

Hydropower in Finland

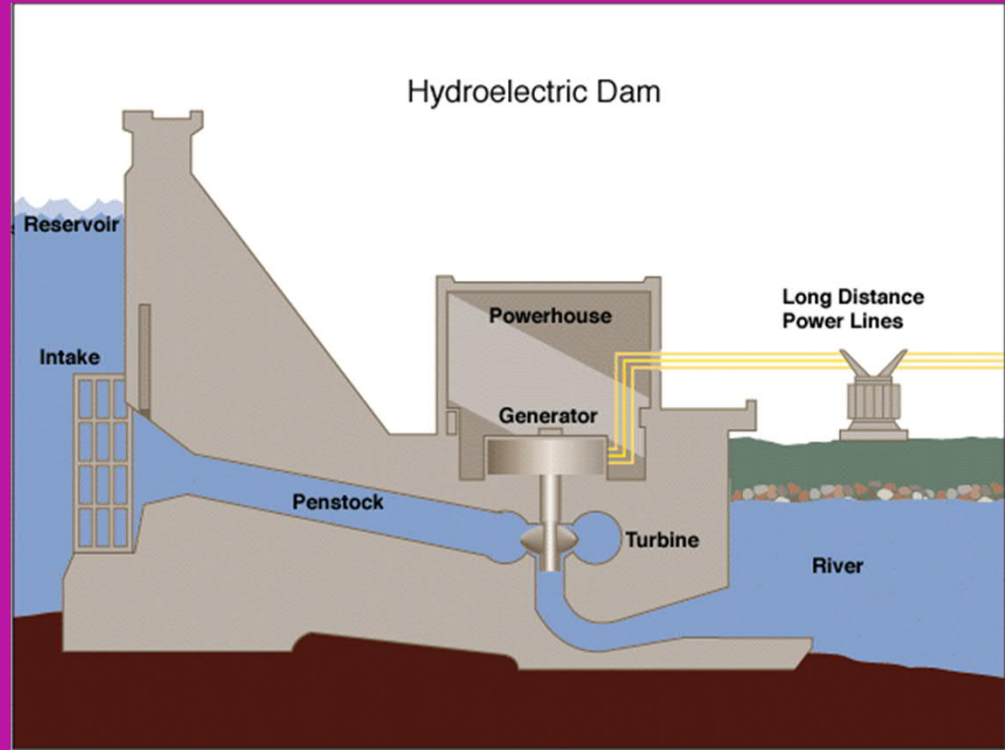
WAT-E2080

Water and
Governance-course

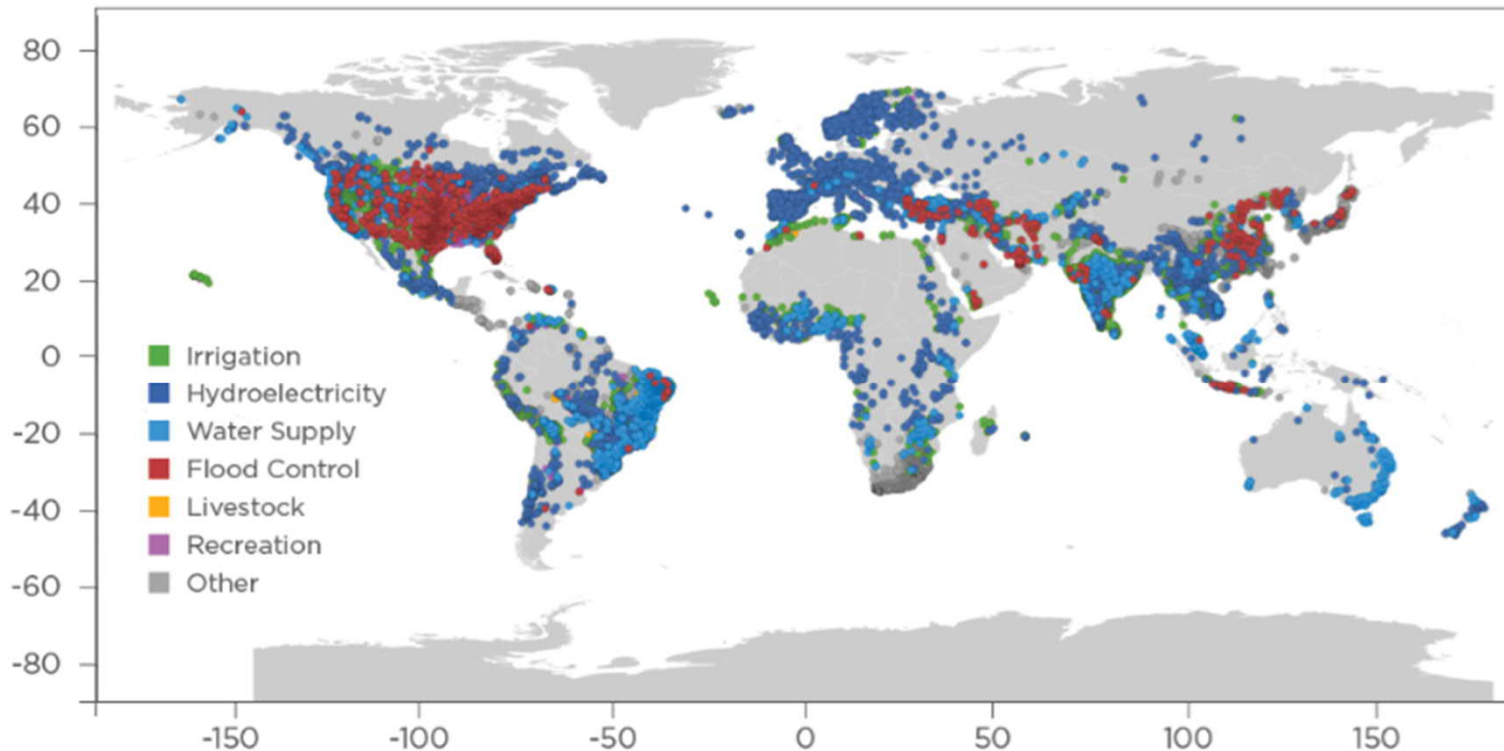
Lauri Ahopelto
2.2.2021

A''

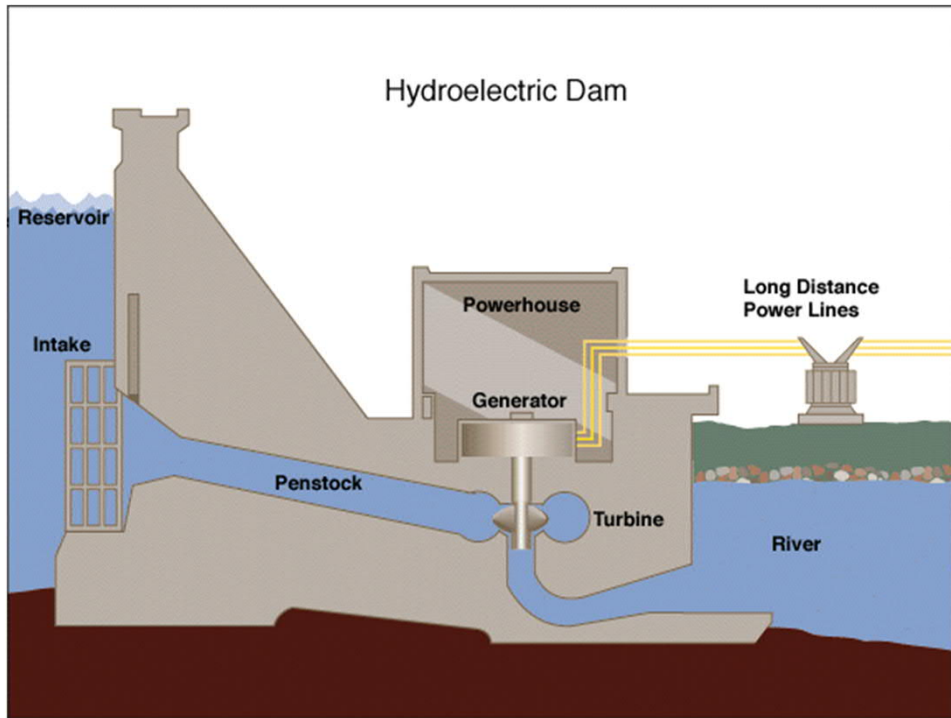
Aalto-yliopisto
Insinöörیتieteiden
korkeakoulu



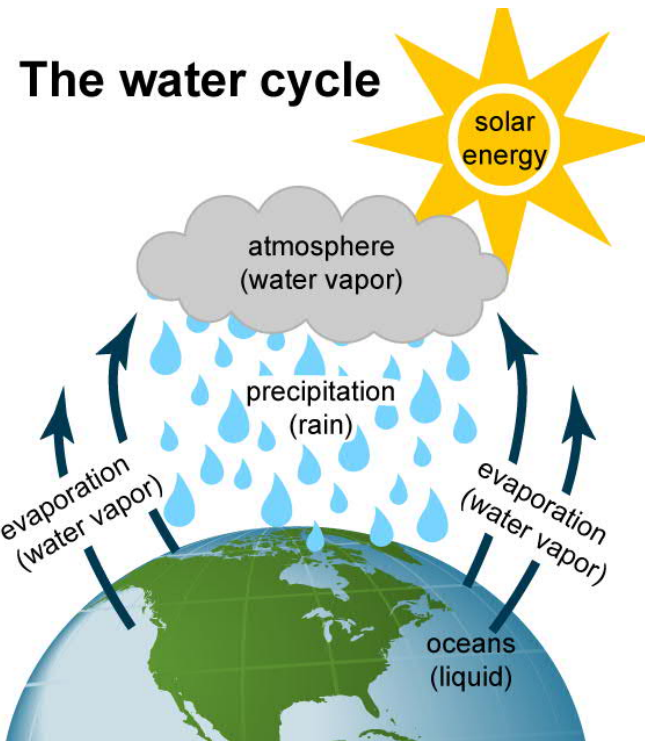
Dams - Why



Hydropower - What



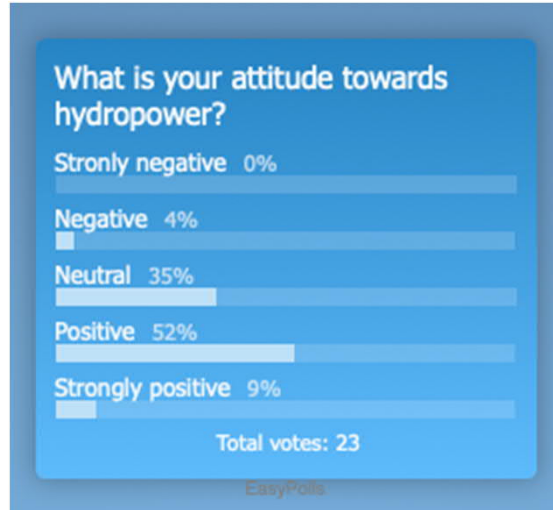
Source: Tennessee Valley Authority



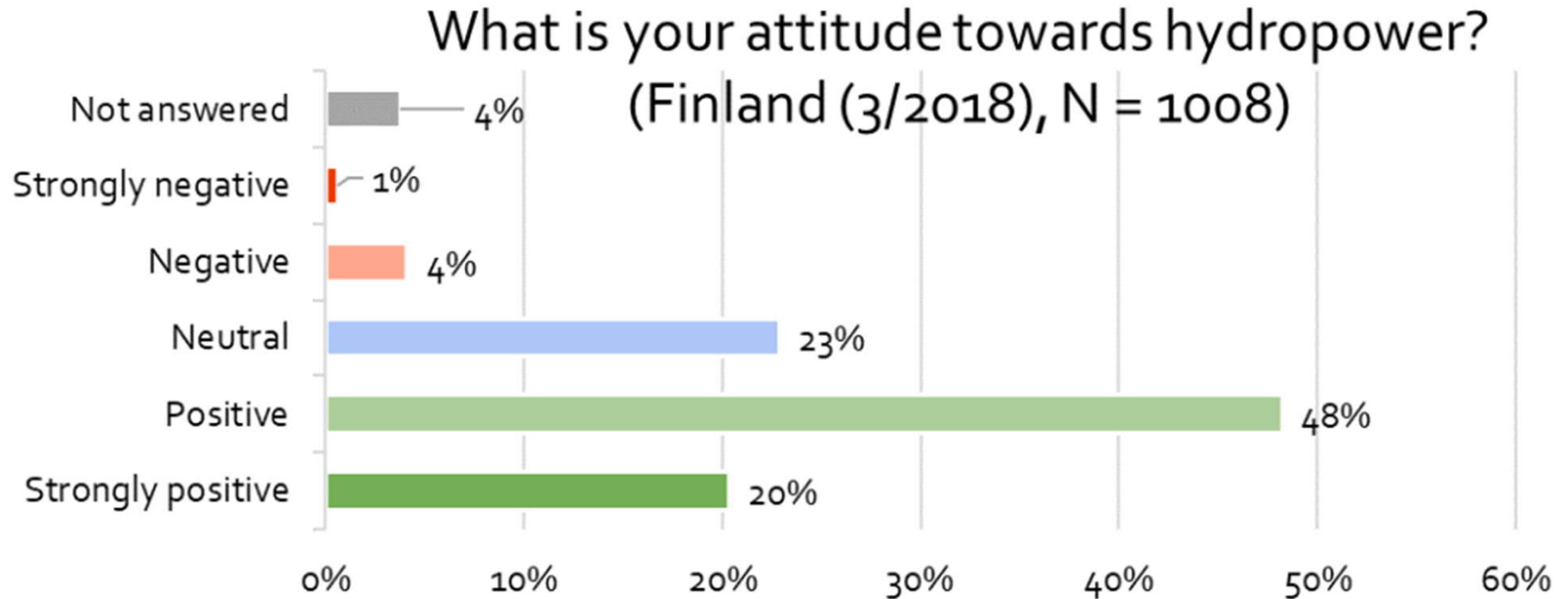
Source: Adapted from National Energy Education Development Project

Quick Hydropower Poll

What is your attitude towards hydropower? (your vote)



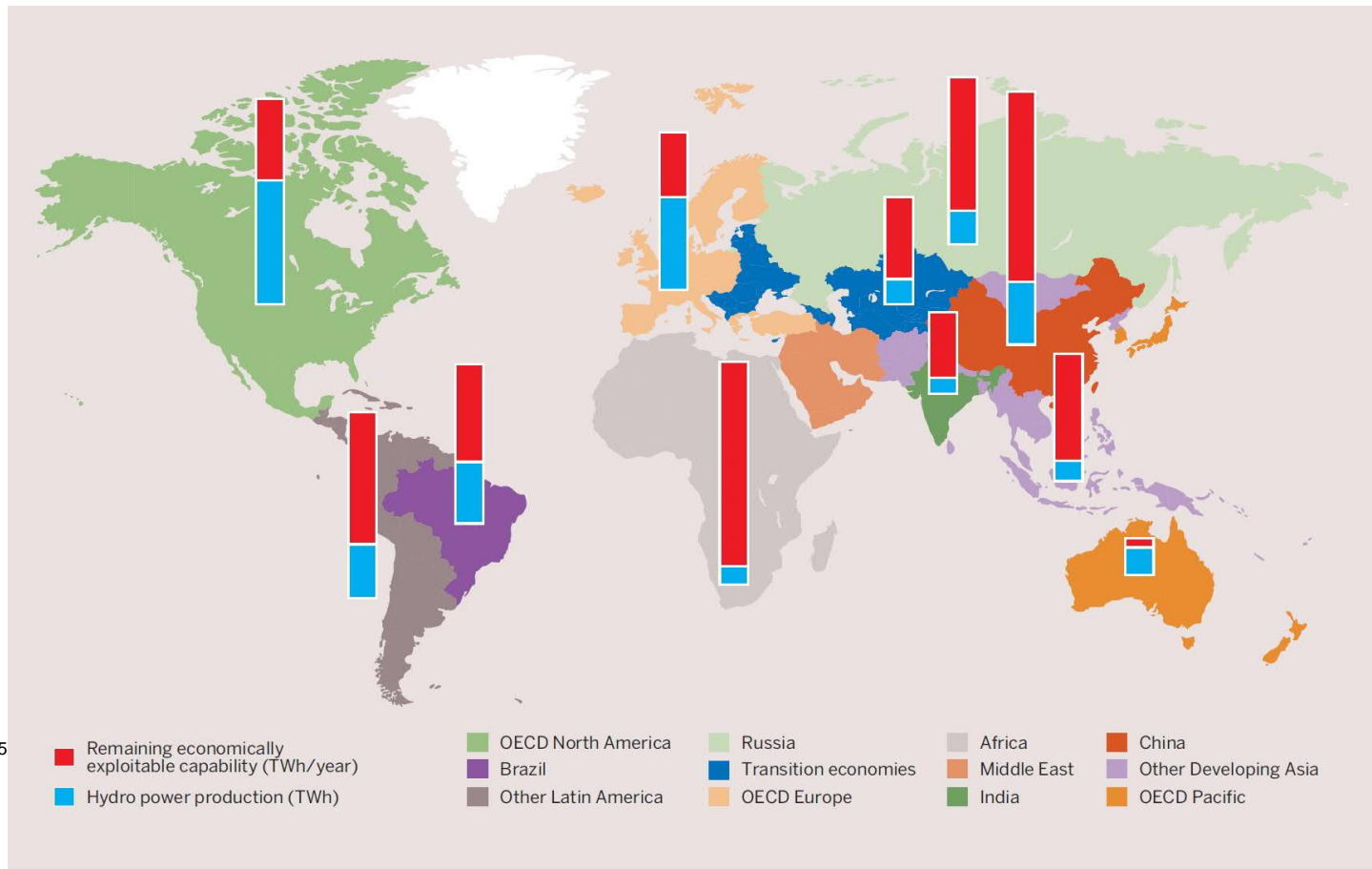
Hydropower - attitude



Hydropower - Why

- **Hydropower is important in balancing power grid**
 - Even more so in the future with higher levels of solar and wind production
 - Only possible with reservoirs
- **Renewable and low emission energy source**
 - Quite low maintenance and long lifetime

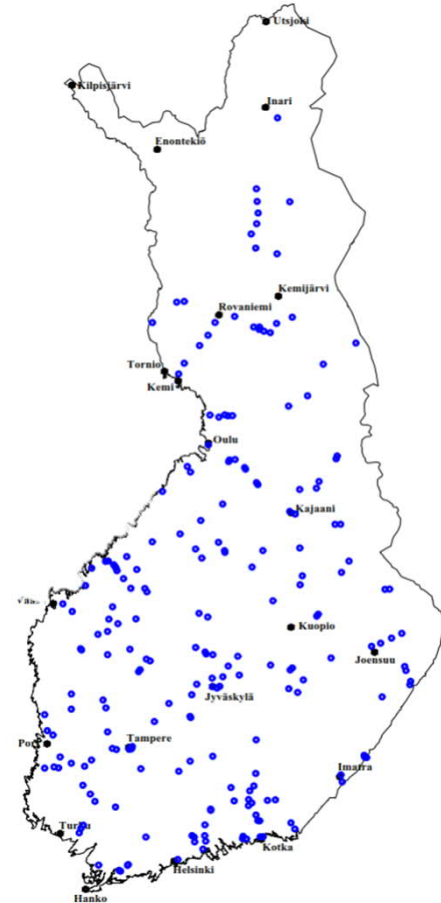
Hydropower - Where & how much



Hydropower - Where & how much

Finland

- ~250 hydropower plants
 - Generating roughly 12-25% of annual electricity production
 - Regulate water levels of ~ 350 lakes
- Largest 20 plants produce ~70% of the total



Hydropower - Why not

- **Cause significant harm to ecosystems and society**

- Migratory fish (e.g. Baltic salmon and sea trout)
- 13 wild salmon rivers remain in the Baltic Sea region out of 45-50
- In Finland 90% of our 159 000 river-km have been altered by humans.
- Blocks sediments
- Alters the flow regime

- **Reservoirs cause losses of land area (houses, infrastructure, ecosystems)**

- **Reservoirs also cause CO2 emissions: situation worst in the tropics, depends from land use & soil**

The effects can be mitigated:

Environmental flows

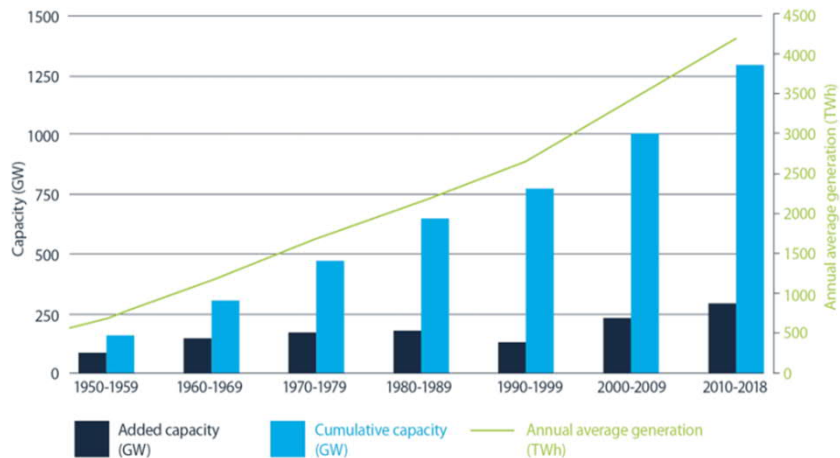
Fish passages

Fish Planting

EIA

Hydropower - When

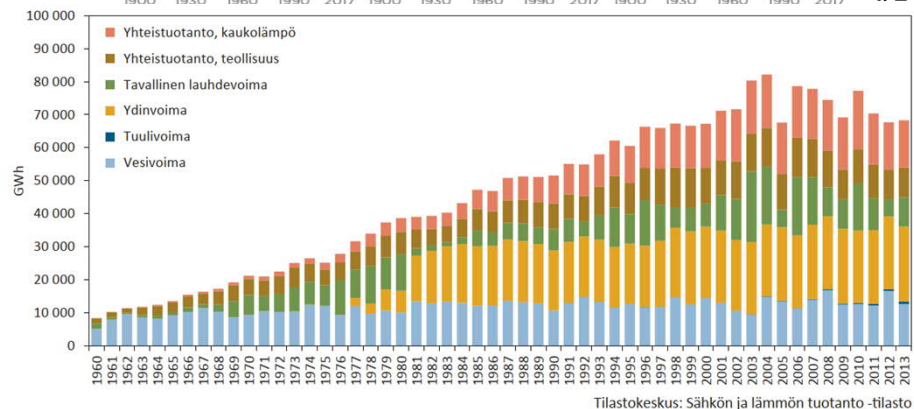
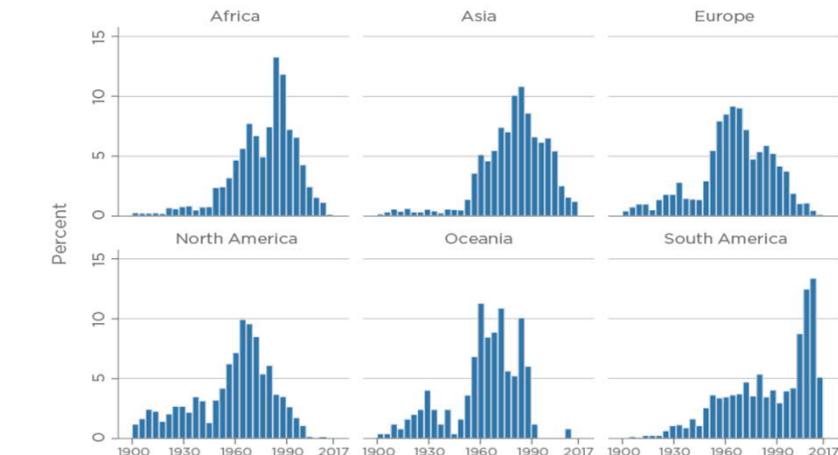
HYDROPOWER GROWTH THROUGH THE DECADES



hydropower.org/statusreport

A? Aalto-yliopisto
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Figure 2: Distribution of dam completion year by continent



Tilastokeskus: Sähkön ja lämmön tuotanto -tilasto

Kuva 16. Sähkön ja lämmön tuotanto Suomessa 1960–2013.

Hydropower - When

- **Finland and western countries**
 - The majority of hydropower potential was built in 1940s-1960s
 - The values of societies were different, and environmental factors were seen less important
 - Discussion (and some action) on dam removal, esp. in US
- **Other countries**
 - Dams increasingly controversial due to their large negative social and environmental impacts in 1990s: pause in 2000s, linked partly to the work by the World Commission on Dams
 - Re-emerging dam boom since 2010s: links to climate change mitigation and renewable energy

Hydropower - Governance

Institutions

Laws, permits, strategies, values...

Actors

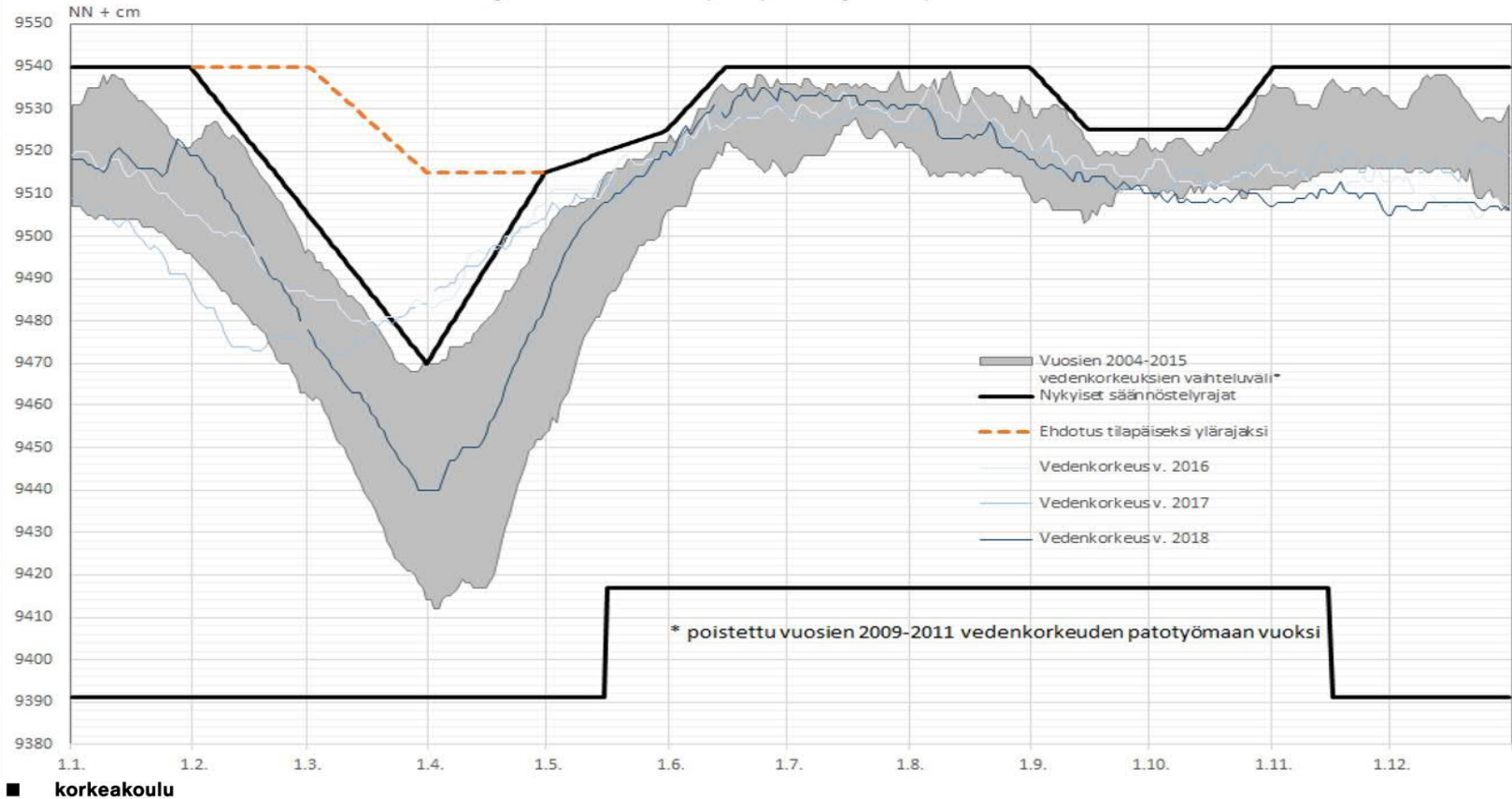
Energy companies, regional and national authorities, residents, livelihoods, river commissions...

Interactions

Hearings, EIA, workshops, lobbying...

Hydropower - How

Hakemus Näsijärven säännöstelyn lupaehtojen tilapäiseksi muuttamiseksi



Hydropower - Recap

- **Important part of a balanced energy grid**
 - Dams usually serve other purposes also
- **Most new hydropower development happening mostly in Asia and South America**
- **Major societal and environmental impacts up- and downstream of the plant**