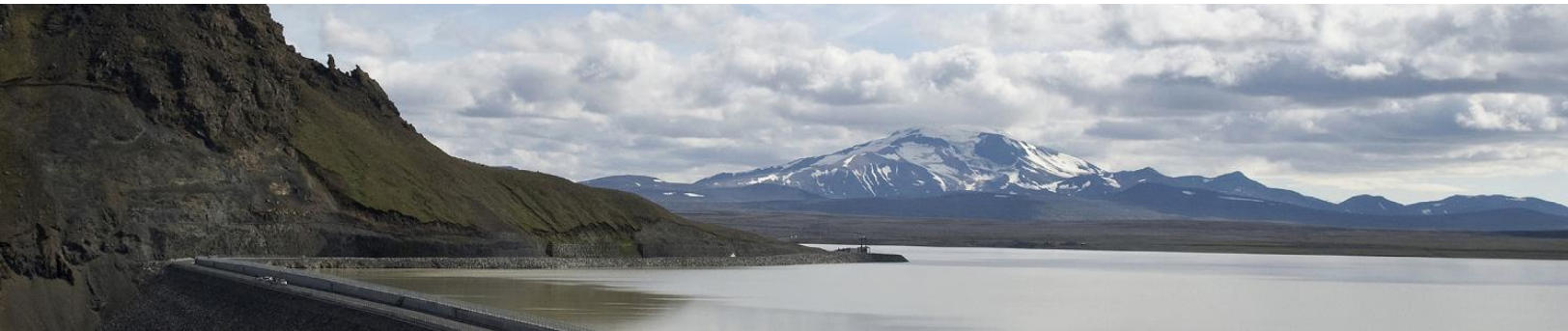


LCA of Hydroelectric Generation in Fljótsdalur Hydropower Station



NorLCA Symposium, September 16th 2011

Gyða Ingólfssdóttir, EFLA Consulting Engineers

AIM OF THE STUDY & FUNCTIONAL UNIT

Aim:

- Calculate environmental impacts associated with electric power generation in Fliótsdalur Hydropower Station
- To provide transparent and reliable information on the environmental impacts of the hydroelectric power generation

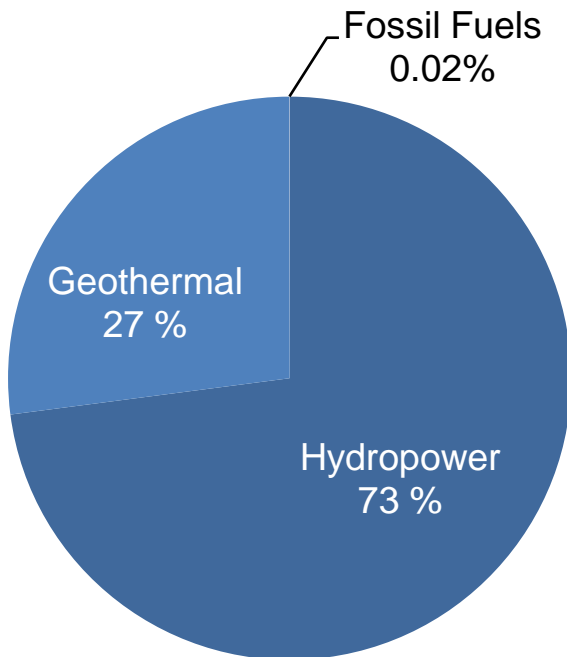
Functional unit:

- 1 kWh electricity generated in Fliótsdalur Hydropower Station in Eastern Iceland

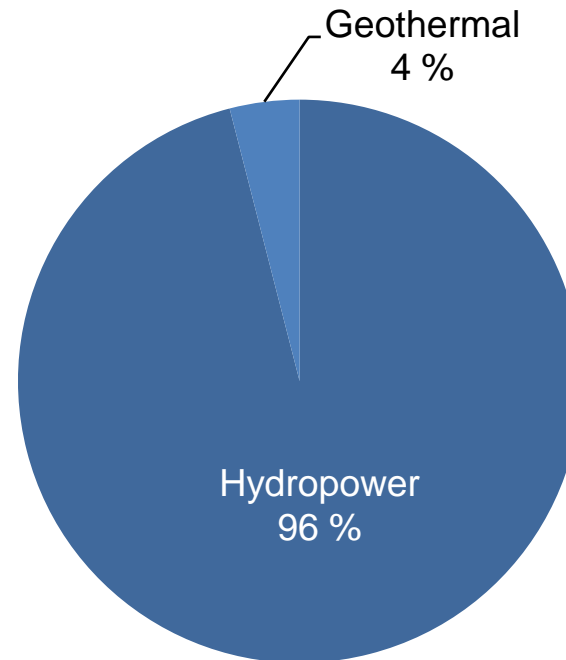


ELECTRIC POWER GENERATION IN ICELAND

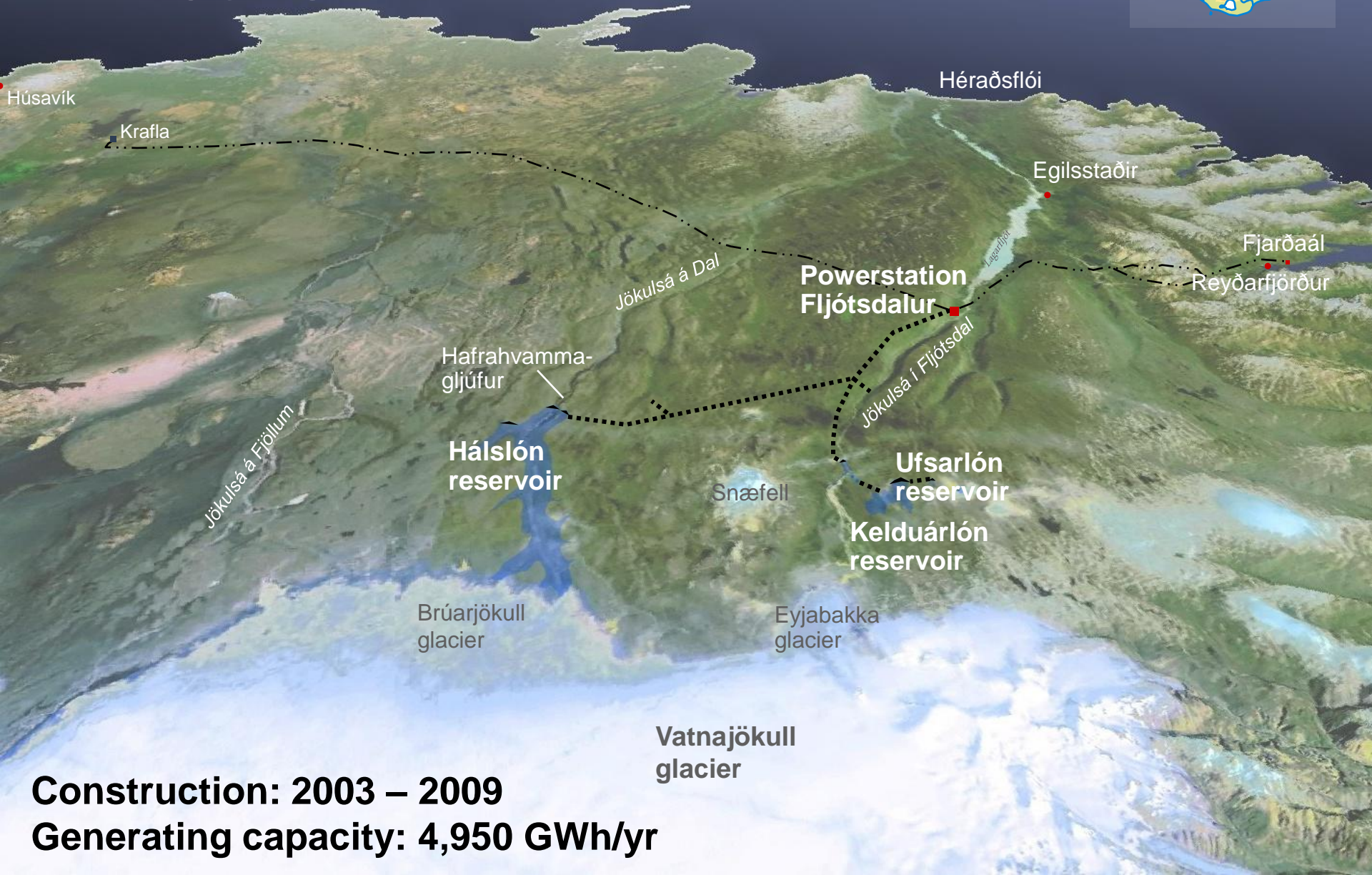
Iceland, Electric Power Generation in 2010



Landsvirkjun, Electric Power Generation in 2010



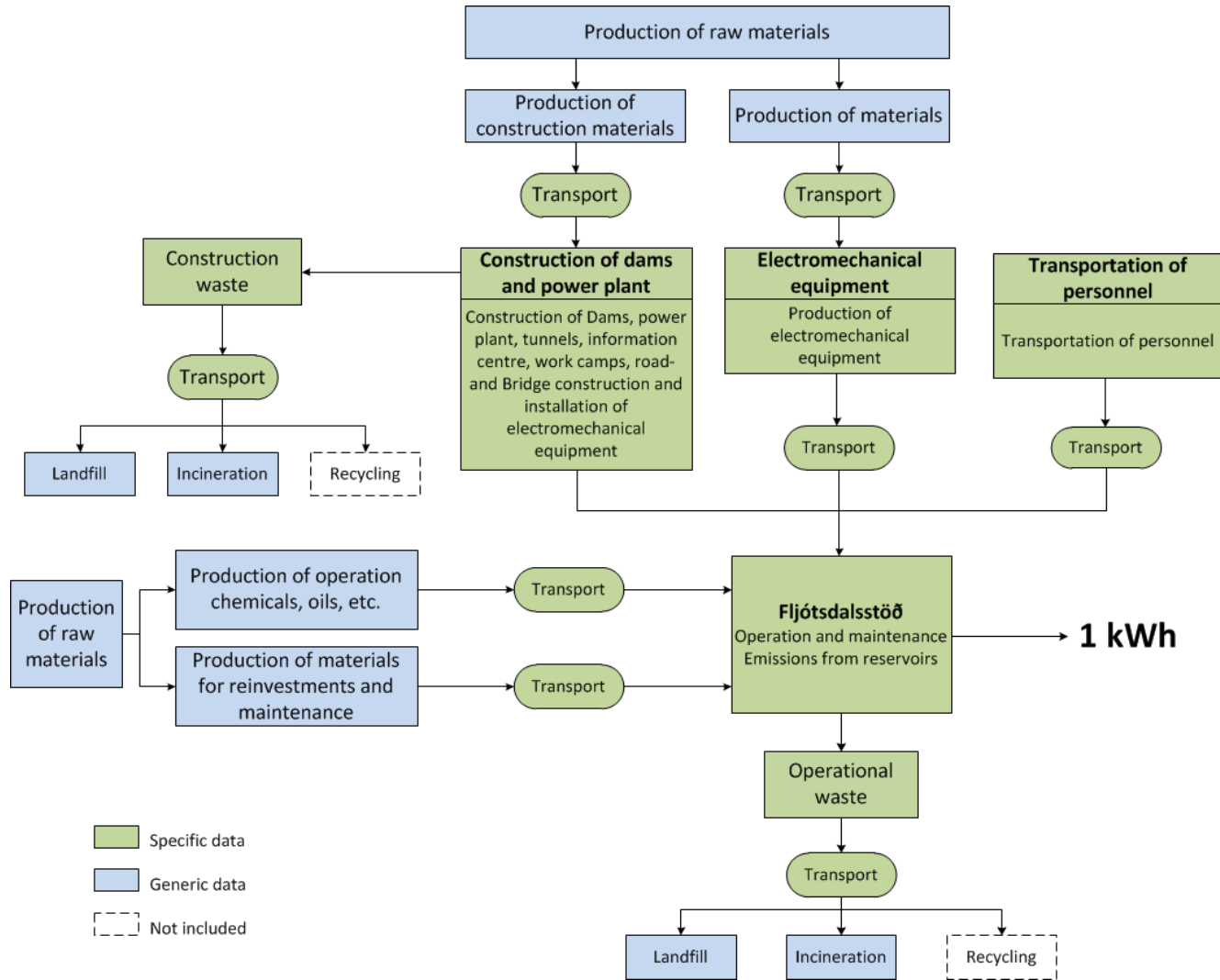
KÁRAHNJÚKAR HYDROELECTRIC PROJECT

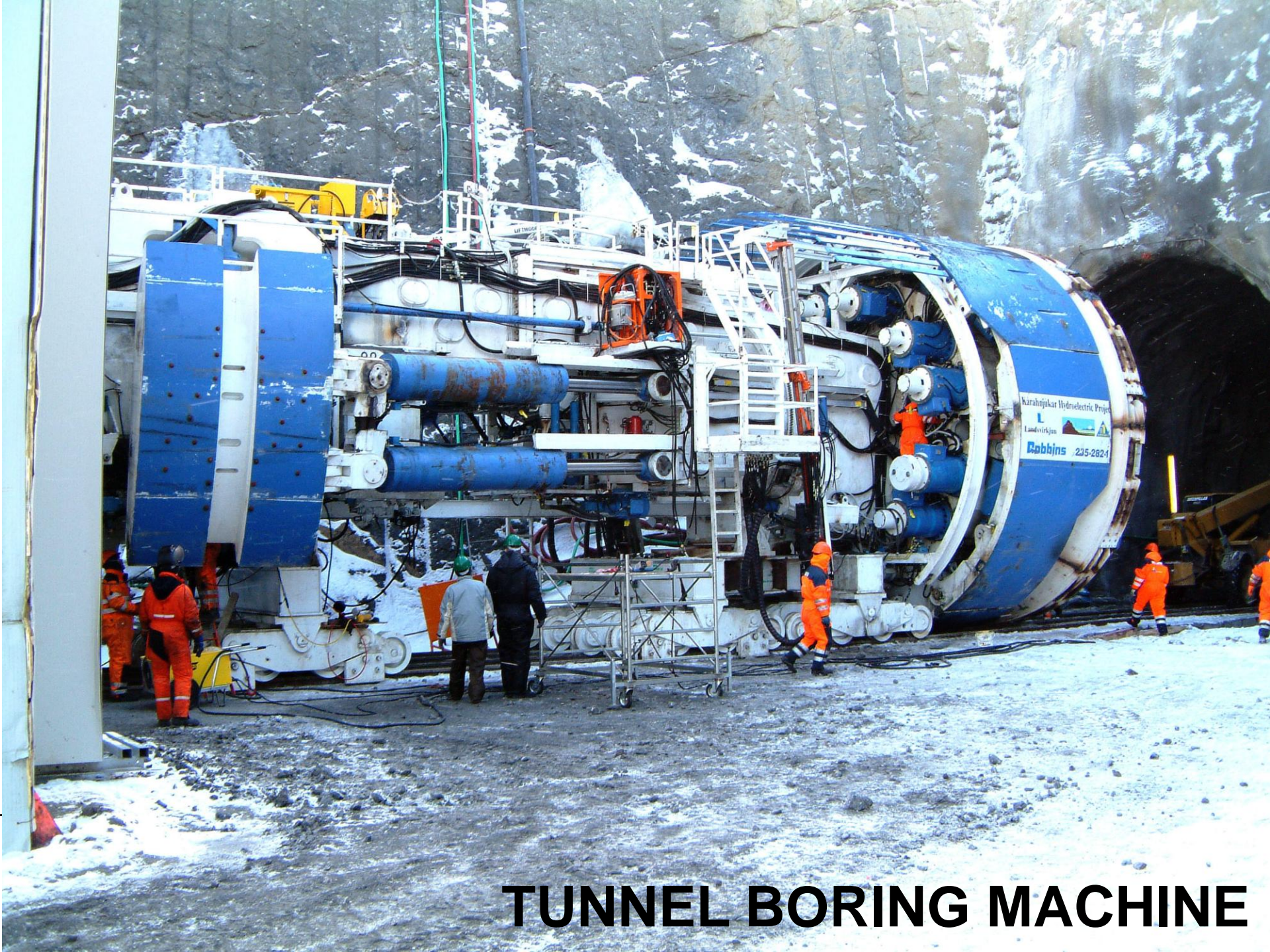


Construction: 2003 – 2009

Generating capacity: 4,950 GWh/yr

SYSTEM BOUNDARIES





TUNNEL BORING MACHINE



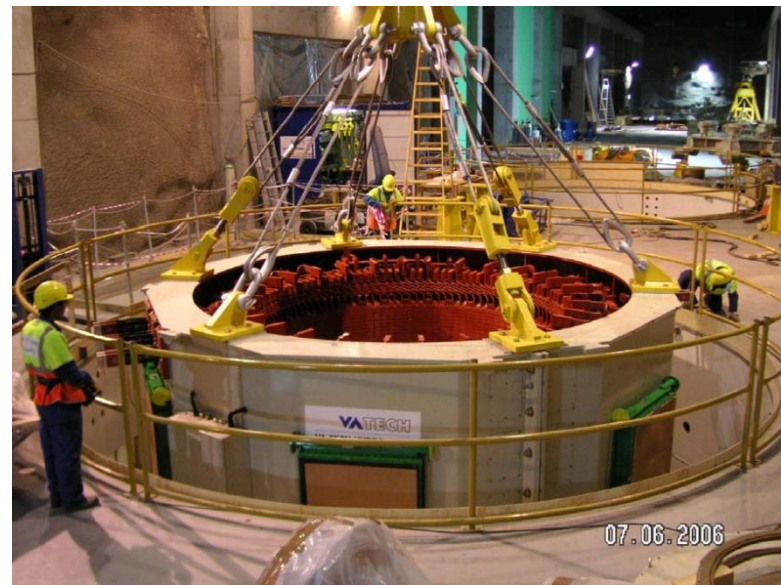
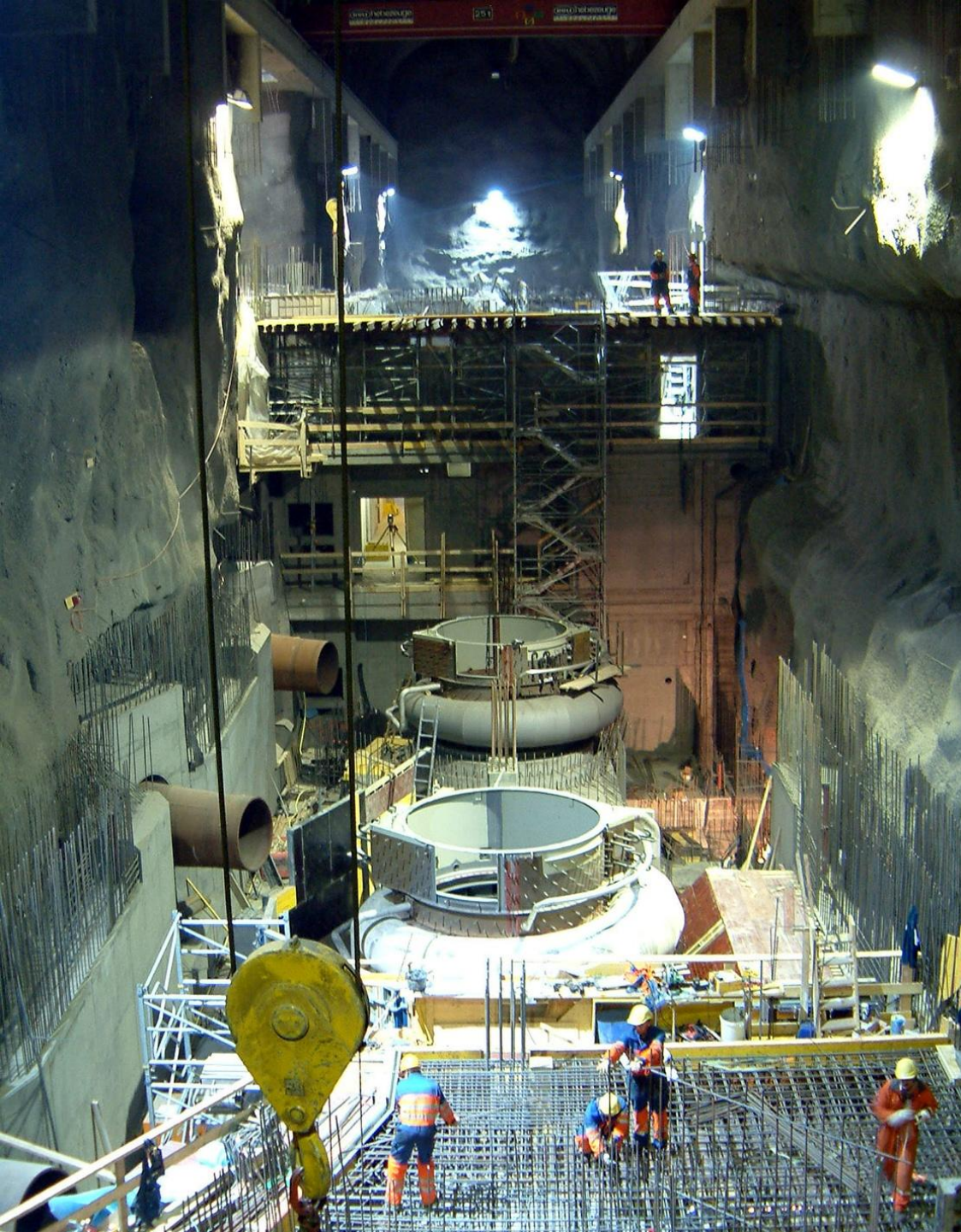
June 2005



March 2005
26 MAR. 2005 15:14



July 2005

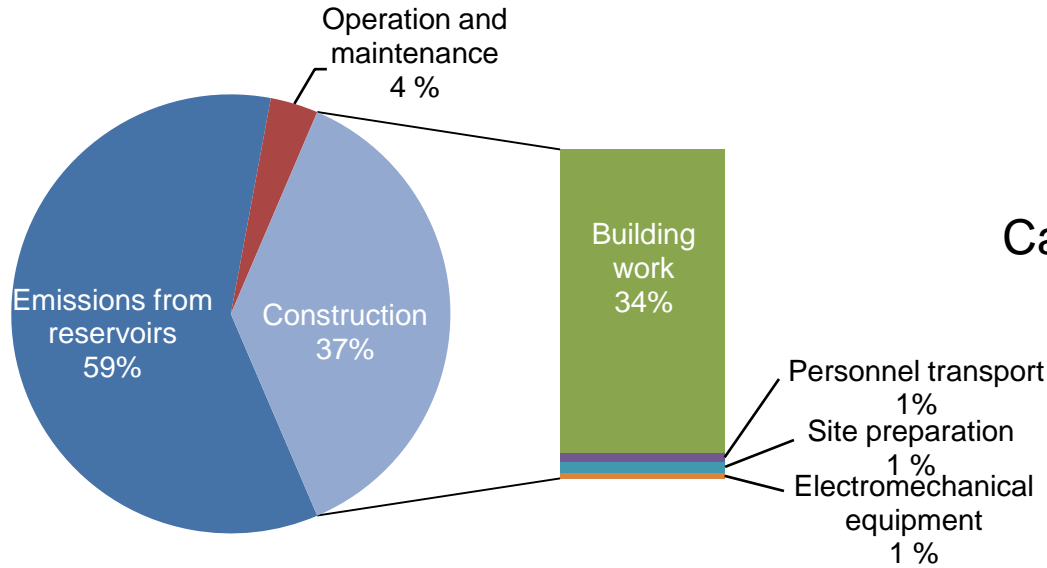


ENVIRONMENTAL IMPACTS CATEGORIES

- Global Warming Potential
- Acidification Potential
- Ozone Layer Depletion Potential
- Eutrophication Potential
- Photochemical Ozone Creation Potential
- Abiotic Depletion (elements and fossil)
- Freshwater Aquatic Toxicity
- Human Toxicity Potential
- Terrestrial Ecotoxicity Potential

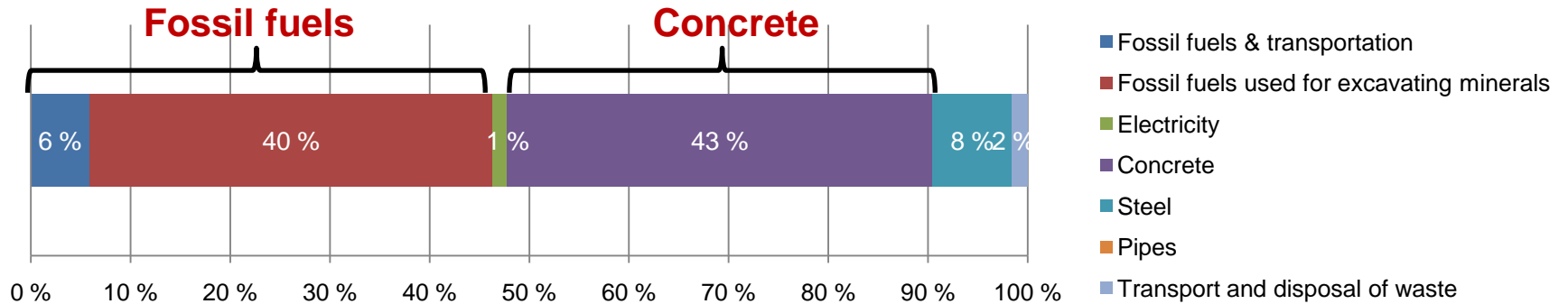


RESULTS - GWP



Carbon footprint:
2.7 g CO₂ eq./kWh

Building work

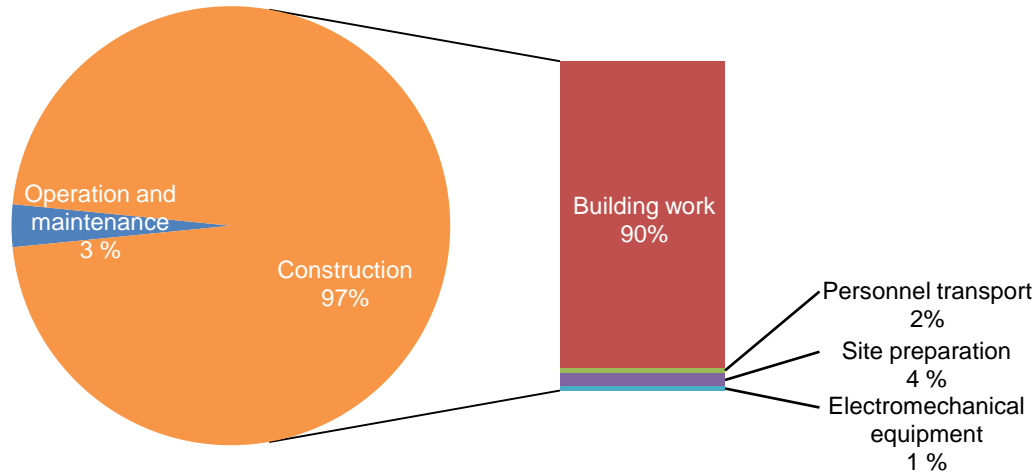


EMISSIONS FROM RESERVOIRS

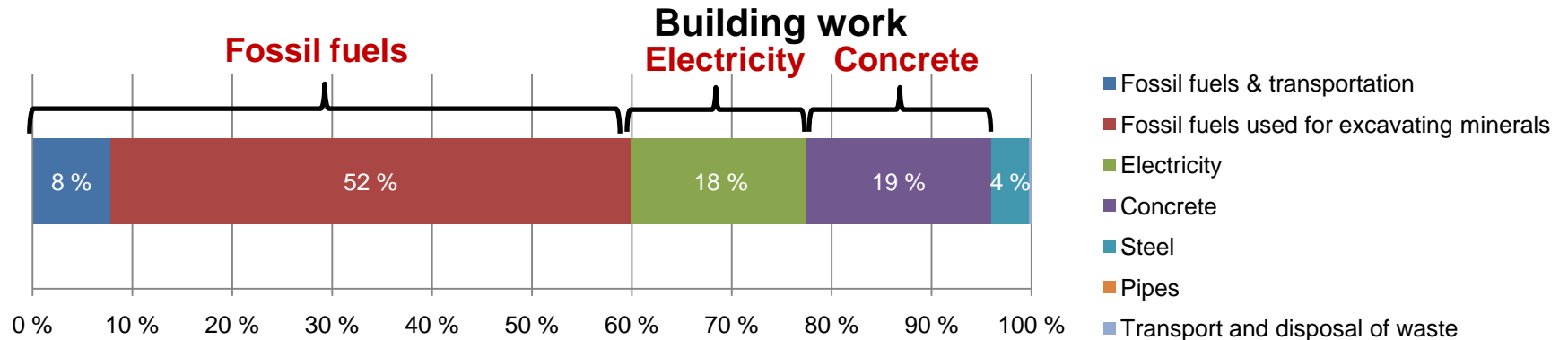
- Calculations of CO₂ and CH₄ emissions based on studies conducted by the Agricultural University of Iceland (AUI)
- **Basis for calculations:**
 1. Amount of C in inundated land known
 2. 10% GHG released as CH₄ and 90% as CO₂



RESULTS - AP



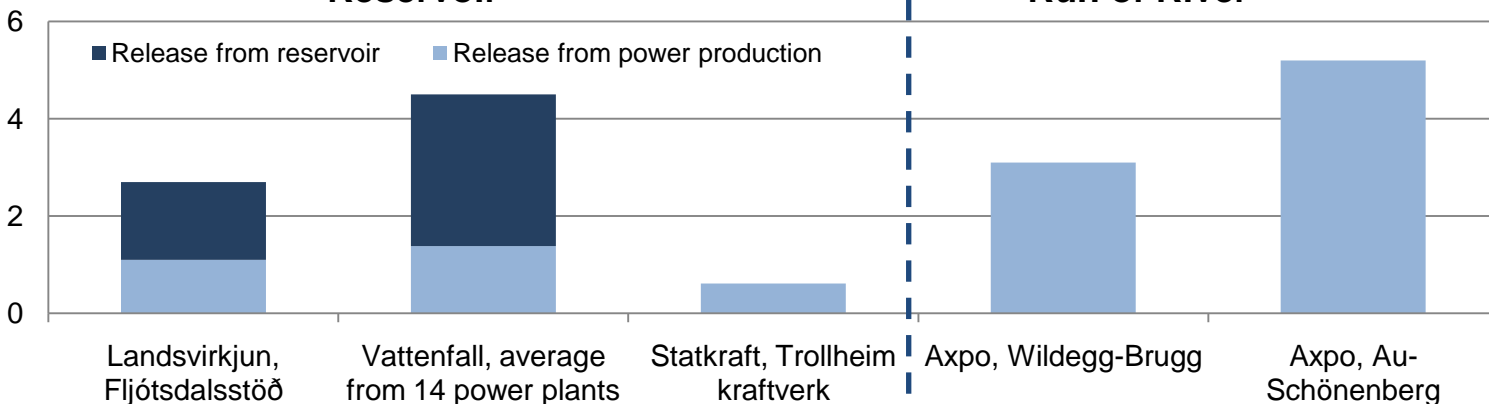
Acidification Potential:
5.7 mg SO₂ eq./kWh



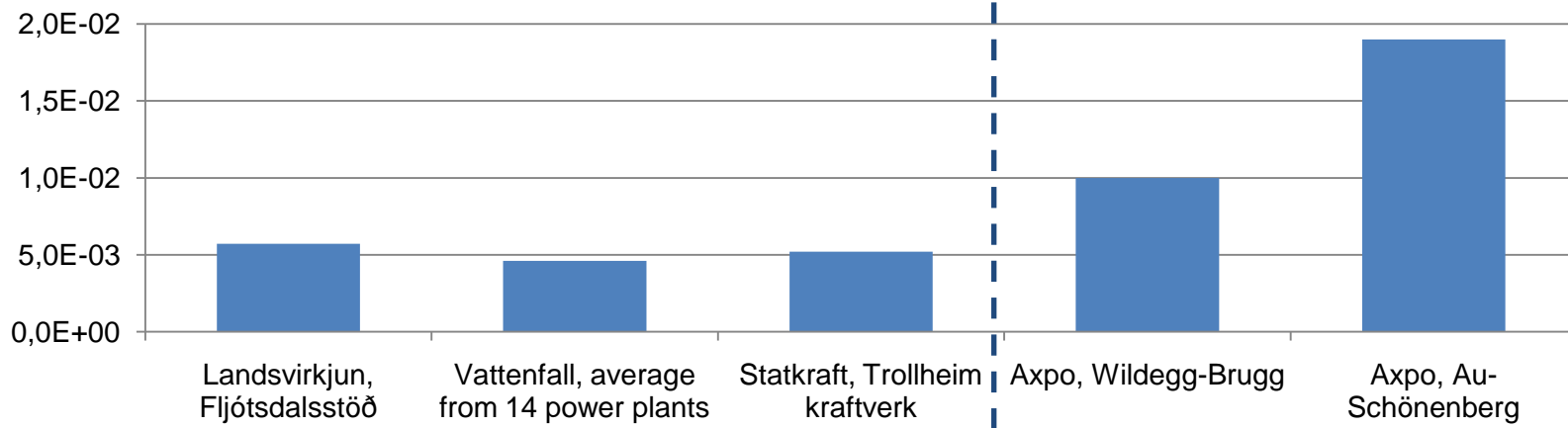
GWP, g CO₂ eq/kWh

Reservoir

Run of River



AP, g SO₂ - eq./kWh



CONCLUSIONS

- GHG emissions from reservoirs cause significant part of the environmental effects in terms of GWP
- Burning of fossil fuels and production of cement for the construction phase are the major cause for other negative environmental impacts.



THANK YOU

