water authority and Russian energy company
- Safety needs
  - Fortum take into account in the weekly planning also safety needs, e.g. need for maintenance in a Finnish or Russian hydropower plant



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Thank you!