

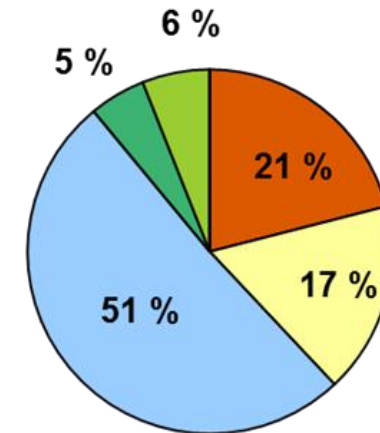
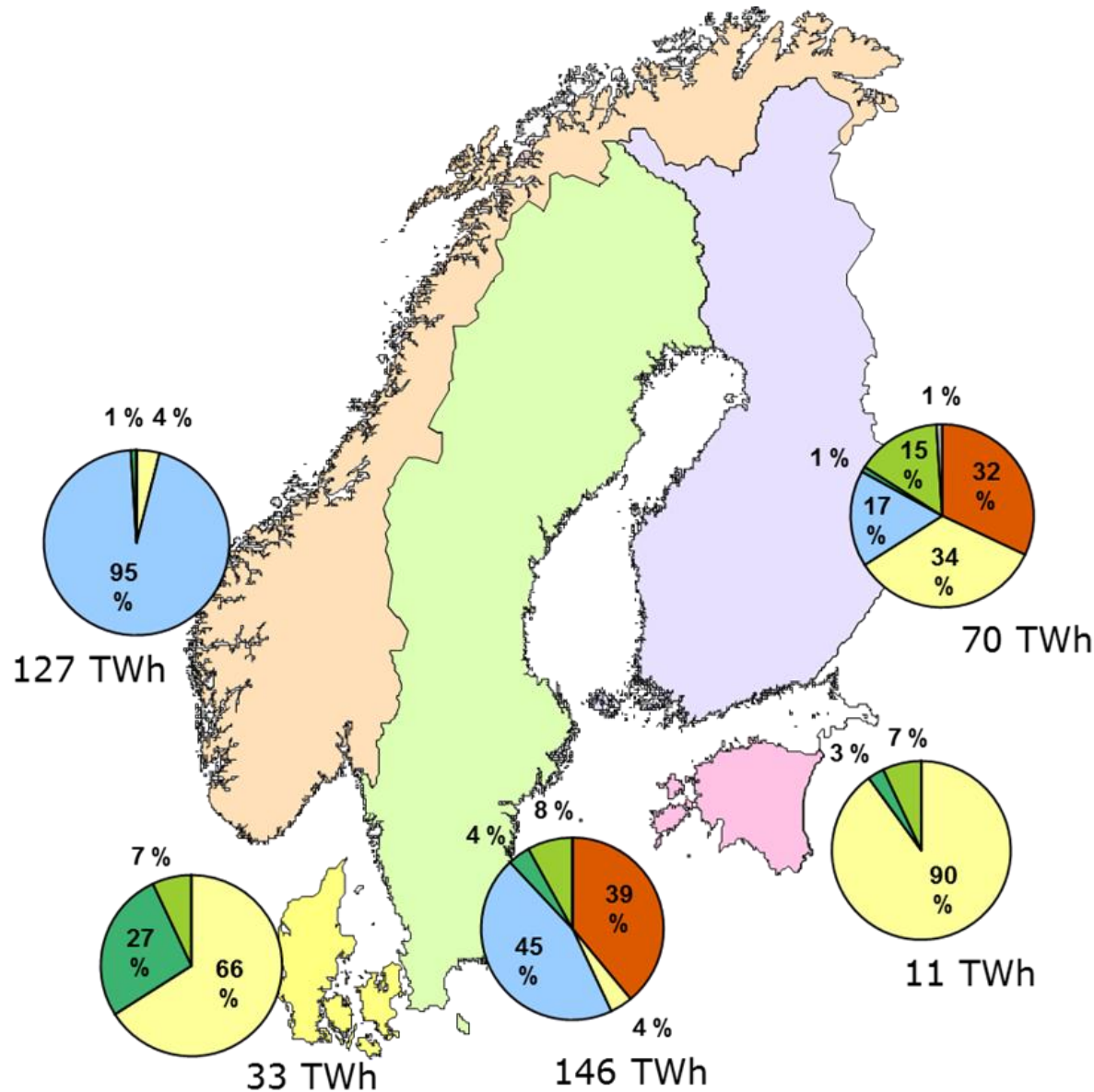


KEMIJOKI OY  
Mr. Aimo Takala  
President and CEO

# Role of Hydro Power in the Finnish Energy System



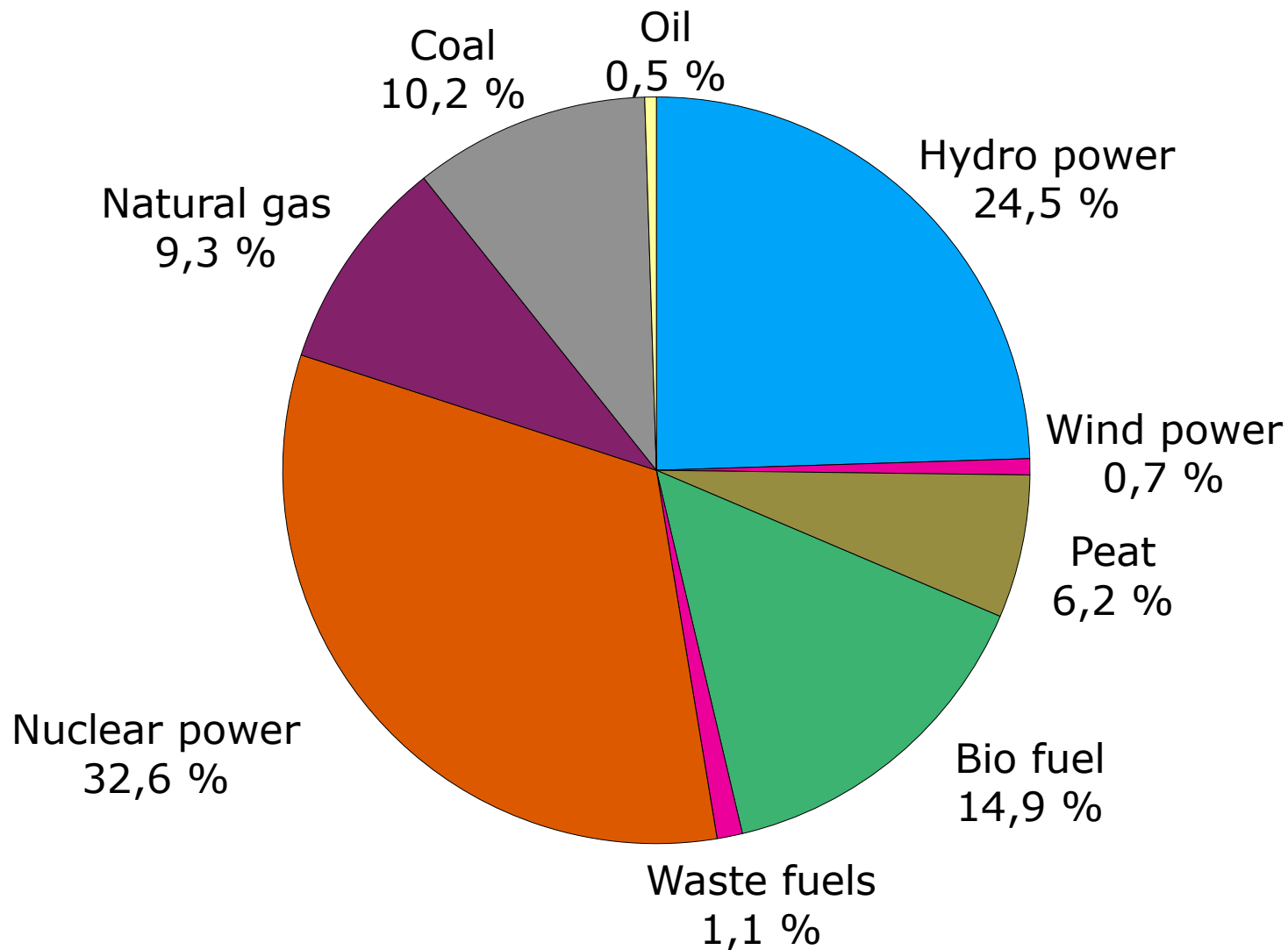
# Electricity Generation in Nordic market area 2011



- Hydro power
- Wind power
- Other renewables
- Nuclear power
- Fossil fuels
- Non-identifiable

Source: ENTSO-E

# Electricity Production by Energy Sources 2012 (67,7 TWh)



**Renewable 41 %**

**Carbon dioxide free 73 %**

Source: Finnish Energy Industries

# 20-20-20 targets for the European Union

By 2020, the EU should:

- increase the share of renewable energy sources to 20 %
- decrease greenhouse gas emissions by 20 %
- increase energy efficiency by 20 %





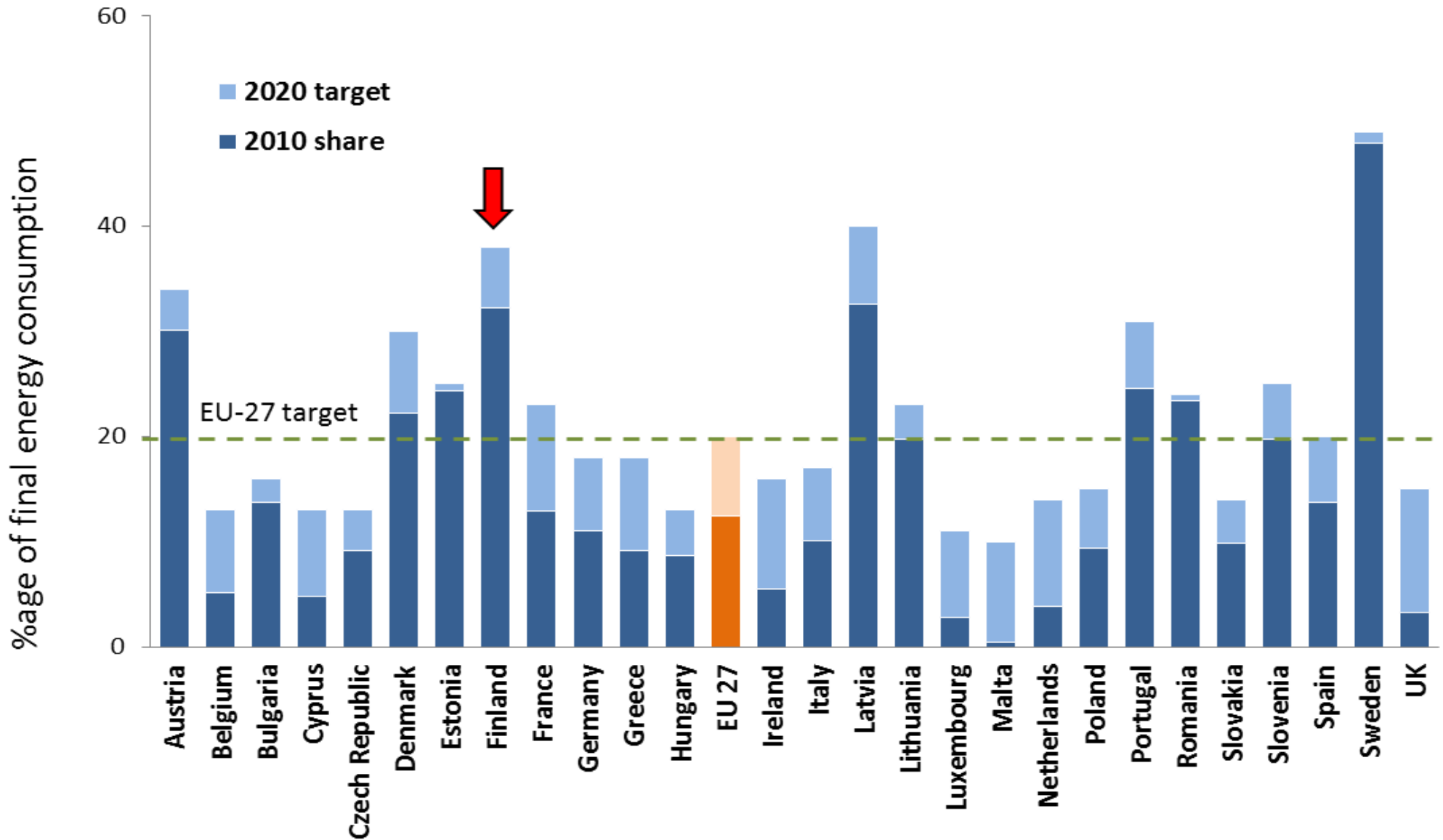
# Energy Roadmap 2050

The European Commission issued its **Energy Roadmap 2050** in December 2011

- the aim is to reduce carbon dioxide emissions by 85 % by 2050
- electricity has a vital role in reaching the goal:
  - > total energy consumption decreases
  - > electricity consumption increases

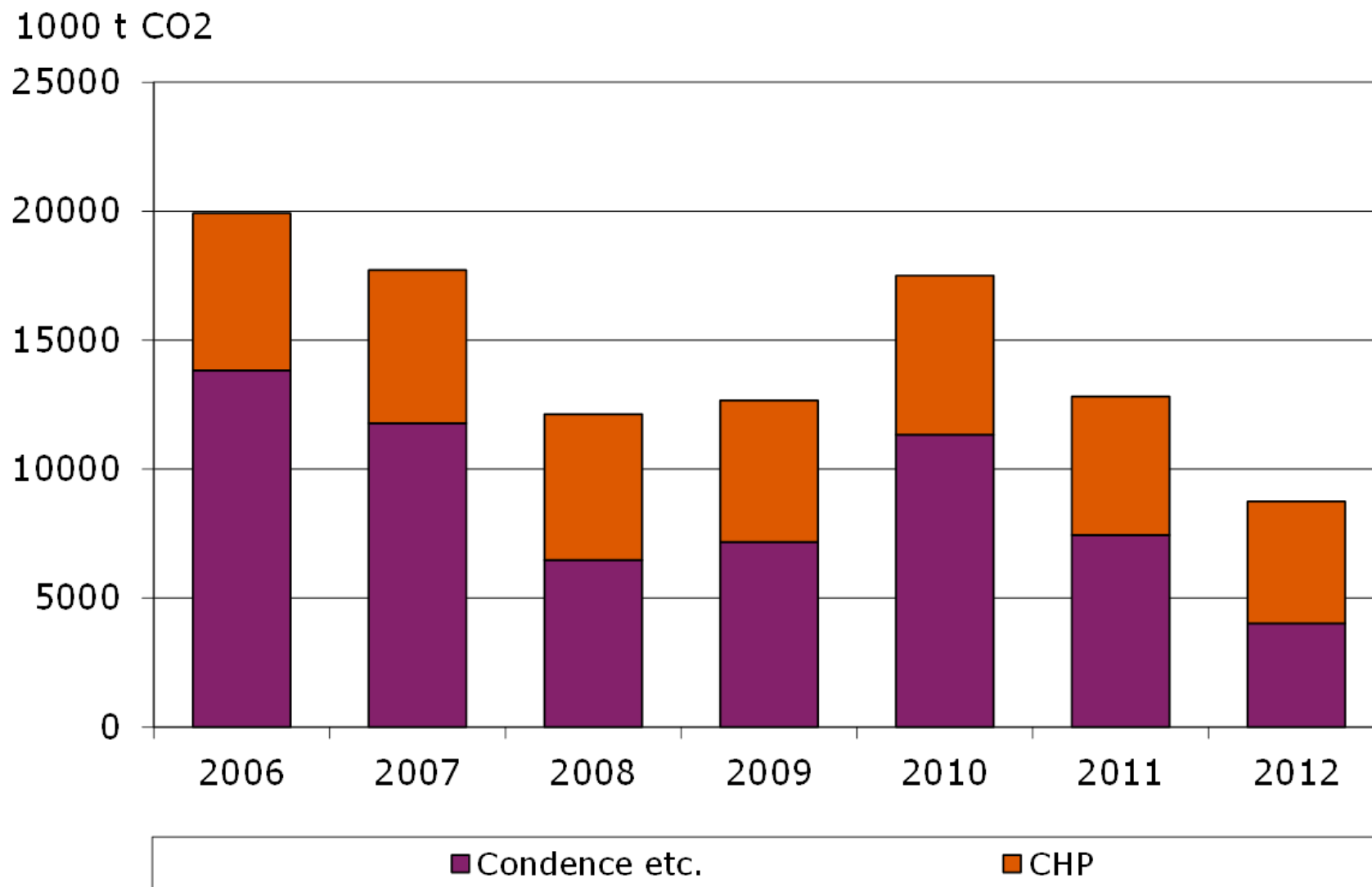


# Renewable energy targets, as percentage of final energy demand



Source: Eurostat (online data code: t2020 31)

# CO<sub>2</sub>-emissions of Power Production



Source: Finnish Energy Industries

# Objectives for Finland

Objectives for Finland have been listed in the **Long-Term Climate and Energy Strategy** approved by the Government in November 2008. Strategy will be updated in the beginning of 2013.

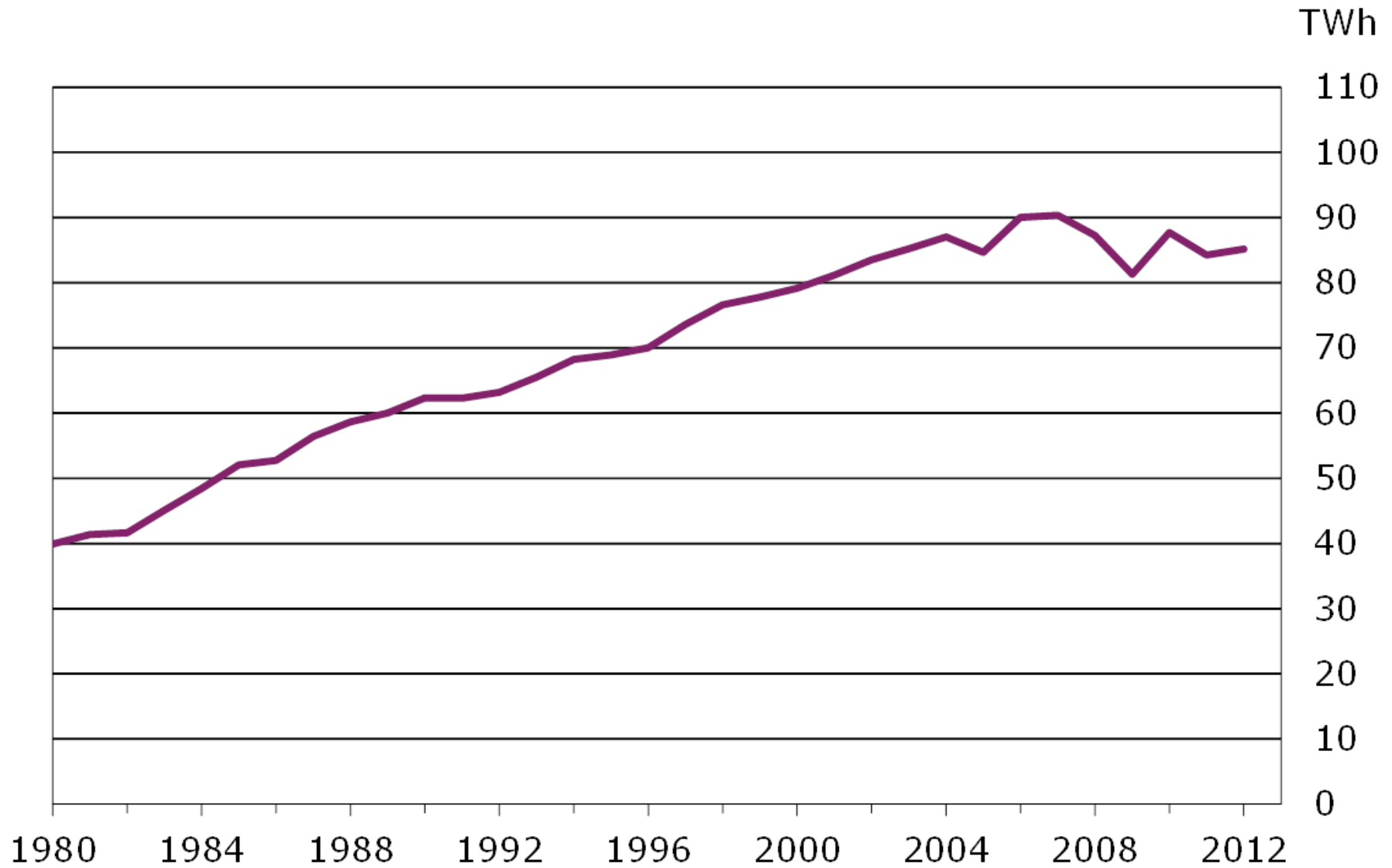
- decreasing total energy consumption
- increasing the share of renewable energy to 38 %
- slow growth in electricity consumption (except for last two years there has been slow decrease due to recession)
- acquisition of electricity should primarily be based on own capacity
  - > nuclear power will almost triple and wind power increase tenfold during the next 10 - 15 years





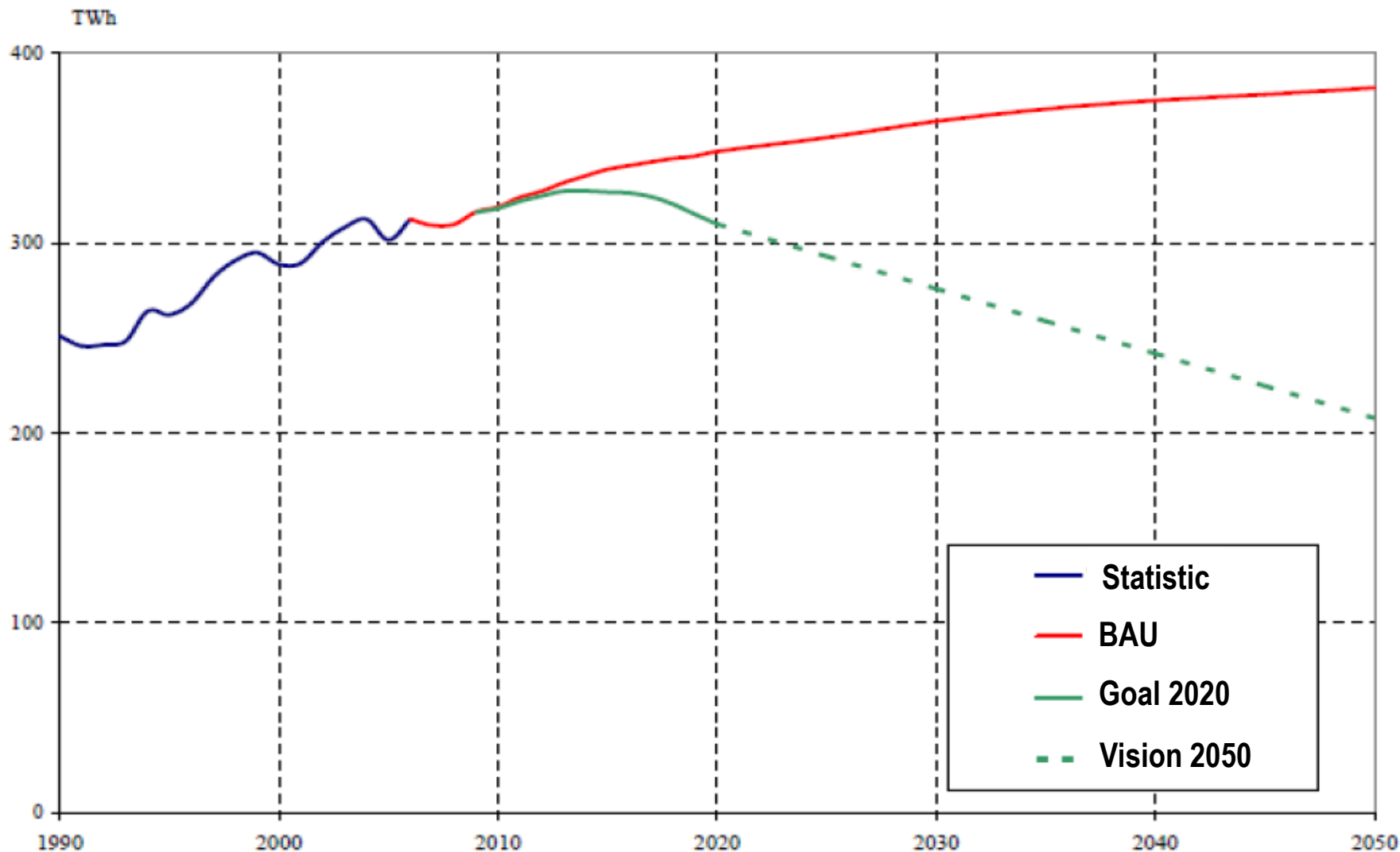
# Electricity Consumption

Year 2012 85.2 TWh



Source: Finnish Energy Industries

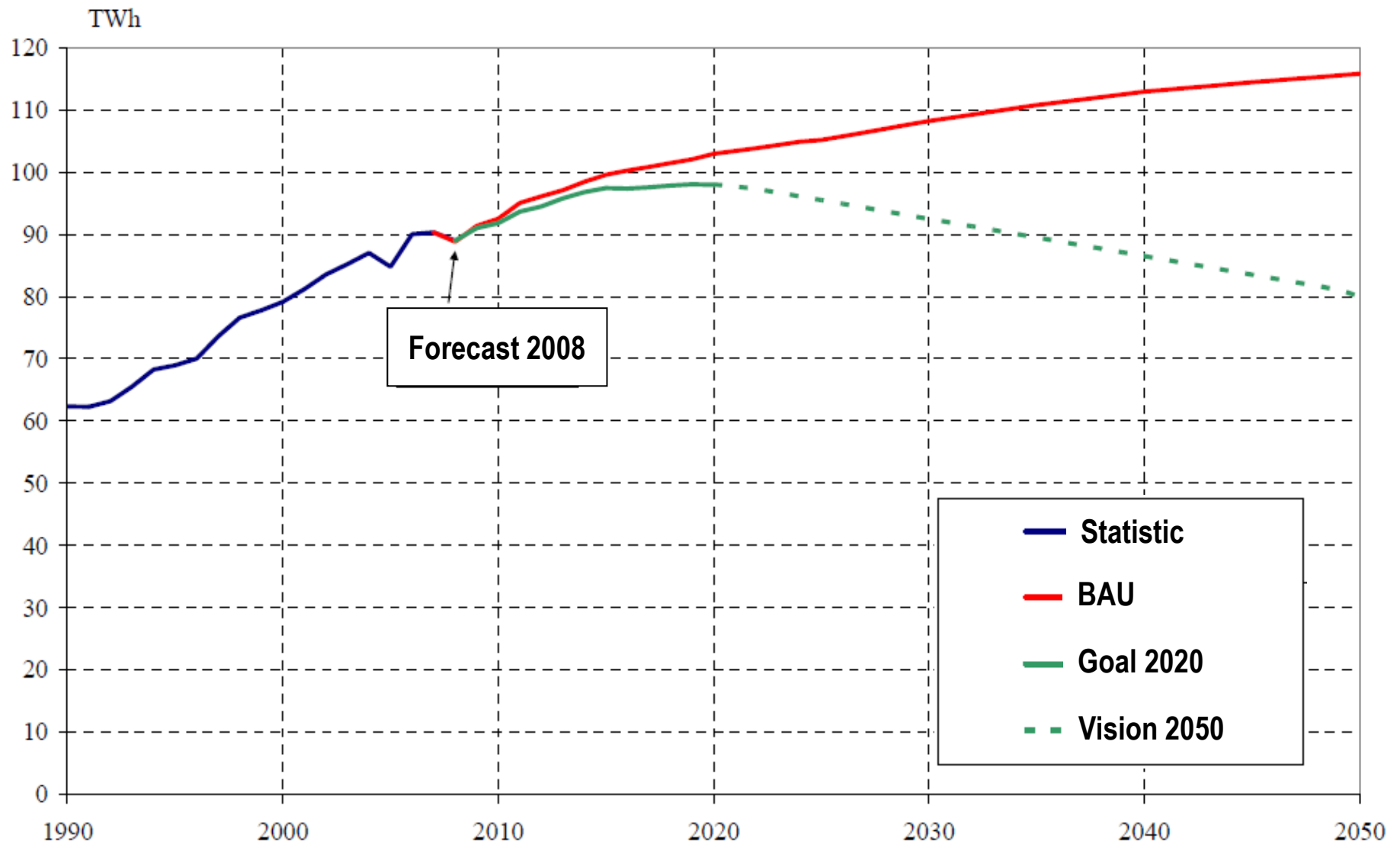
# Energy demand 2007-2050



Energy demand 1990-2006, BAU (business as usual) and goal 2007-2050, TWh

Source: Valtioneuvoston selonteko eduskunnalle 6.11.2008, VNS 6/2008 vp




# Electricity demand 1990-2050

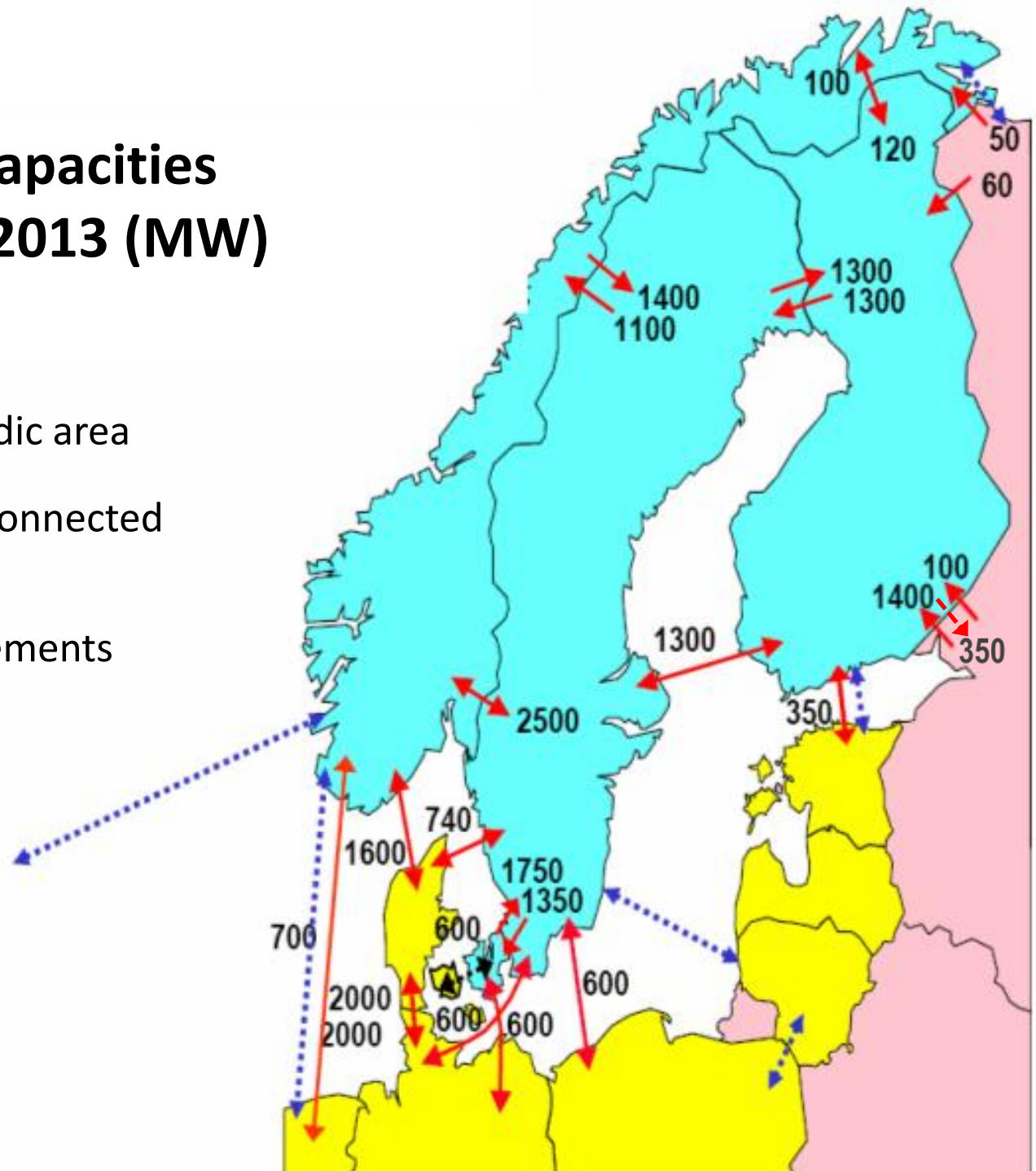


Electricity demand 1990-2008, BAU (business as usual) and goal 2007-2050, TWh

Source: Valtioneuvoston selonteko eduskunnalle 6.11.2008, VNS 6/2008 vp

# Transmission Capacities in the beginning 2013 (MW)

-  Synchronous Nordic area
-  Asynchronously connected EU area
-  Planned reinforcements



Source: Nordel

# Indications of Grid Capacity Development in Europe 2020

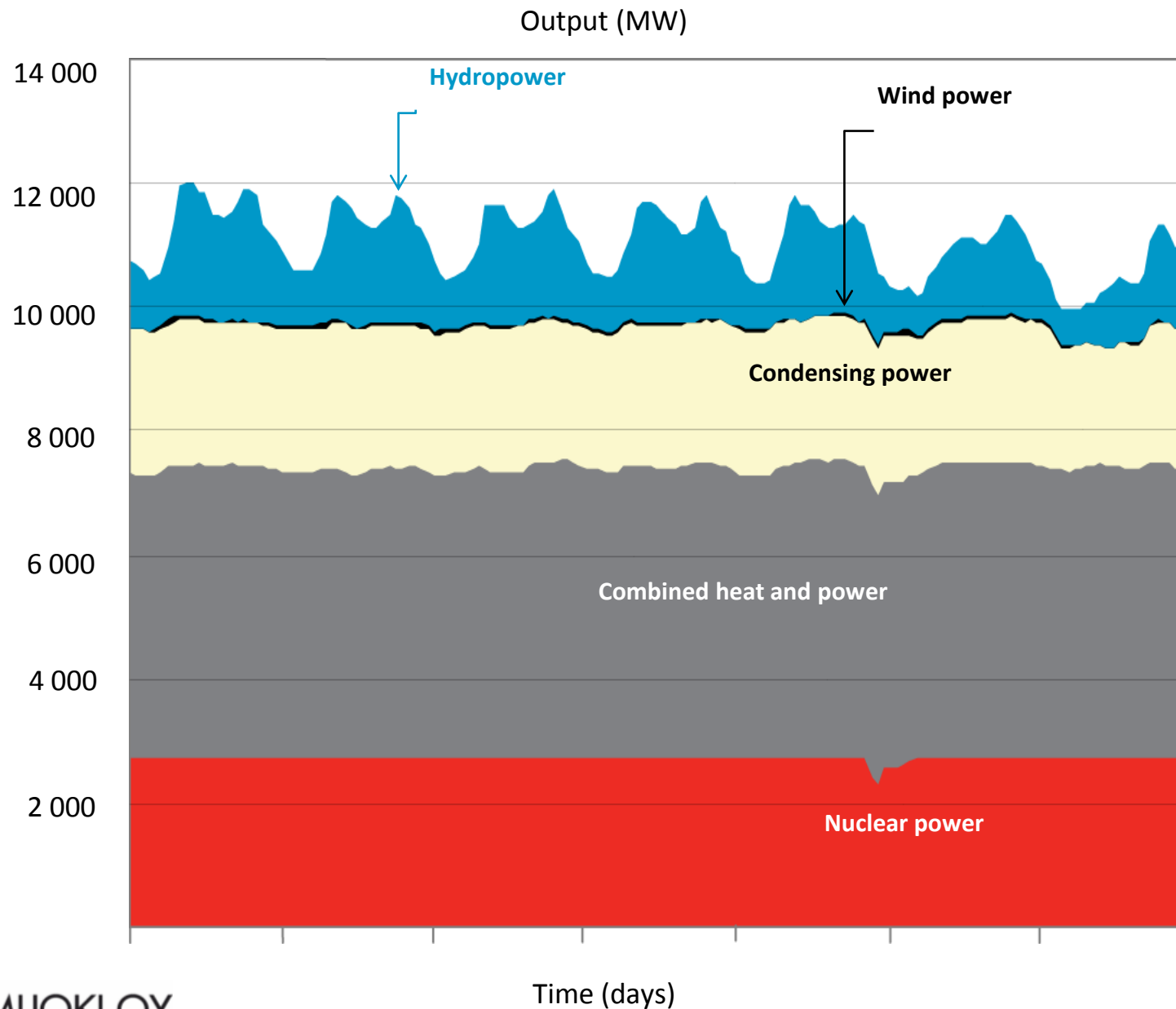


Source: ENTSO-E

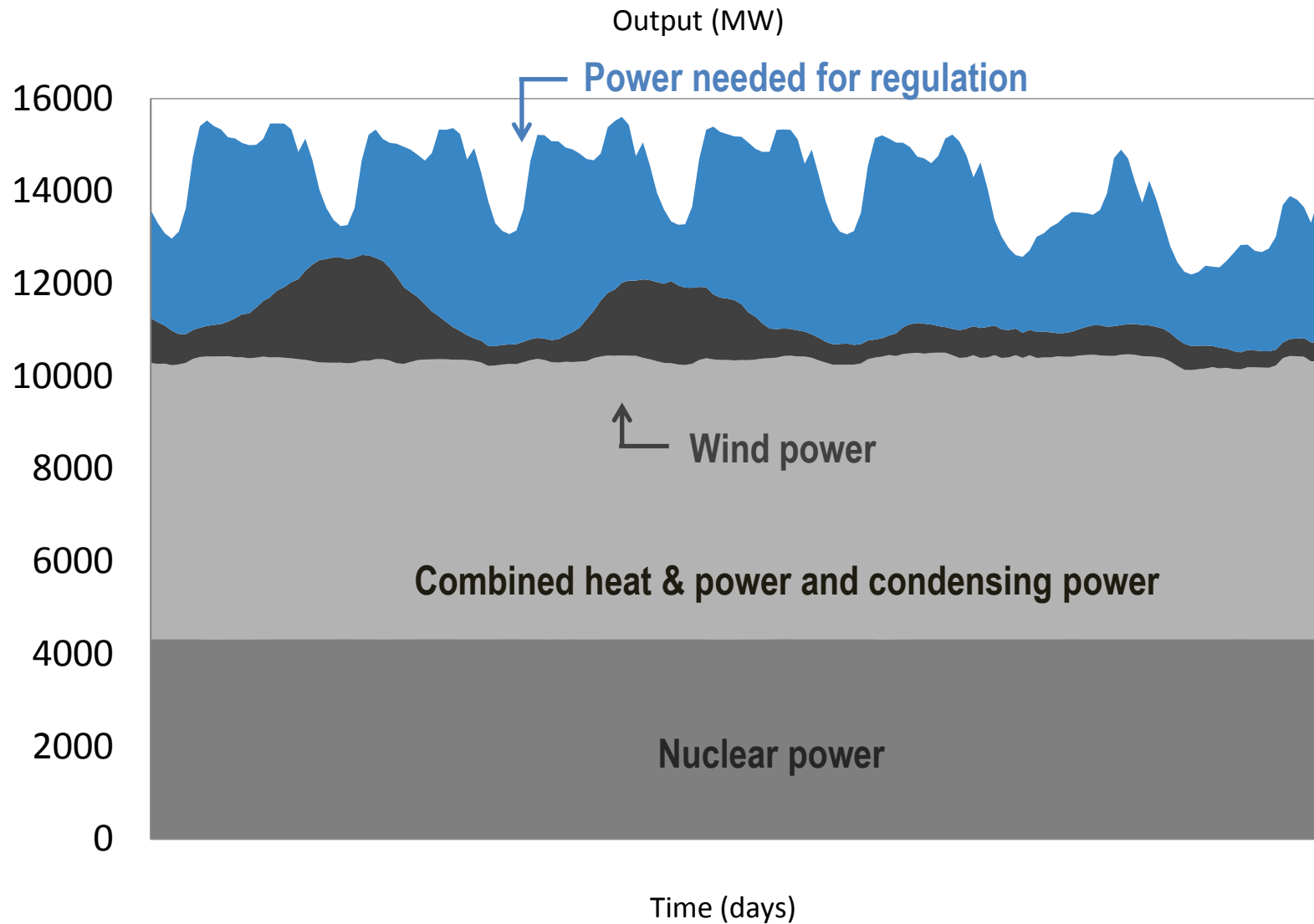




# Electricity production in Finland – one week

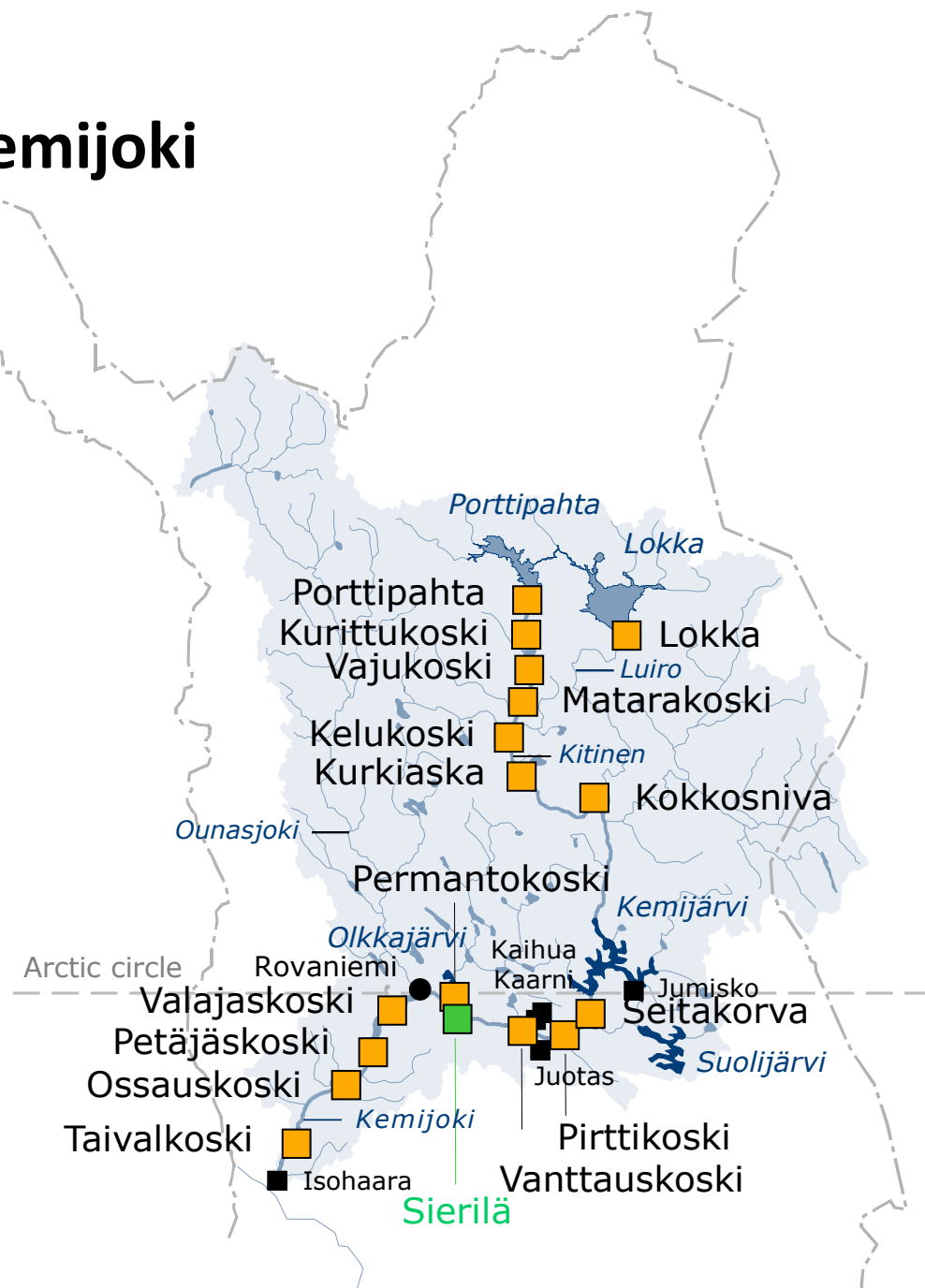


# The structure of electricity production in Finland will change in 2020 thus increasing the demand for regulation

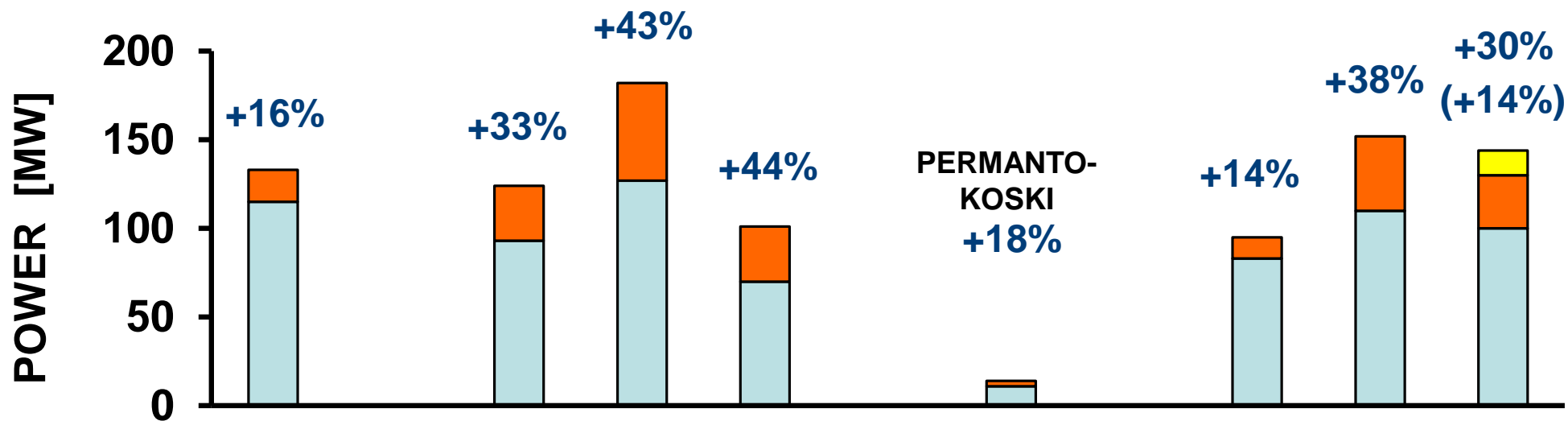
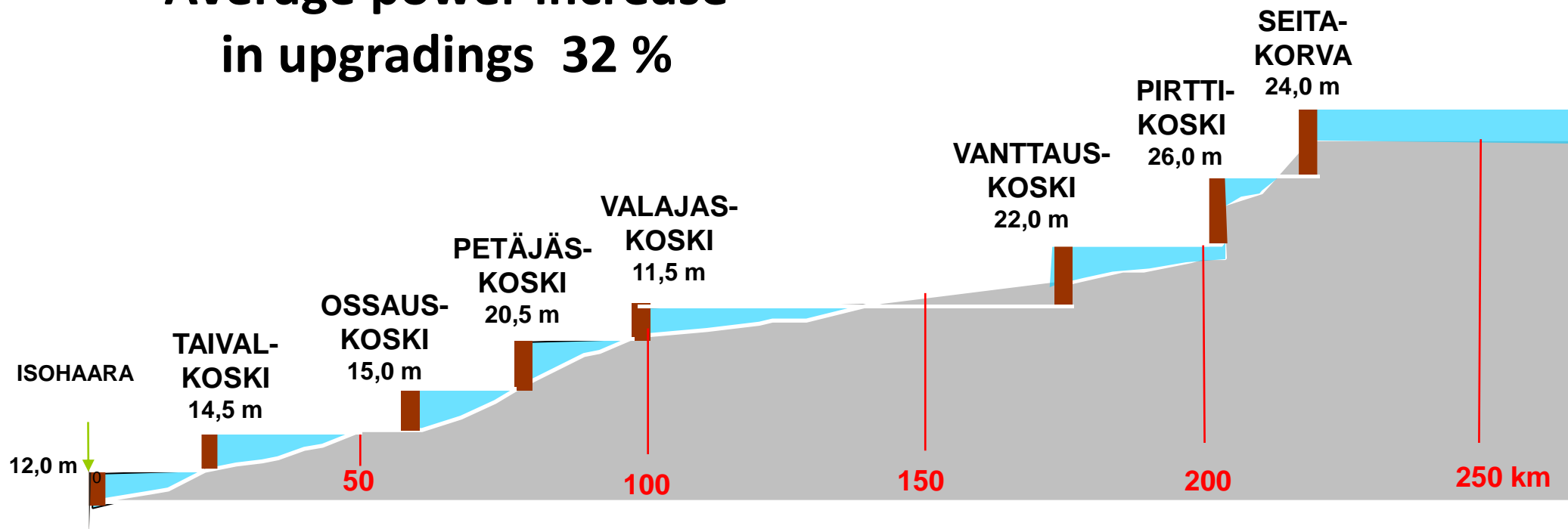


# Power plants on the River Kemijoki

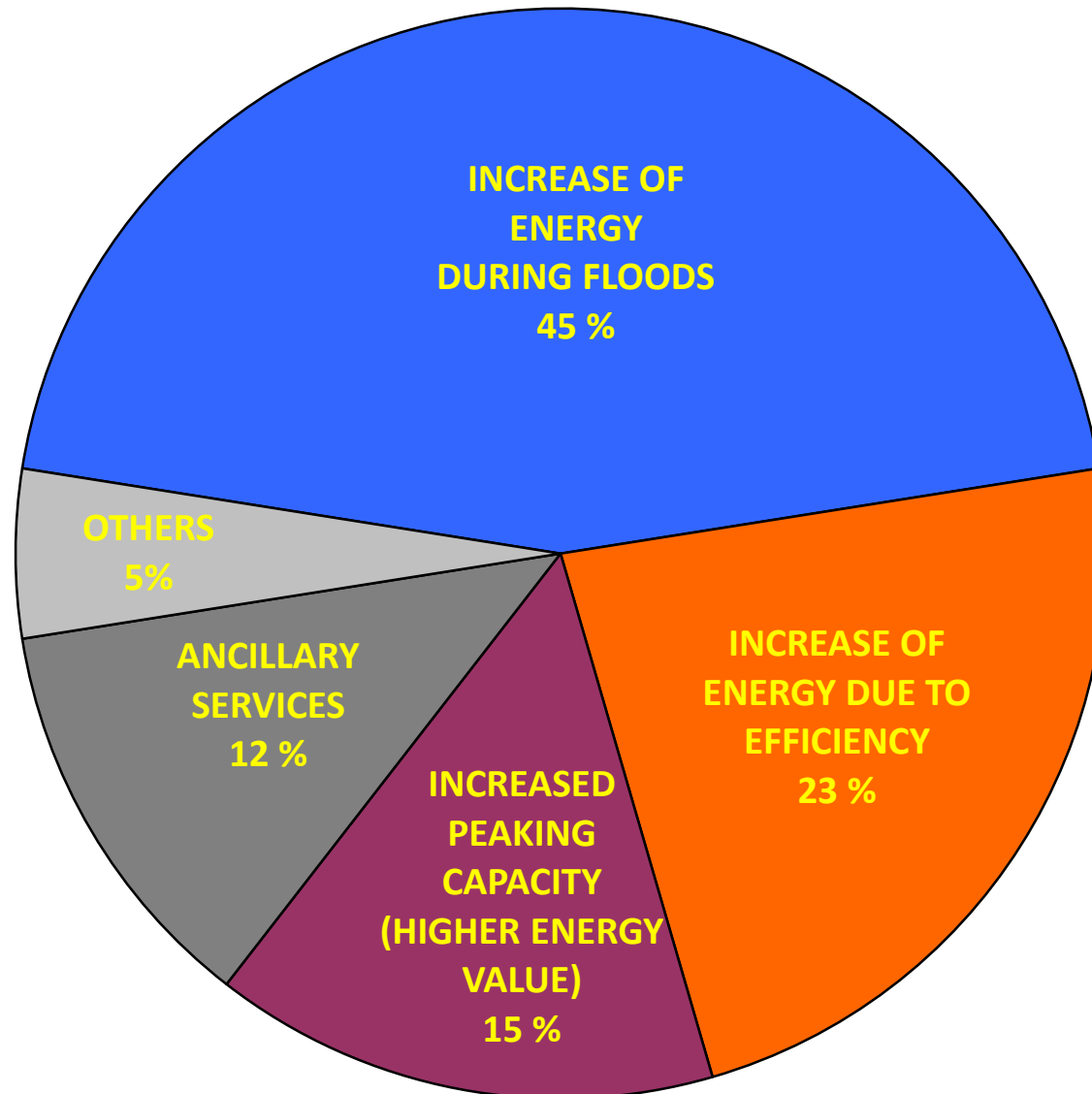
- Power plant owned by Kemijoki Oy
- Planned power plant
- Power plant owned by:
  - PVO-Vesivoima Oy
  - Rovakairan tuotanto Oy
  - Keski-Lapin Voima Oy
- Regulated lake
- Reservoir
- Watercourse area



# Average power increase in upgradings 32 %



# Average distribution of benefits in upgradings





## Conclusions of upgradings

- Upgrading in connection with refurbishment is often very cost-effective
- Long periods on excess water improve the feasibility
- Possibility to improve safety and environment-friendliness by totally new solutions
- Increased value of power and improvement in turbine design have made it possible to achieve bigger power increase in the latest upgradings compared with the first ones

# Thank You !

