Midterm Planning at Vattenfall
– where do we see challenges in the future?

Brukermøte Produksjonsplanlegging
Trondheim 22. + 23. maj 2013
Betina Knudsen, Vattenfall

Agenda

- Vattenfall
- Mid Term planning at Vattenfall – models and processes
- EMPS & Mid Term Planning in the future

Vattenfall's markets and position in Europe

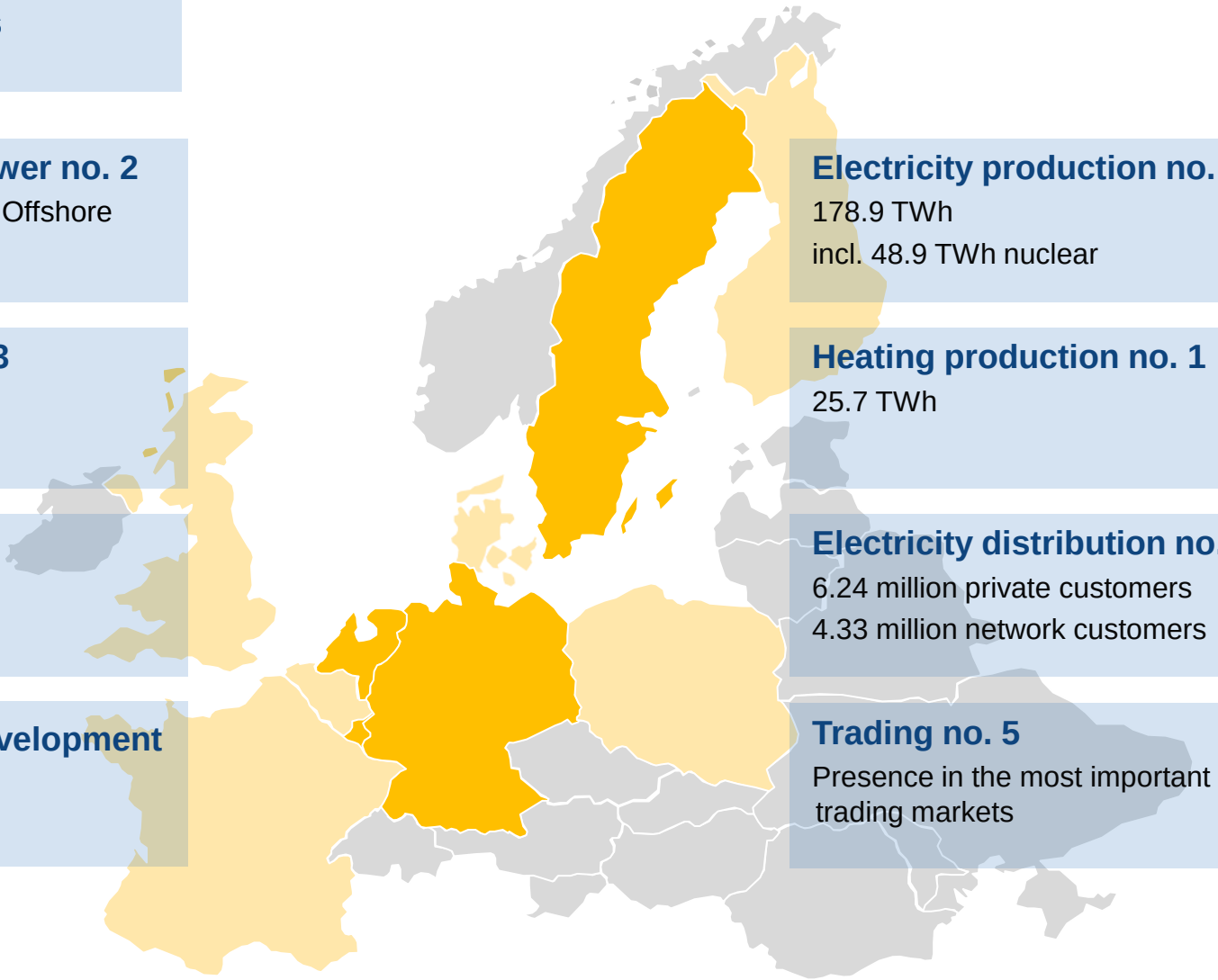
32.000 employees

Offshore wind power no. 2
3.6 TWh onshore and Offshore

Hydro power no. 3
42.2 TWh

Biomass no. 5
2.5 TWh

Technological development
Wave energy



Electricity production no. 6
178.9 TWh
incl. 48.9 TWh nuclear

Heating production no. 1
25.7 TWh

Electricity distribution no. 6
6.24 million private customers
4.33 million network customers

Trading no. 5
Presence in the most important trading markets

Core markets

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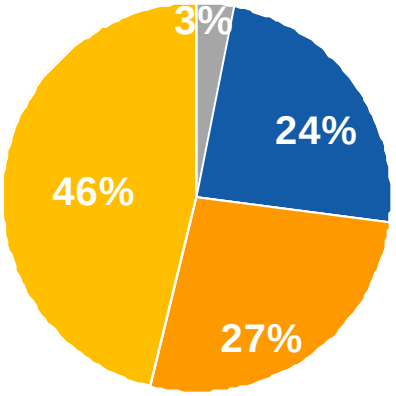
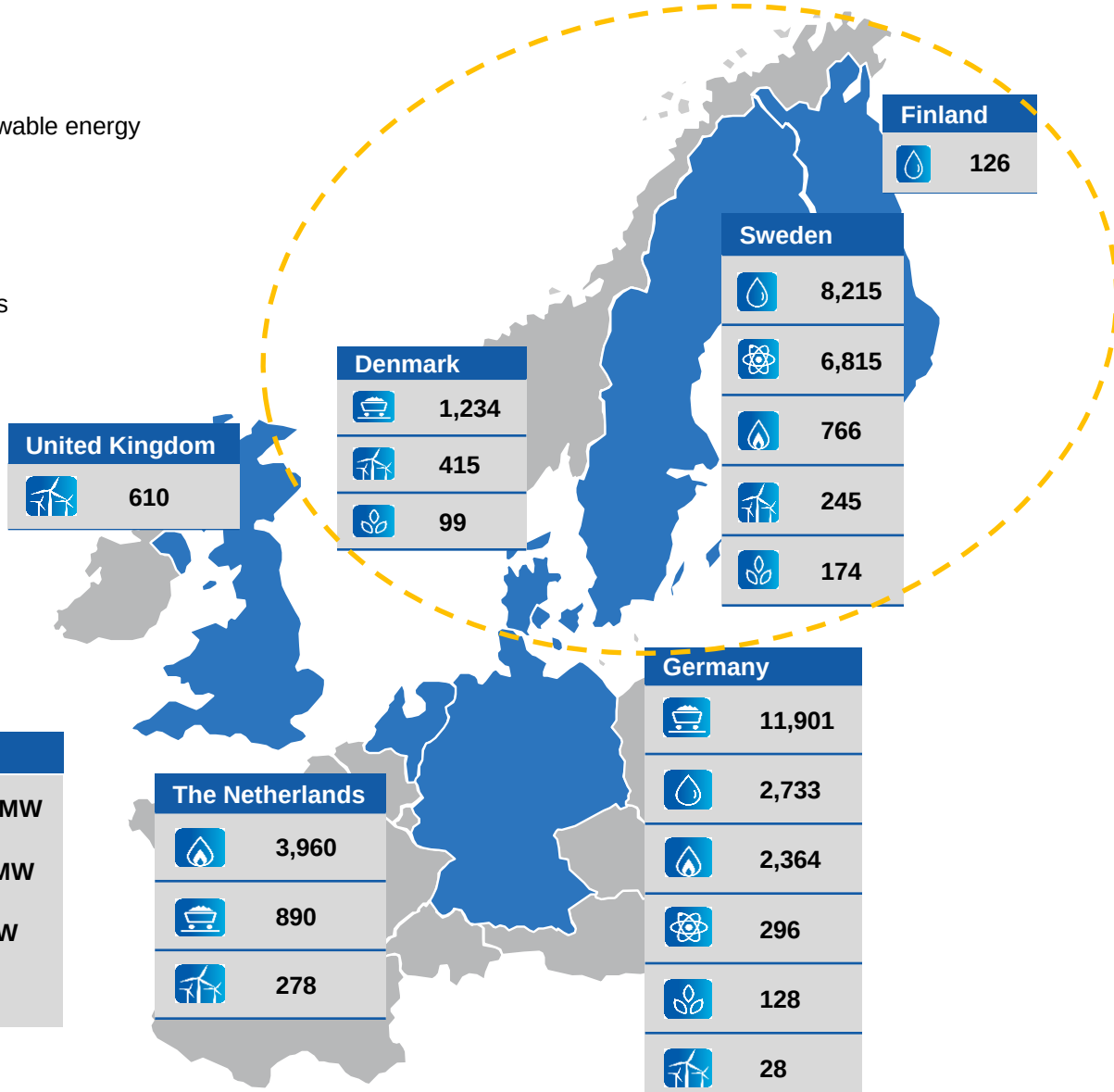
Vattenfalls installed capacity & Generation



- Other renewable energy
- Hydro
- Nuclear
- Fossil Fuels



Vattenfall total			
Biomass: 401 MW		Hydro: 11,074 MW	
Coal: 14,025 MW		Nuclear: 7,11 MW	
Gas/Oil: 7,090 MW		Wind: 1,576 MW	

Gross installed capacity 2012: 38,544 MW

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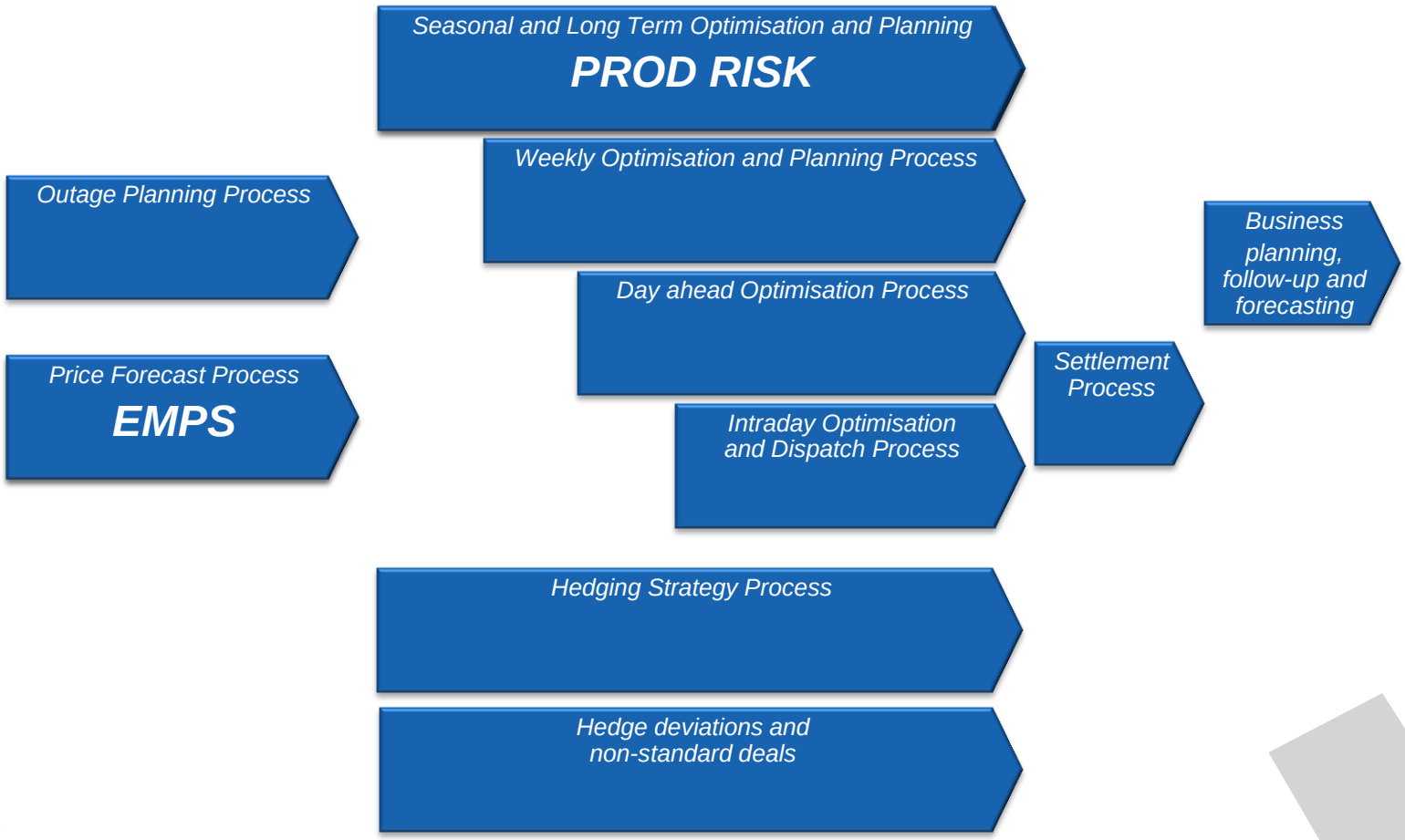
Mid Term Planning at Vattenfall



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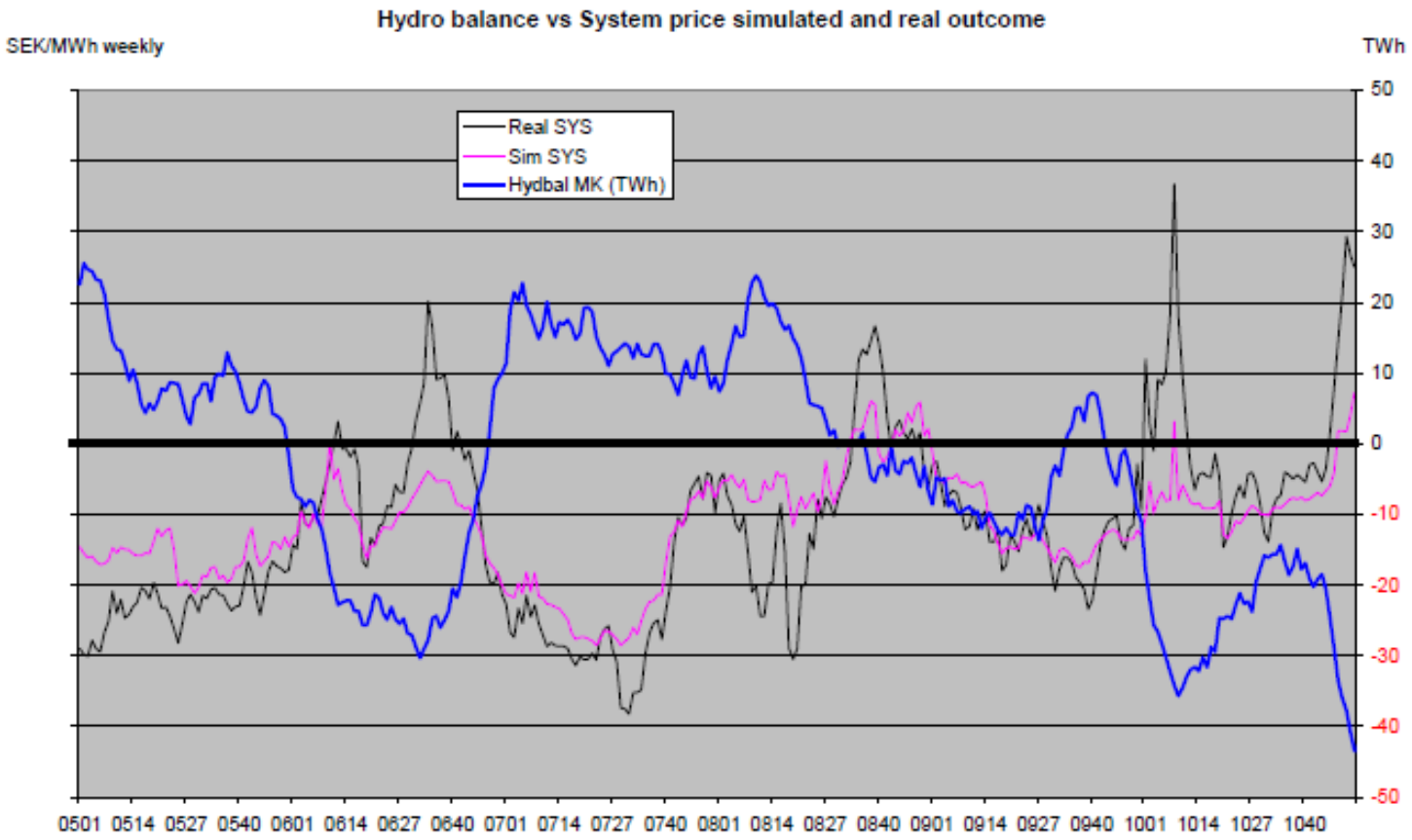
Experiences so far - Backtesting



- Simulated price too high when HB is positive
- Simulated price too low when HB is negative

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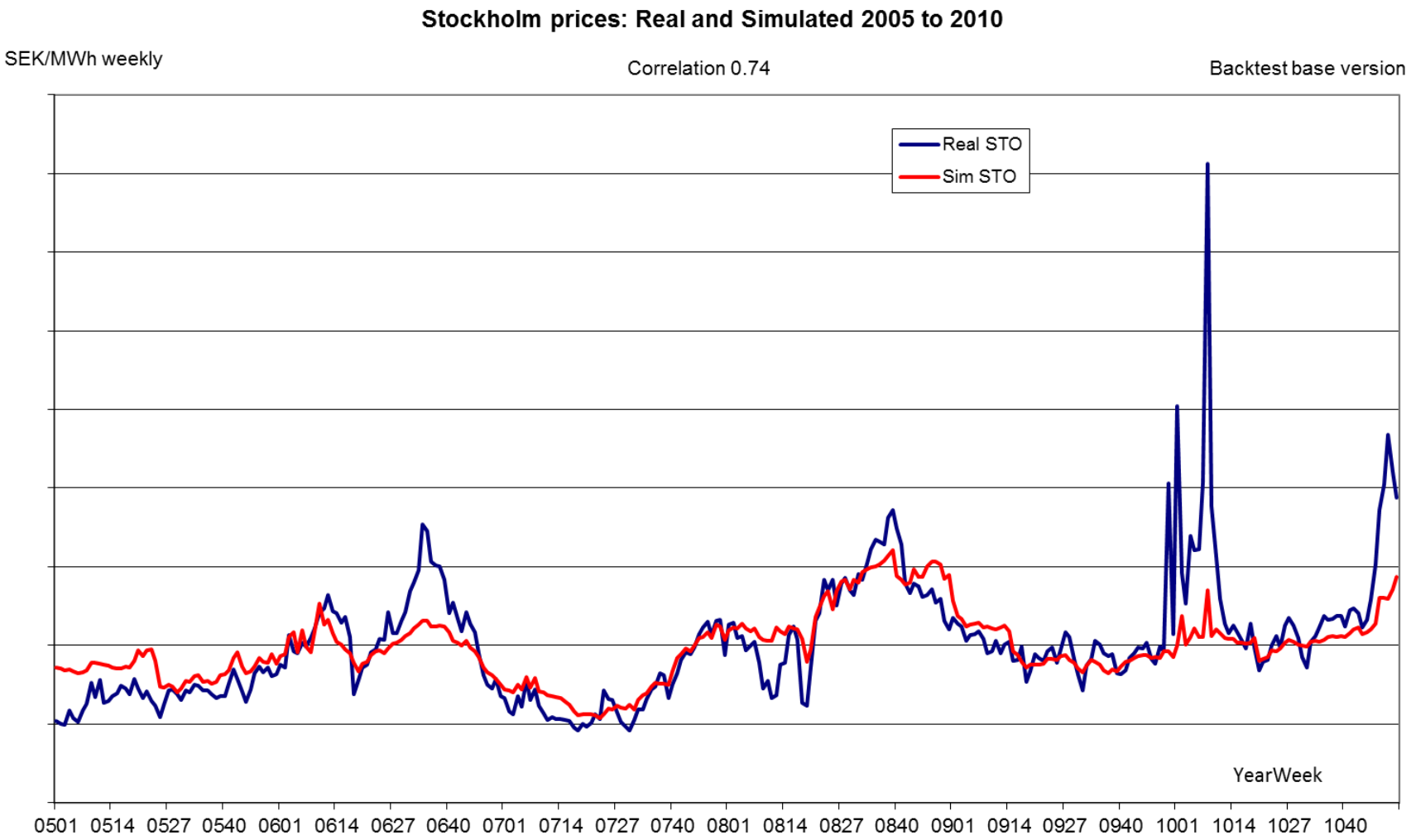
Backtesting - STOSEK weekly



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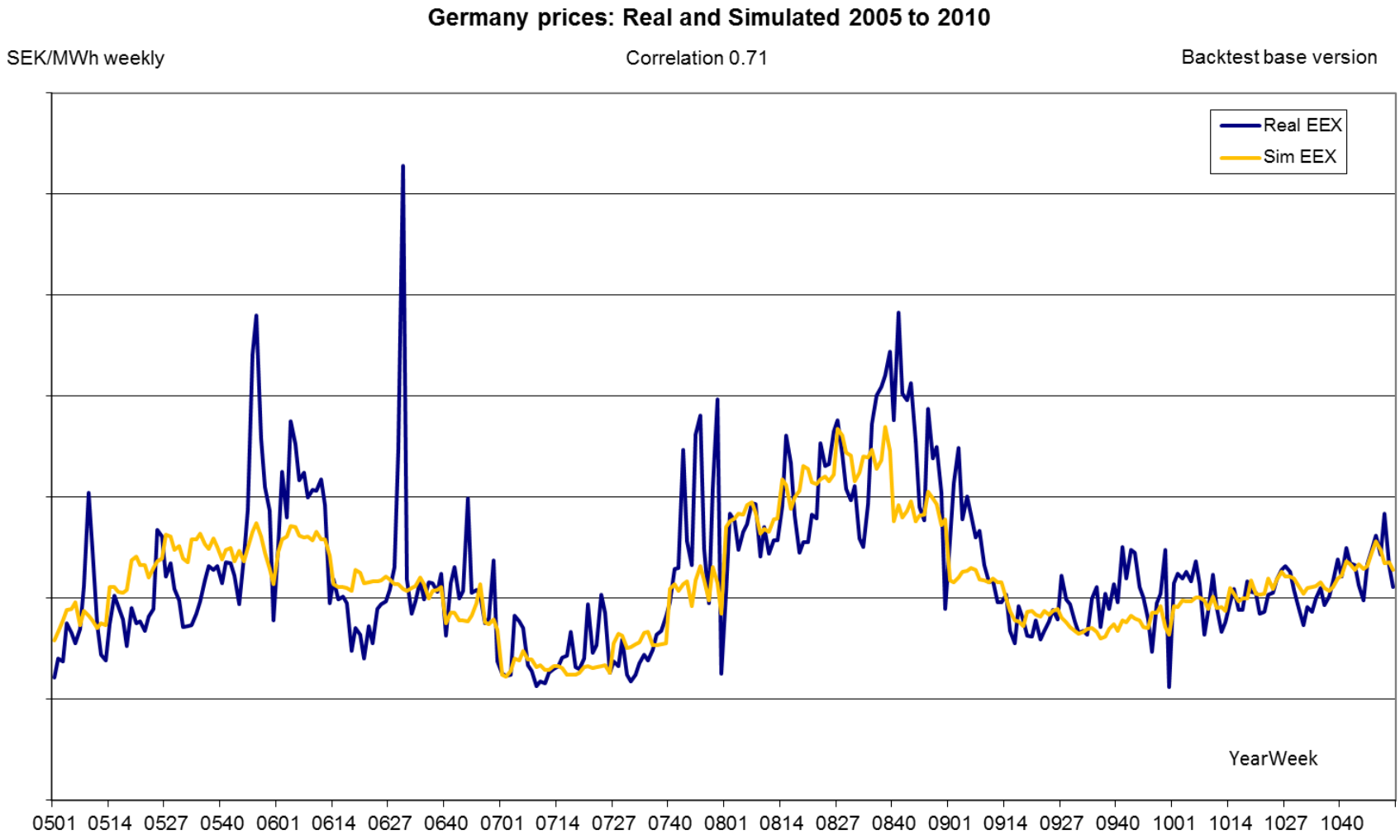
Backtesting - EEXSEK weekly



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EMPS & Mid Term Planning in the future

- The future will bring:
  - More Renewables
  - A weather dependent power price
  - Change of merit order – wind, solar and thermal
- And what about future framework for power producers:
  - Capacity payments….
  - RE Support…..
  - Market coupling…..
  - Political regulation

- Vattenfall needs:
  - A price forecast model with high quality output

Continue with EMPS as a part of Mid Term Planning?

EMPS & Mid Term Planning in the future

- Strengths
  - Can handle energy planning stochastic
  - Proven model
  - Good cooperation with Sintef
  - **Progress in development, time resolution, calculation time ect…**
- Weakness
  - Not user friendly – user interface and engine
  - Takes time to learn
  - Does not capture price spikes
- Opportunities
  - Can handle the increasing part of wind and solar stochastic
  - **Complemented with statistical tools**
  - **Set up of a GUI**
- Treats
  - Can it simulate the future power system with a new merit order?
  - Can it simulate potential future changes in framework
  - Newer and more user friendly models on the market

Thank you