Energy systems

Quantitative analysis of the NordPool electricity system

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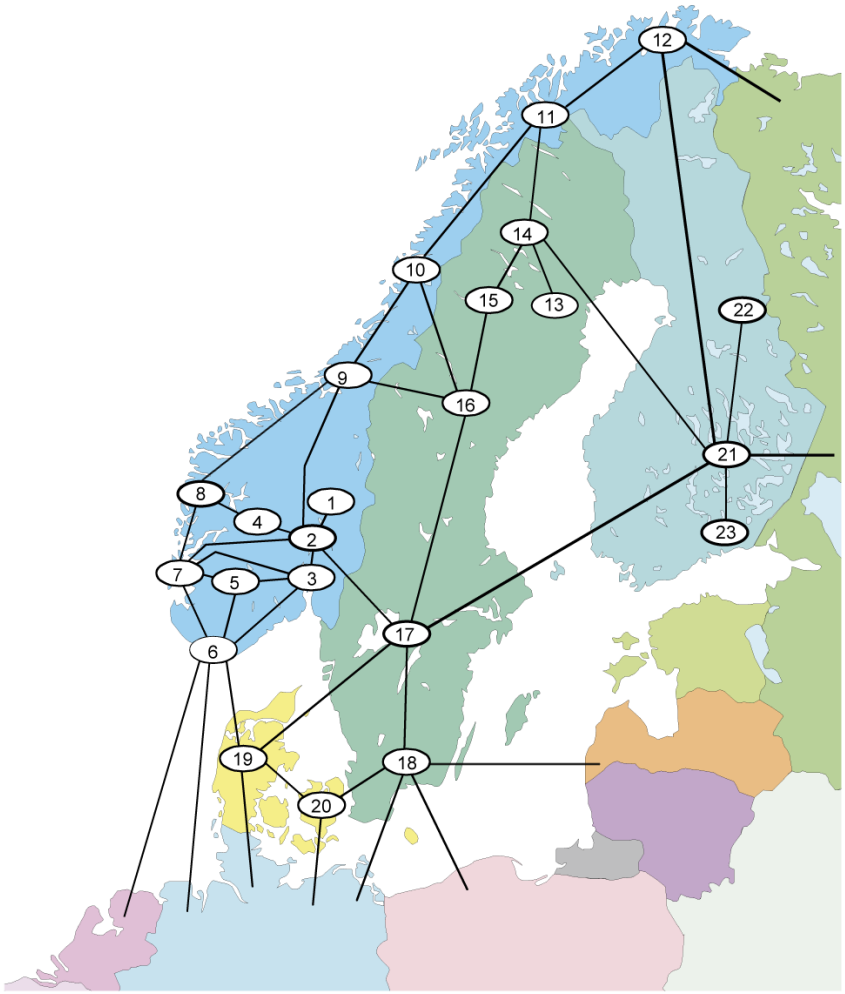
Outline

- Methodology
- Electricity system model in 2020
- Results
  - Hydropower, inflow, production and reservoir handling
  - Thermal power, production
  - Energy balance
  - CO_2 emissions

Analysis methodology

- Simulate operation of the NordPool electricity system with three climatic scenarios
- EMPS-model
  - Water-values and simulation
- Climatic scenarios
  - Reference, Echam, Hadam
  - Data provided by NVE, SMHI and SYKE
- Electricity system model in 2020
  - Predictions made by Eurelectric and Statnett
- Fuel costs in 2020
  - Data provided by EA energy analyses

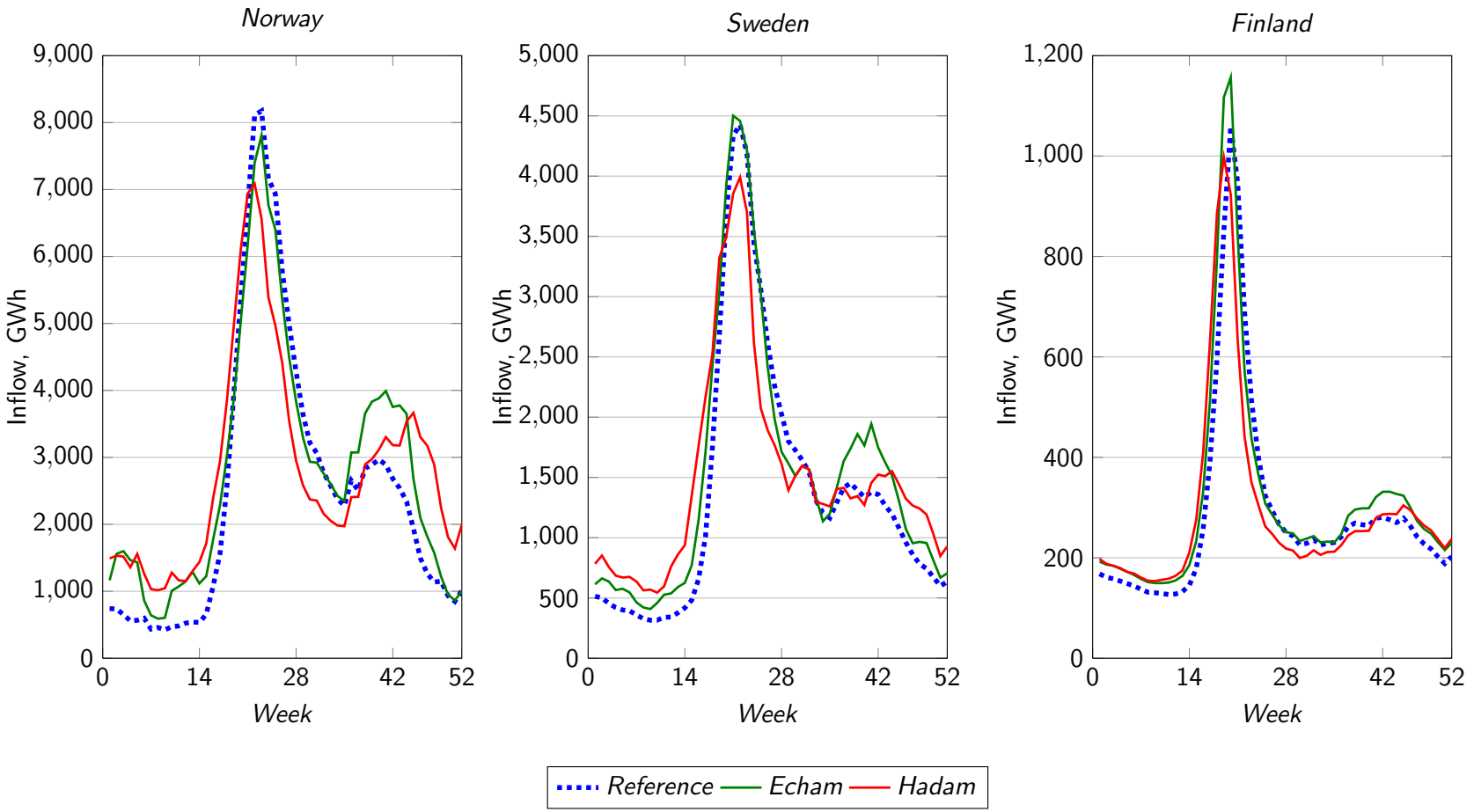
Area model, 2020



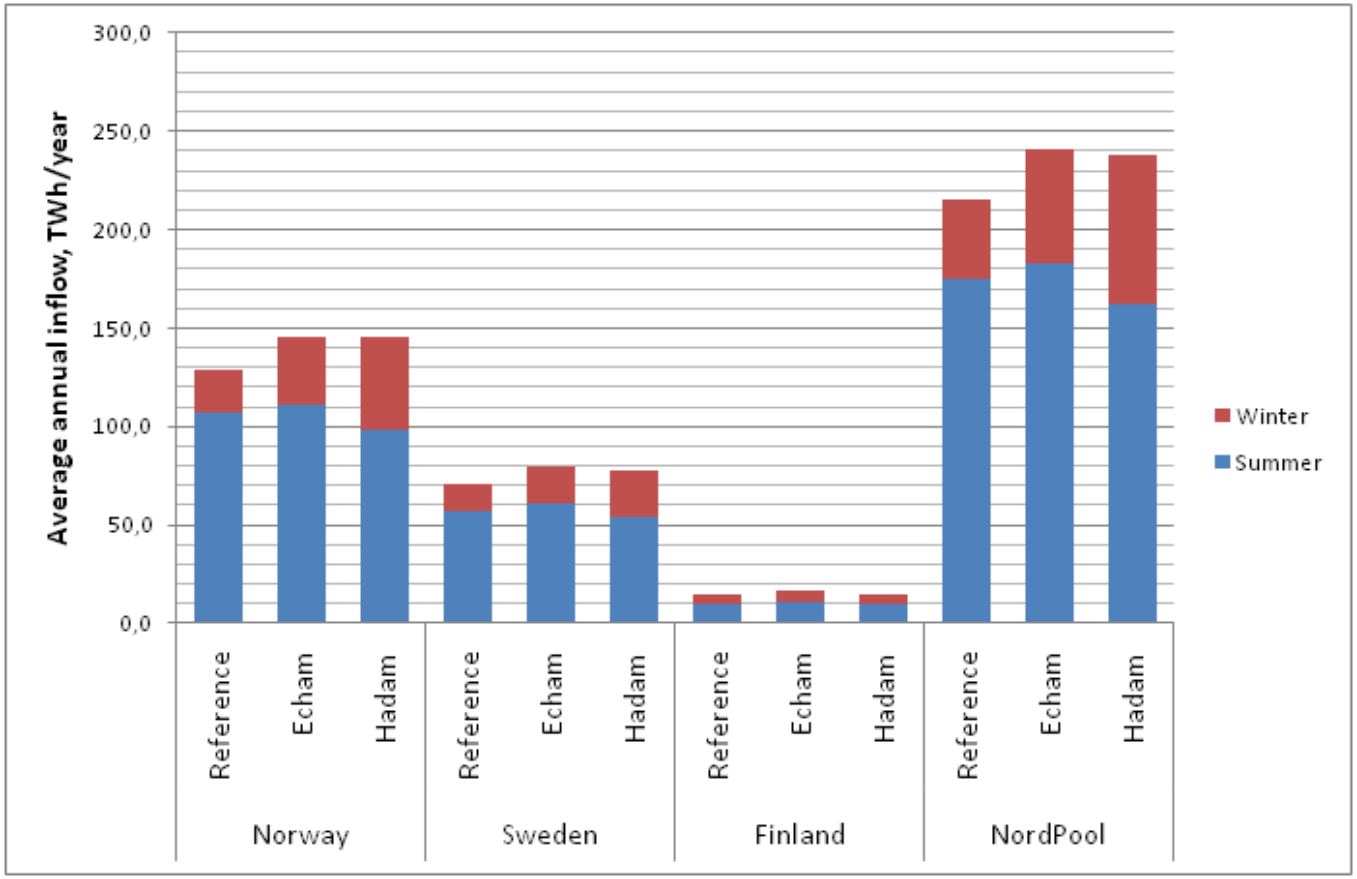
Production capacities in 2020

Country	Nuclear	Thermal	Hydro	Wind	Sum
Denmark	0.0	8.9	0.0	5.6	**14.5**
Sweden	10.0	6.2	16.4	6.0	**38.7**
Finland	5.9	10.8	3.4	1.5	**21.5**
Norway	0.0	1.5	29.5	1.7	**32.6**
NordPool	**15.9**	**27.3**	**49.3**	**14.8**	**107.3**

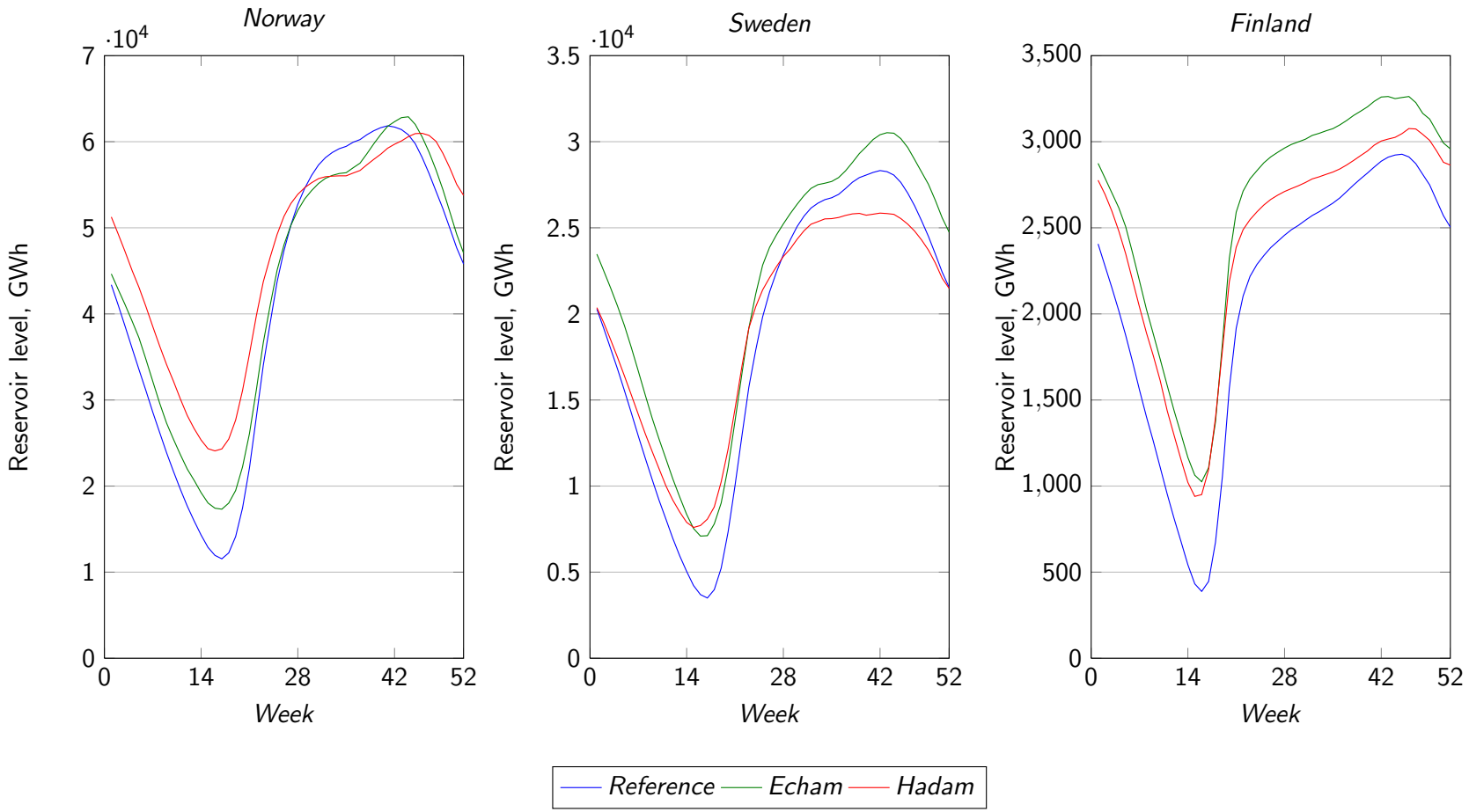
Annual average inflow over the year, GWh



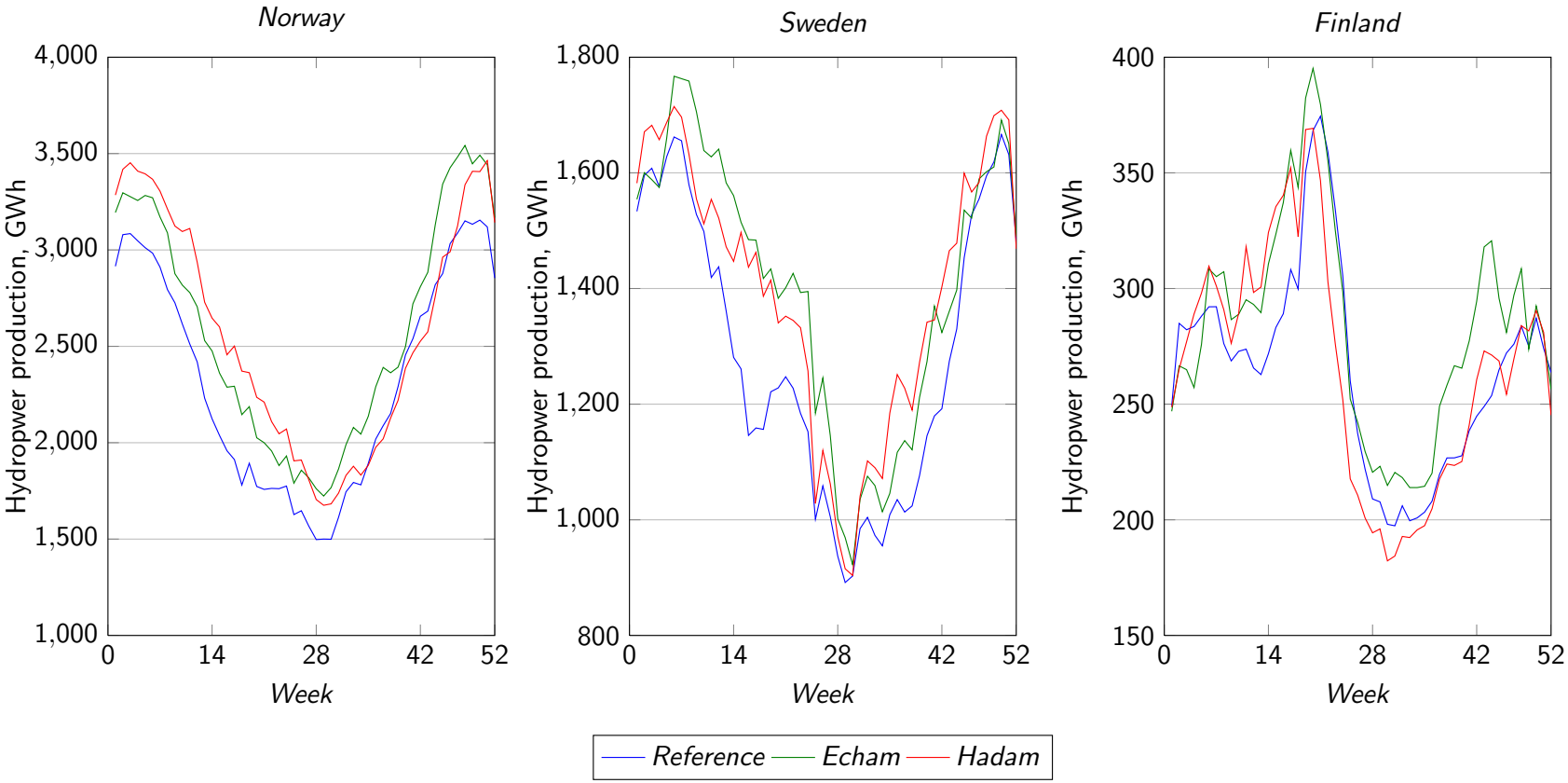
Average annual inflow, TWh/year



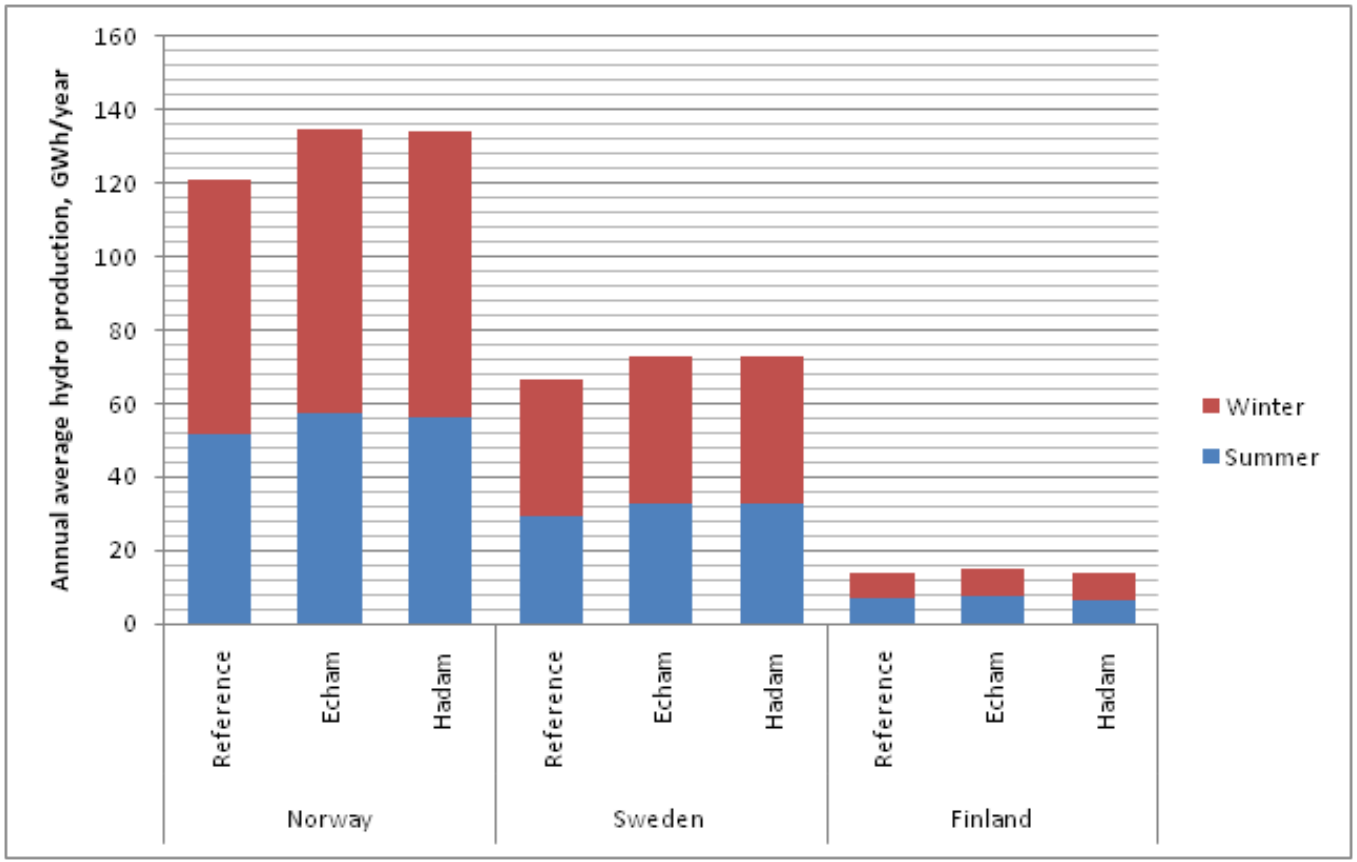
Annual average reservoir level over the year, GWh



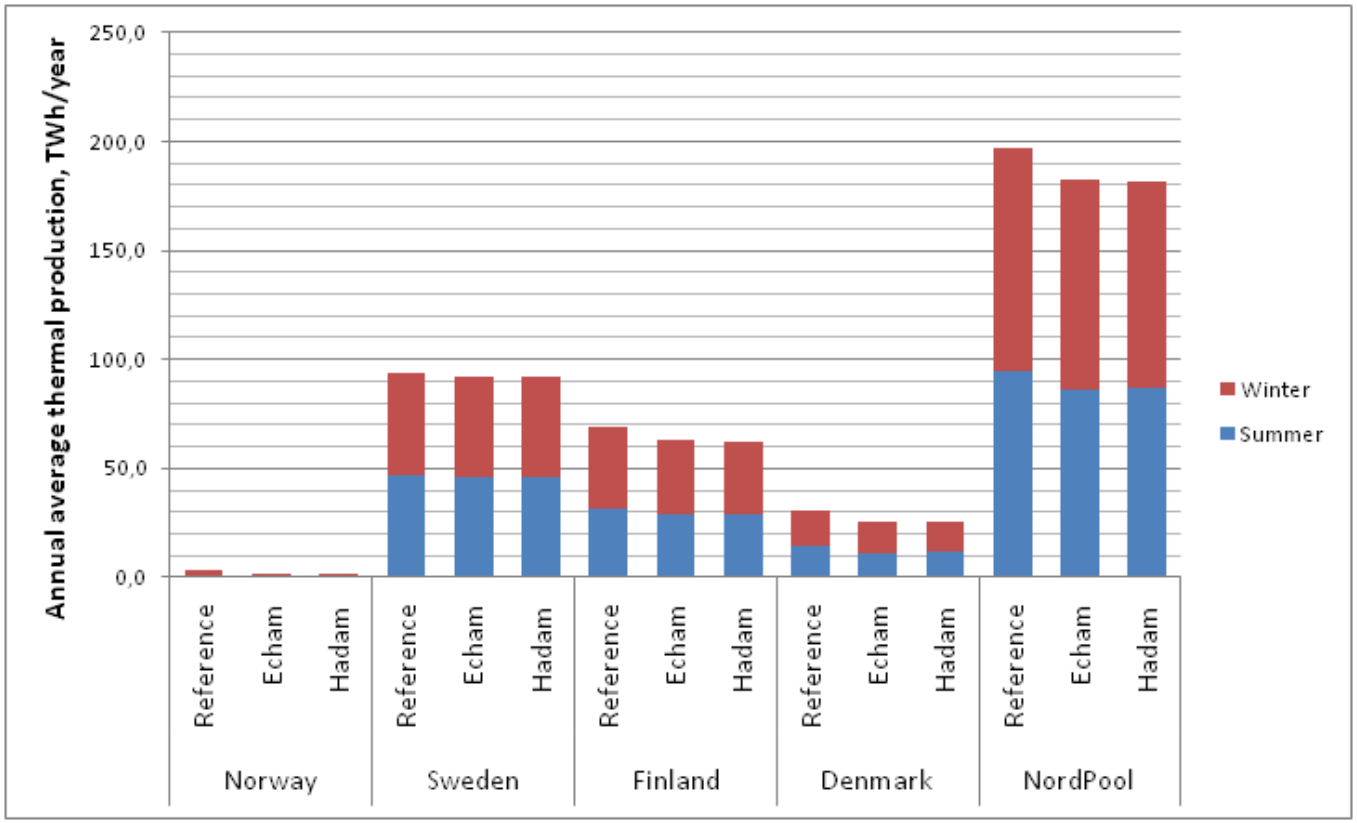
Annual average hydropower production over the year, GWh



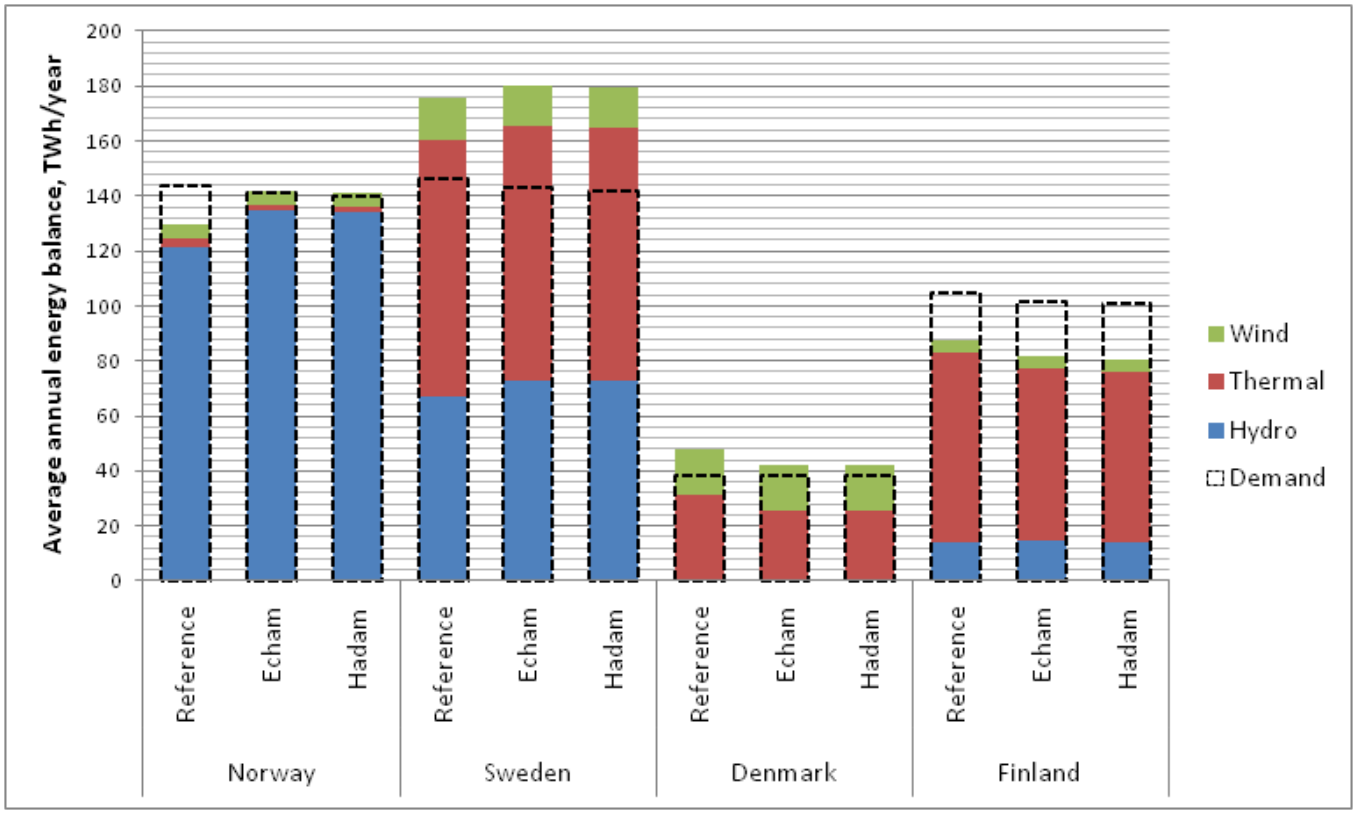
Annual average hydropower production, GWh



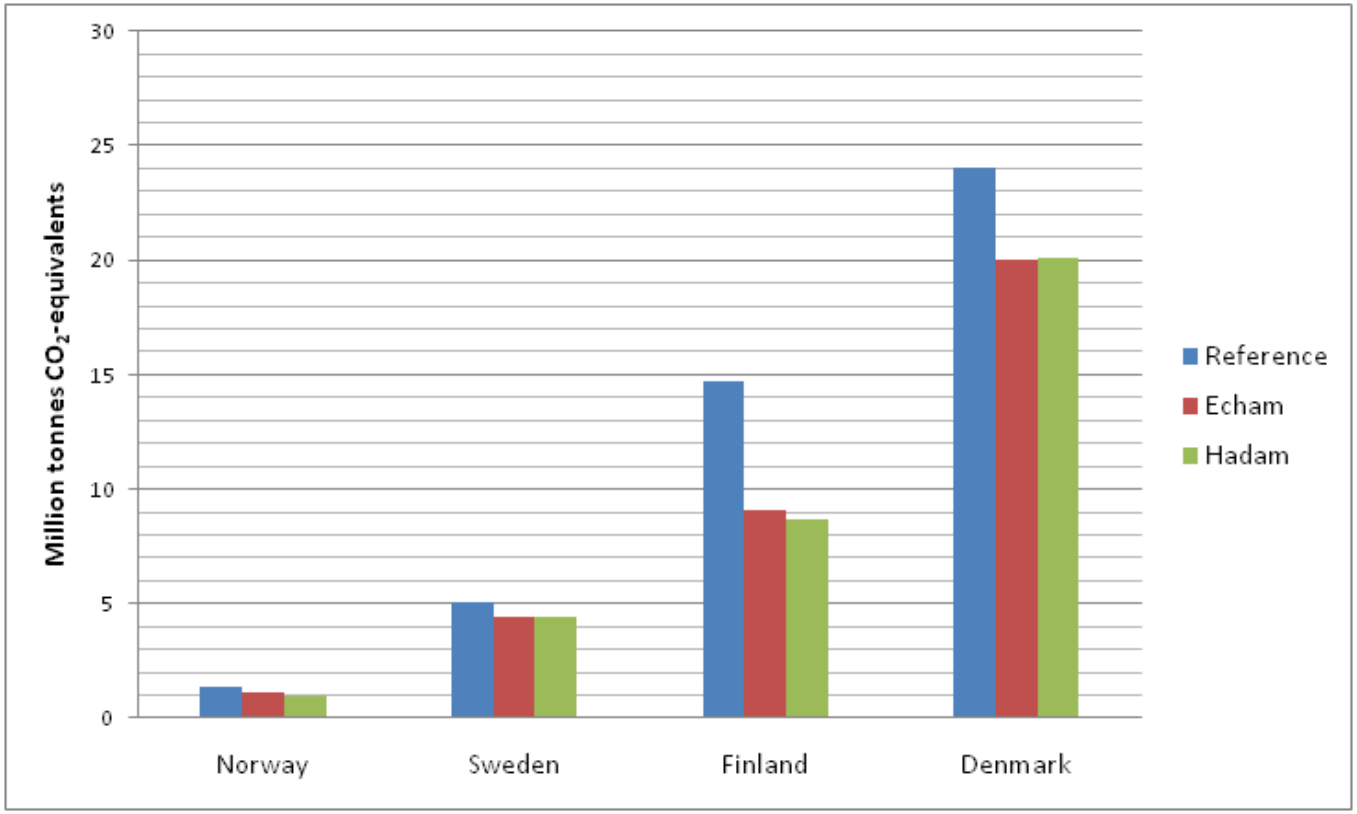
Average annual thermal production, TWh/year



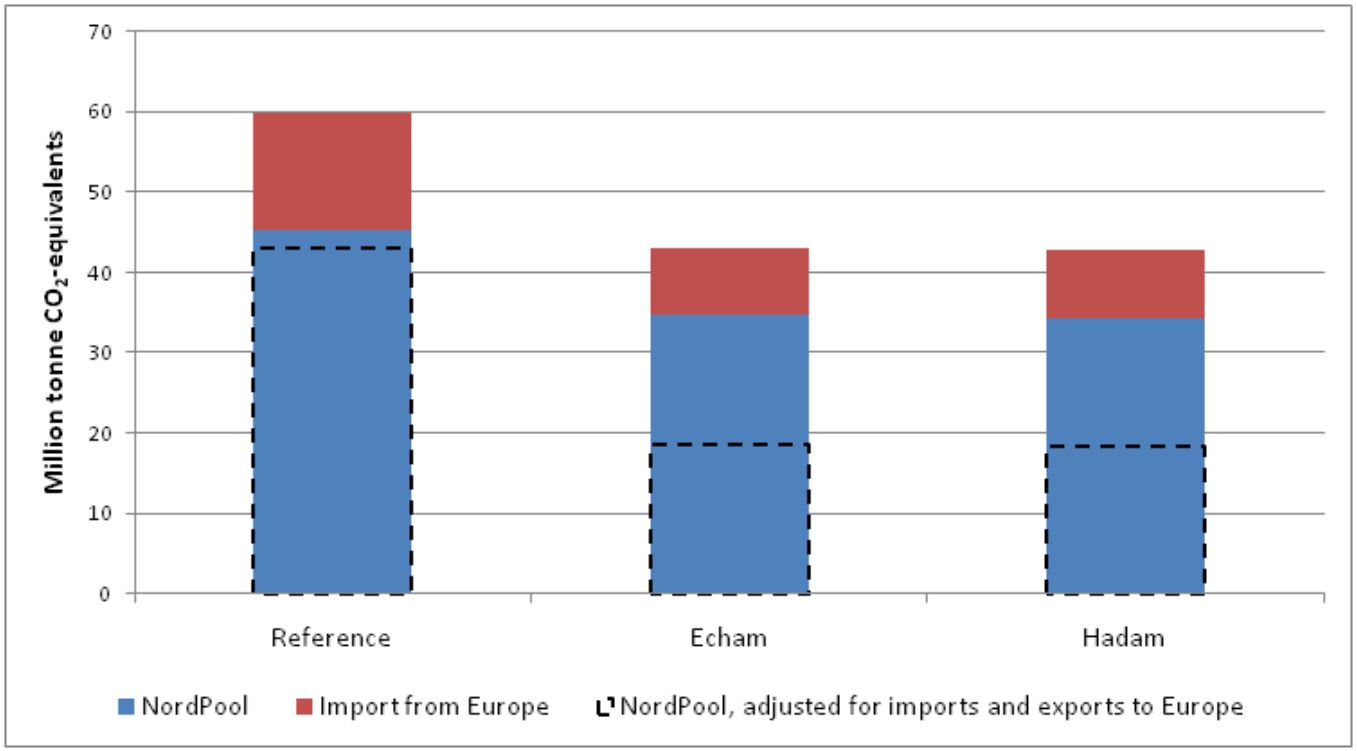
Average annual energy balance



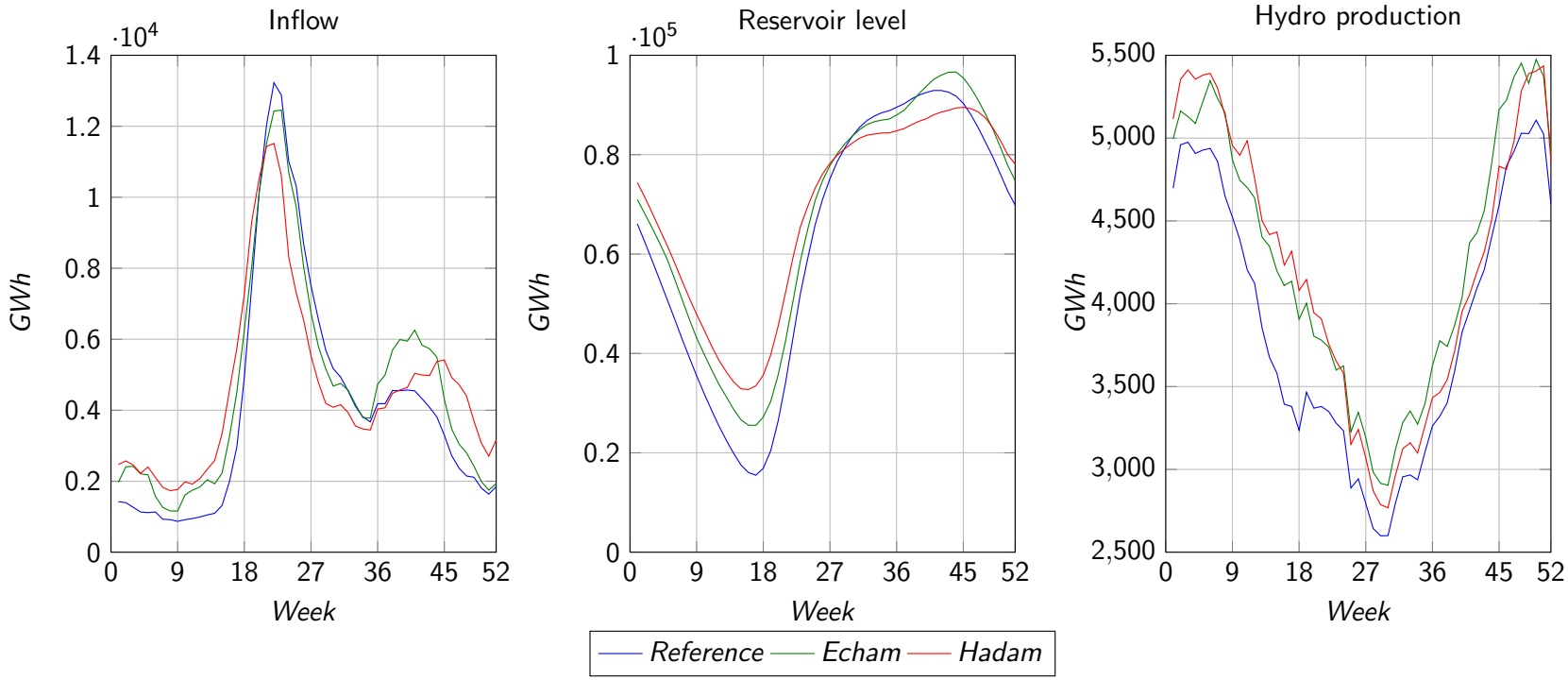
CO_2-emissions in the NordPool region



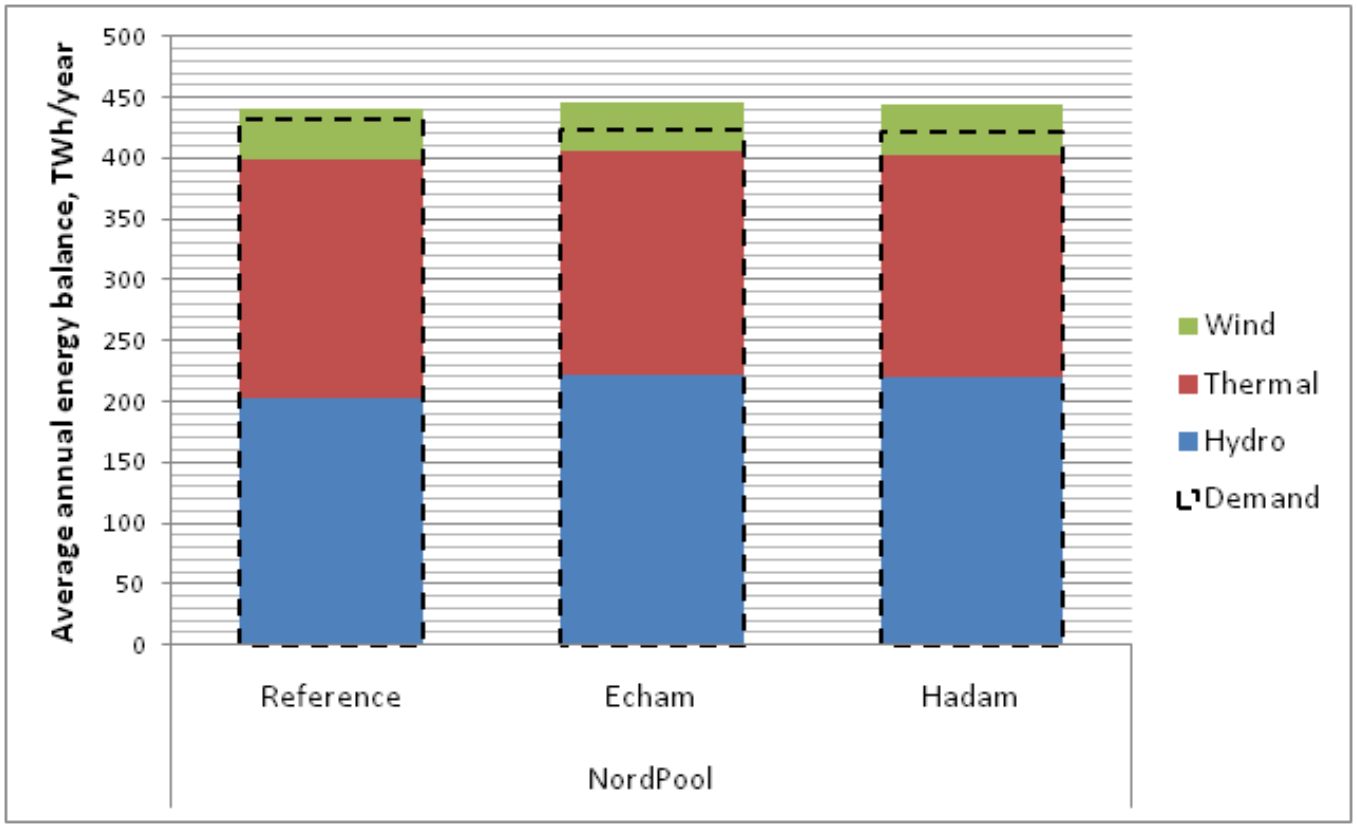
CO_2-emissions adjusted for import and export



Average annual characteristics for the NordPool area



Average annual energy balance, NordPool



- Average annual inflow increase with 12-13 %
- More inflow during winter, less or unchanged during summer
- Higher temperatures causes demand to decrease with 2-3 %
- Thermal production is substituted by hydro production
- Less imports from and more export to continental Europe
- CO_2 emissions decrease with 25 (57) %