

# From tightness to flood – price forecasting in exciting times

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NORGES ENERGIDAGER TORSDAG 13. OKTOBER

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08.09.2011

POINT CARBON



THOMSON REUTERS

# Thomson Reuters

Point Carbon was acquired by Thomson Reuters in May 2010

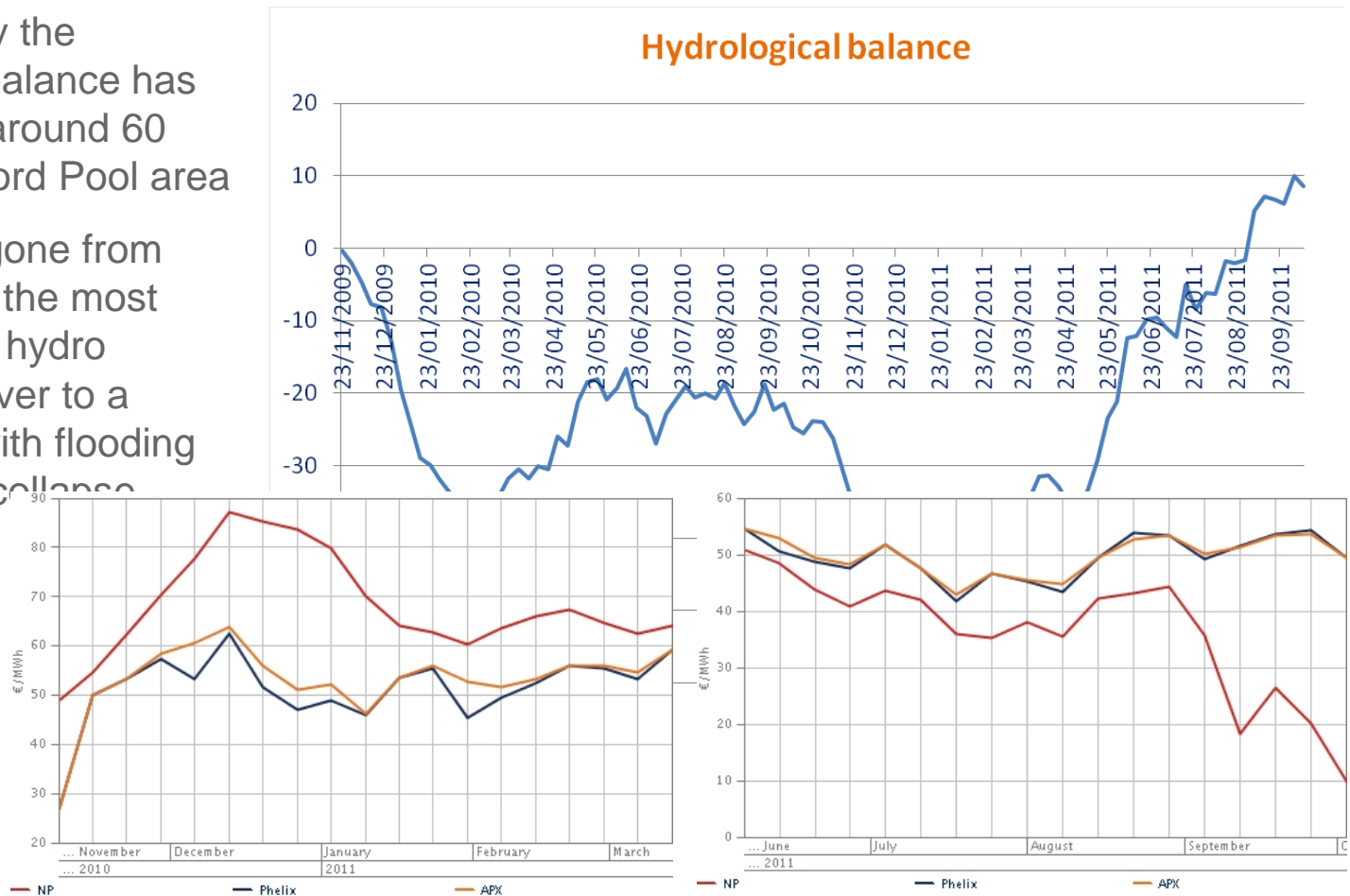
- From October 1 this year, Point Carbon became fully integrated into Thomson Reuters
- Point Carbon will continue as a product name
- Thomson Reuters is the world's leading source of intelligent information for businesses and professionals



# A very special hydrological year

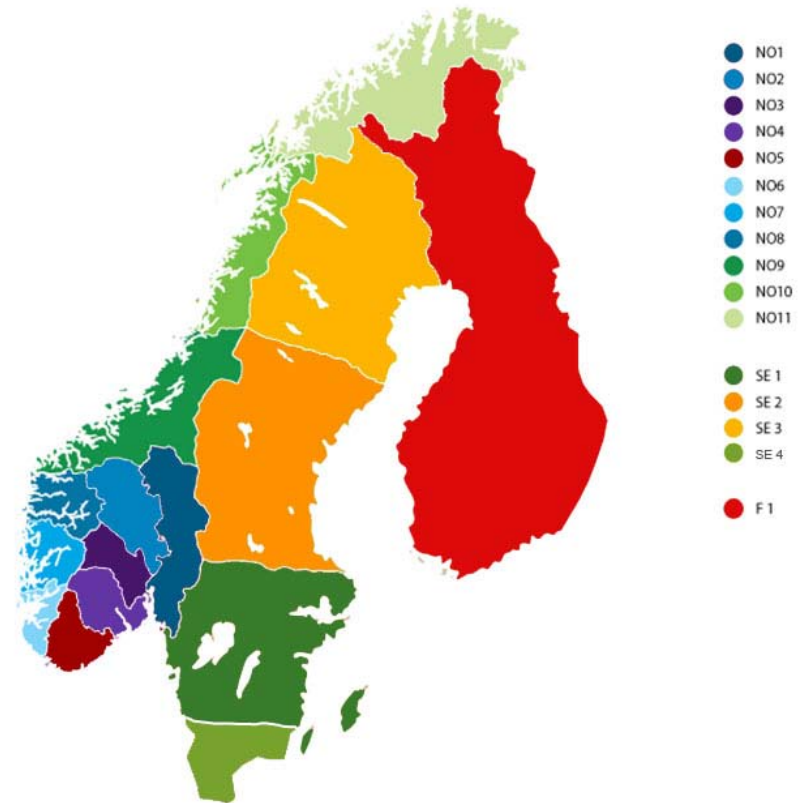
Since January the hydrological balance has improved by around 60 TWh in the Nord Pool area

- We have gone from potentially the most distressed hydro situation ever to a situation with flooding and price collapse

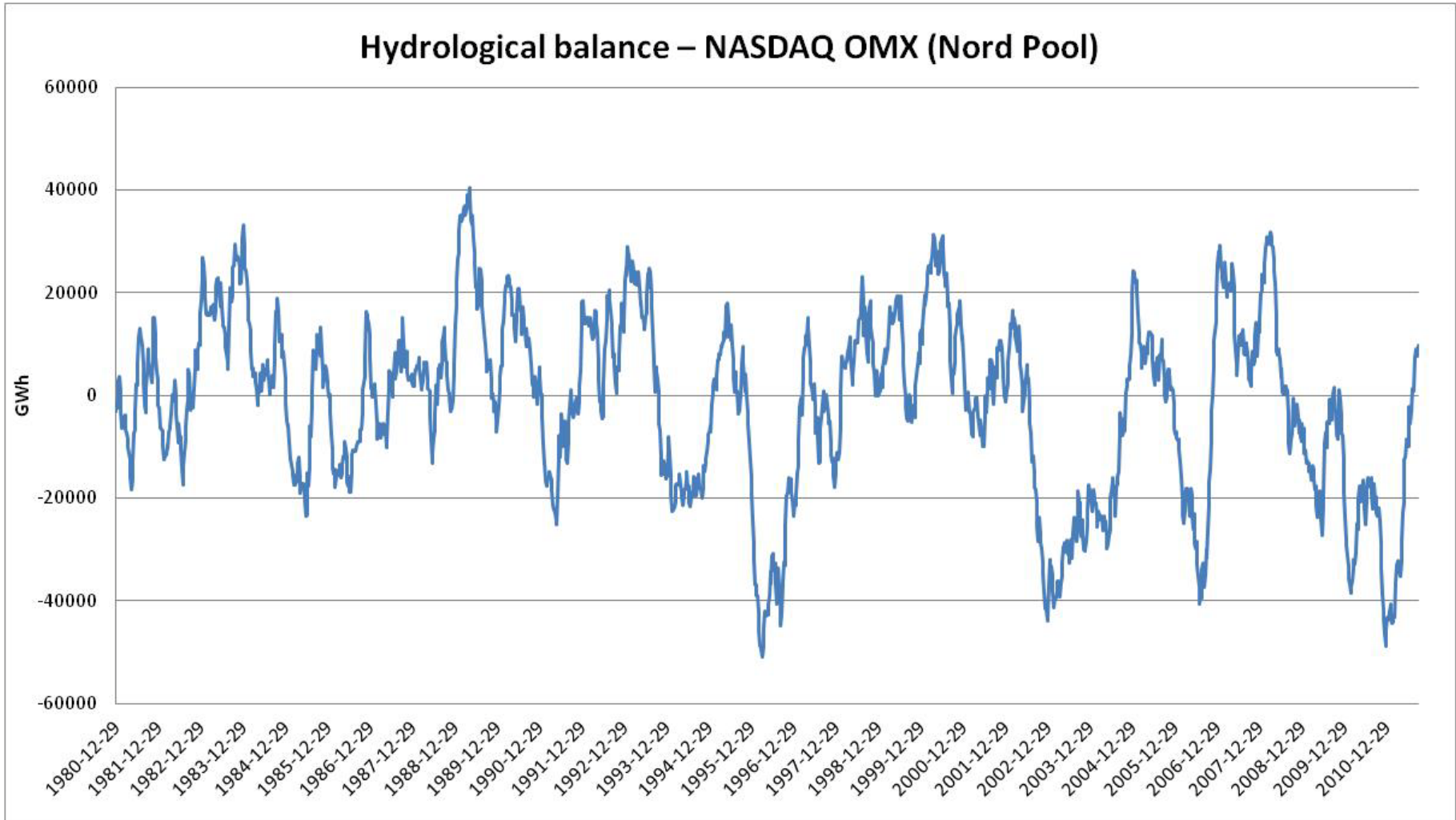


# The HBV model

- Hydro model on 16 areas in Scandinavia  
Also models for Switzerland, Austria, France, Germany & Italy
- Hydro dominated market
- Uses precipitation and temperature forecasts as only input
- Model result in GWh, updated 2 times daily on EC weather forecast and 4 times GFS
- Main input to the medium term price forecast model – SDDP

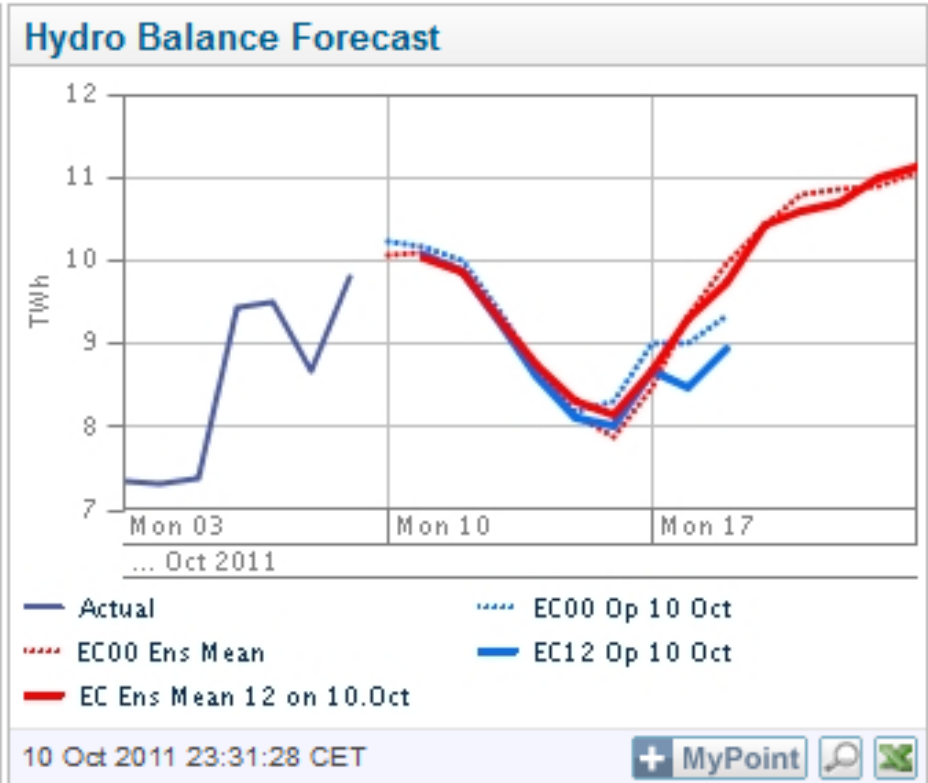


# Historical Hydrological balance 1981-2011 NASDAQ OMX (Nord Pool)

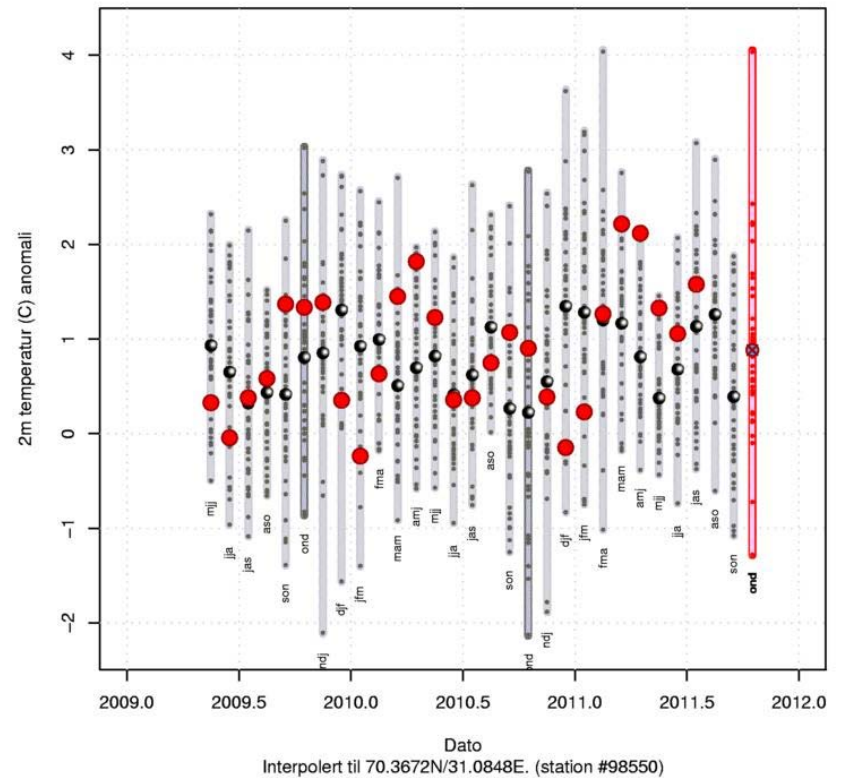
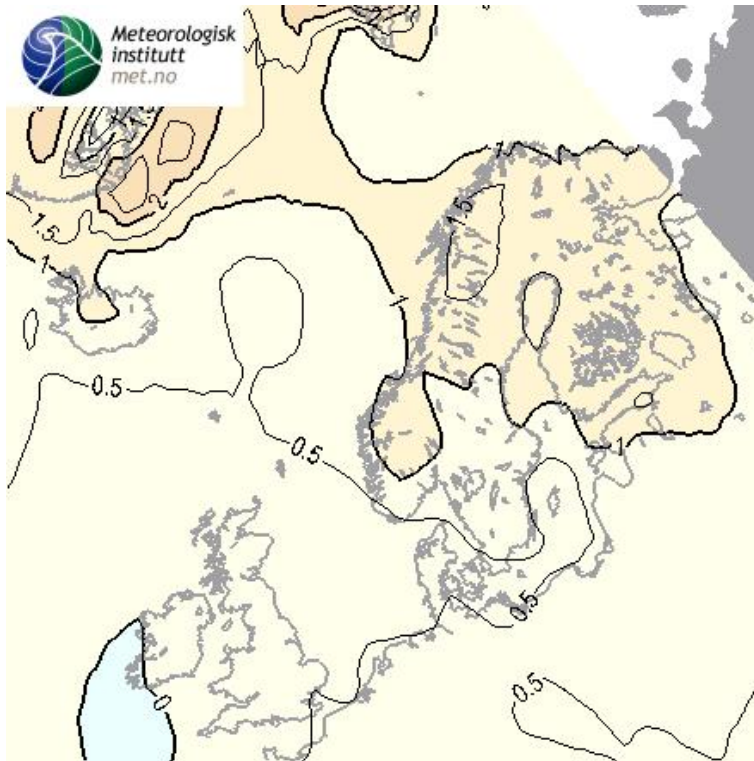


# Hydrological balance – NASDAQ OMX (Nord Pool)

Hydro Summary Nord Pool					
	07 Oct	08 Oct	09 Oct	10 Oct	Chg Prev
<b>Hydro Balance Today</b>					
Last Actual	9.5	8.7	9.8	..	1.1
<b>Hydro Balance Last Day in Forecast</b>					
EC12 Ens Mean	12.5	13.9	11.9	11.1	0.1
EC12 Op	12.4	12.0	10.9	9.3	-0.4
<b>Hydrological Parameters</b>					
Snow and soil, TWh	17.1	16.2	17.3	..	1.2
Inflow, GWh	1 024	945	777	..	-168
Eff precip, GWh	858	-8	1 945	..	1 953
Hydro temp, °C	4.4	2.2	0.4	..	-1.7
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# A normalization ahead? October to December



# Problem characteristics

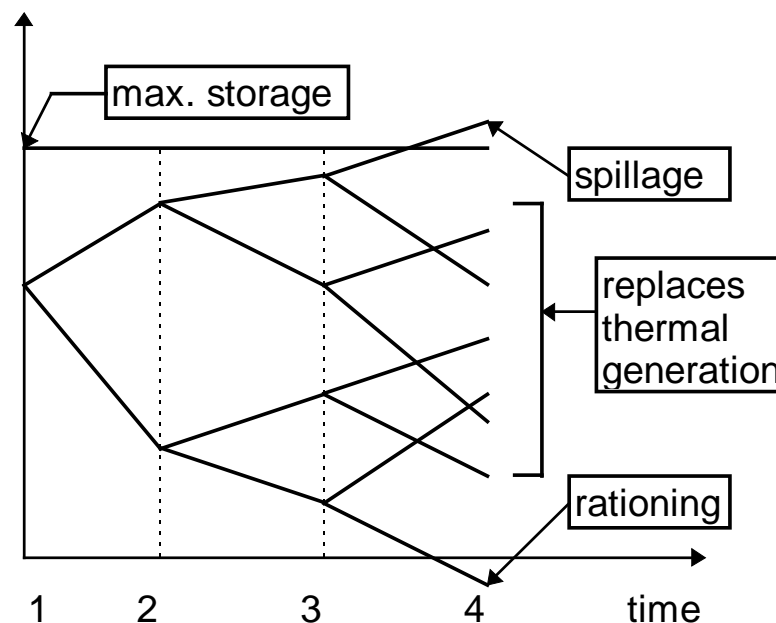
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Hydro producers may move supply from a delivery period with surplus to a delivery period with scarcity

Hydro producers' incentive:

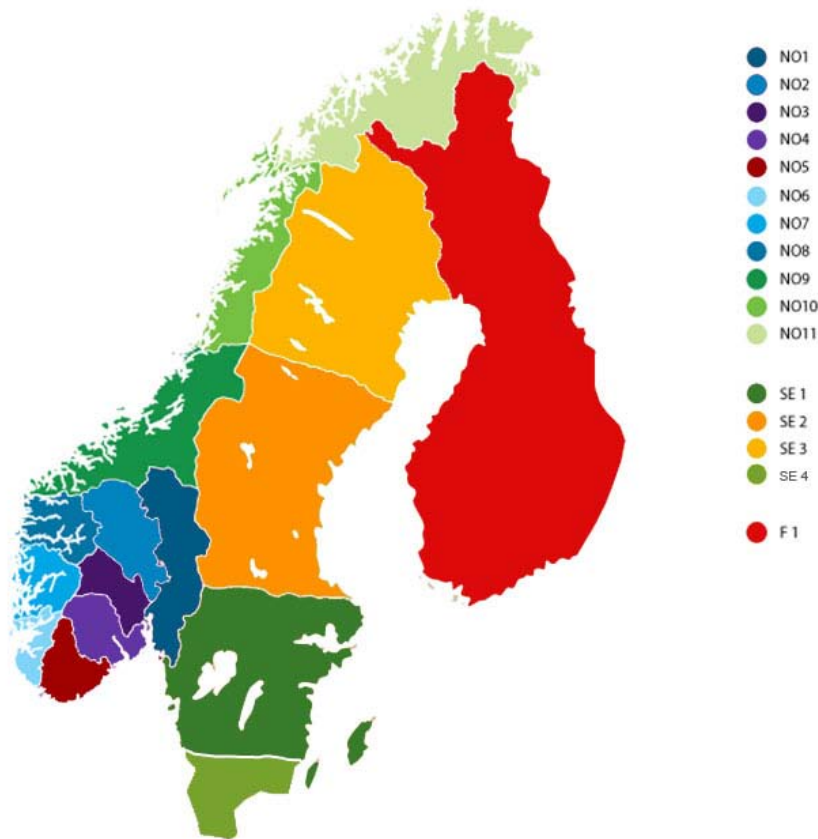
- Allocate their water to the expensive hours  $\Rightarrow$  the water is priced according to what (thermal) production it will replace

Equivalent to minimize total cost of the thermal generation that is required to cover demand



# SDDP hydrology modelling

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- 16 hydrological regions
  - 11 regions in Norway
  - 3 in Sweden,
  - 1 in Finland
- Inflow:
  - 75 inflow scenarios generated from HBV modelling system used for the first months
  - Thereafter historic inflow series 1981-2005

# Other supply and exchange

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## Complete stack for the Nordic region

- Coal
- Gas
- Oil
- CHP
- Nuclear
- Wind

## Using forward curves for fuel prices

## Import/export outside Nord Pool

- Direction determined by price difference
- Using forward curves for EEX and APX
  - Any risk premium in Continental power prices is adopted

# Splitting of reservoirs following level of regulation

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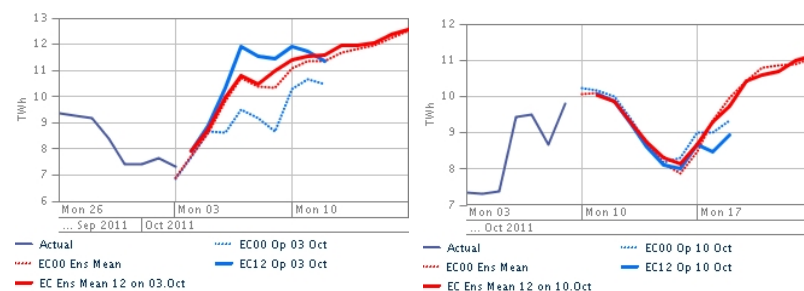


- Within each of the five Norwegian price areas we have made 3-4 synthetic plants made up of groups of actual plants ranked by level of regulation
- In this way we can model a situation with different reservoir levels in short term, seasonal and multi-year reservoirs
- Nevertheless, a model with aggregated reservoirs will always have better control than a system with 600 different reservoirs

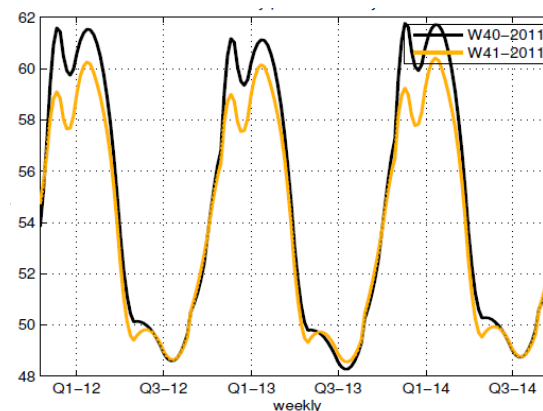
# This week's SDDP forecast - input

- Lower hydrological balance, but revision of inflow target series leads to a higher net inflow target
- Significantly lower Continental power prices, especially during the coming winter
- No major changes in outages

Hydro balance last week and this, TWh



German prices, €/MWh

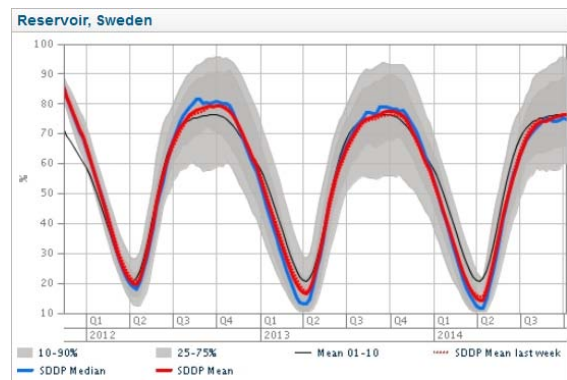
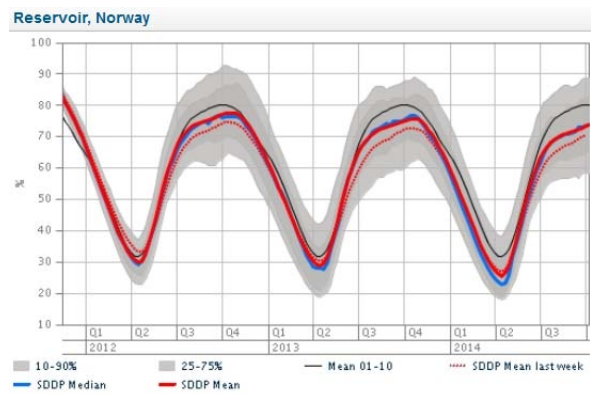
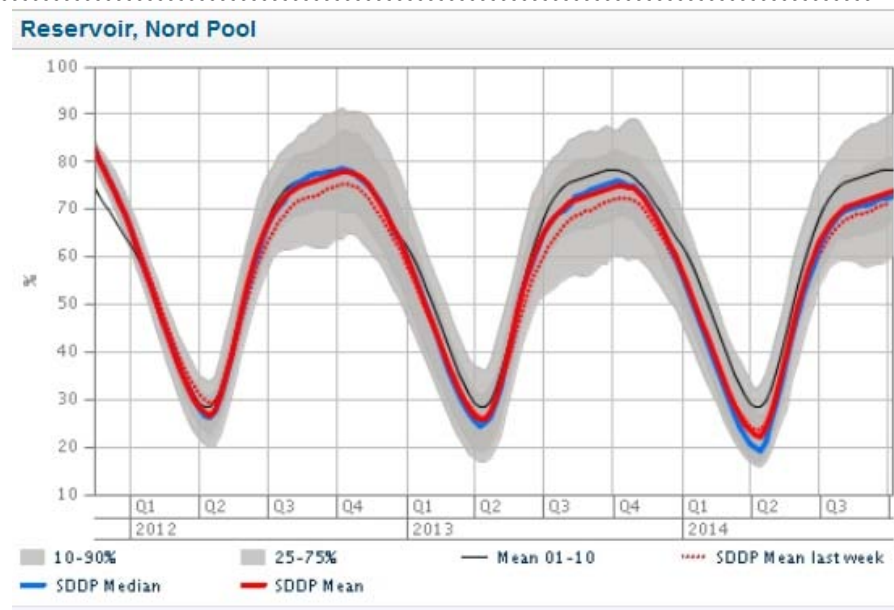
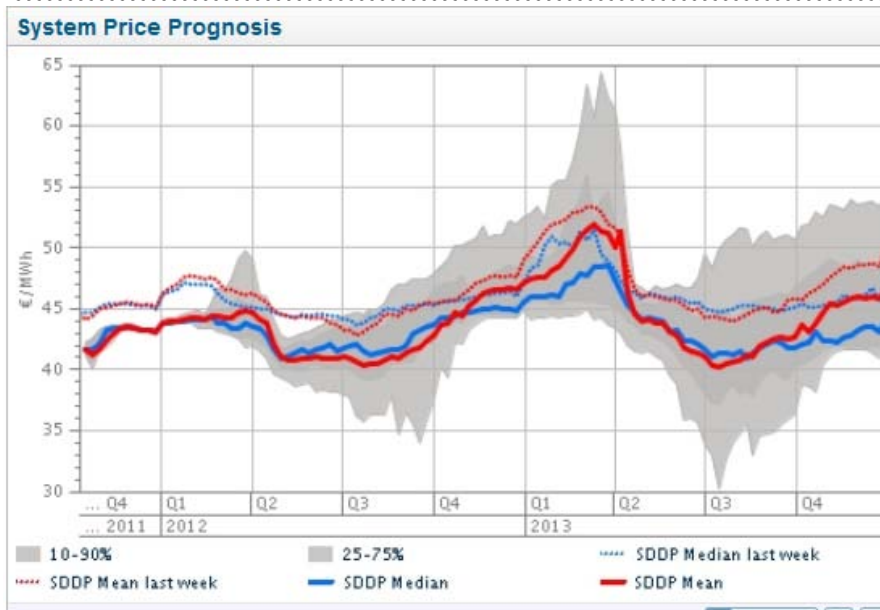


# SDDP system price forecast

- The increased net inflow leads to a general drop in prices
- However, as we have done a major model revision this week, we are cautious when making conclusions
- From a fundamental point of view, both the front month and front quarter could be on the low side

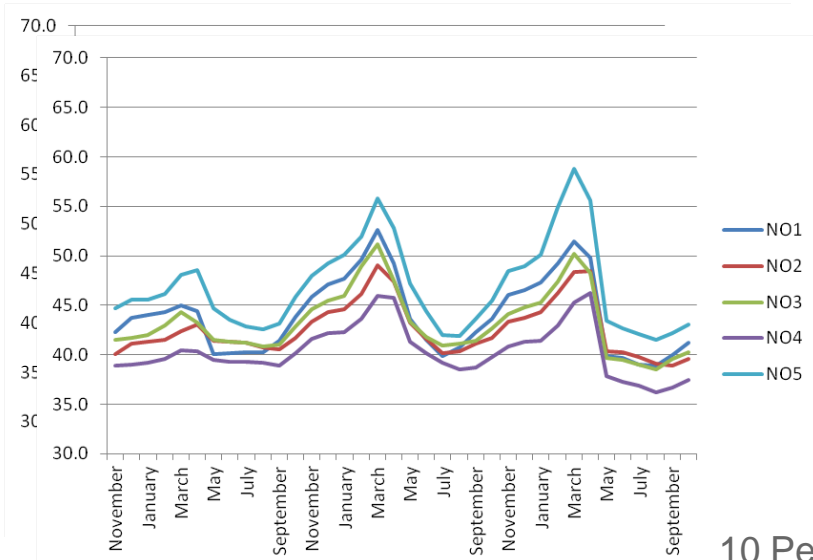
SDDP System Price Prognosis									
CEST	Nov 2011	Dec 2011	Jan 2012	Q1 2012	Q2 2012	Q3 2012	Q4 2012	2012	2013
<b>System Price</b>									
SDDP Mean	42.7	43.3	44.0	44.2	41.8	41.1	45.3	43.1	45.0
Change	-2.5	-2.0	-2.9	-2.7	-2.8	-3.1	-1.4	-2.5	-2.7
<b>Nord Pool Close</b>									
Last close	44.5	47.0	48.1	47.1	41.2	40.7	47.7	44.2	45.0
<b>Percentiles</b>									
10 Percentile	42.4	43.1	43.8	43.4	40.2	34.6	42.3	40.6	40.5
25 Percentile	42.8	43.2	43.9	43.6	40.8	39.7	44.0	42.2	42.2
Median	43.1	43.2	43.9	43.9	42.1	42.0	44.6	43.1	44.8
75 Percentile	43.4	43.3	44.0	44.6	42.8	44.1	47.2	44.7	47.1
90 Percentile	43.5	43.4	44.3	45.7	43.6	45.8	50.2	45.8	50.3
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# SDDP system price forecast and reservoir level

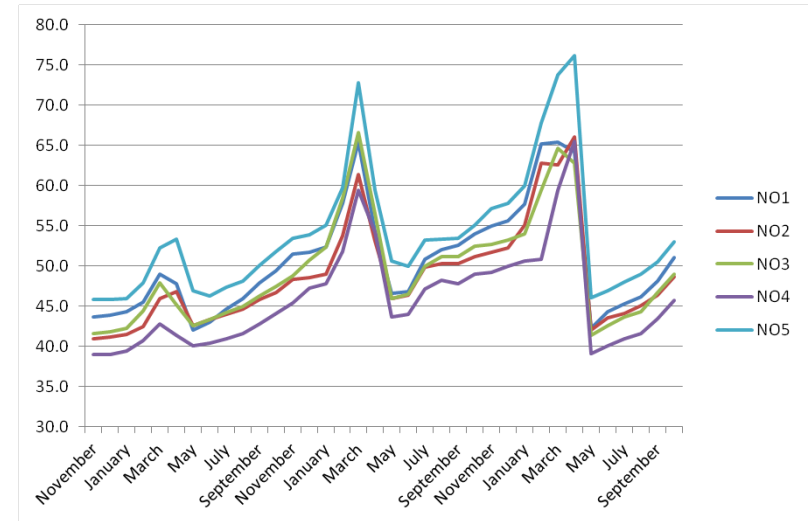


# Norway area price forecast, €/MWh

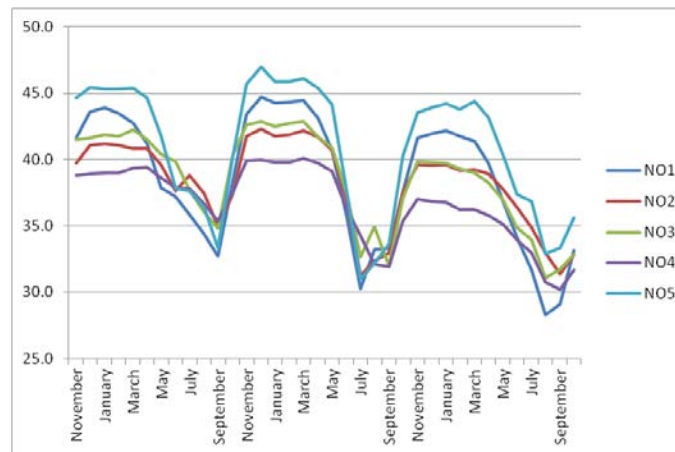
Mean



90 Percentile



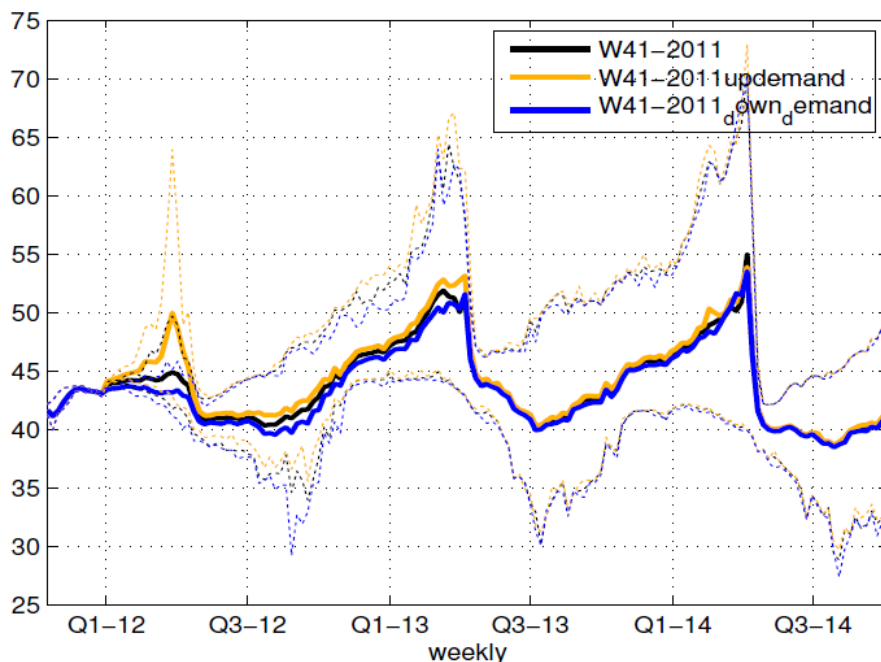
10 Percentile



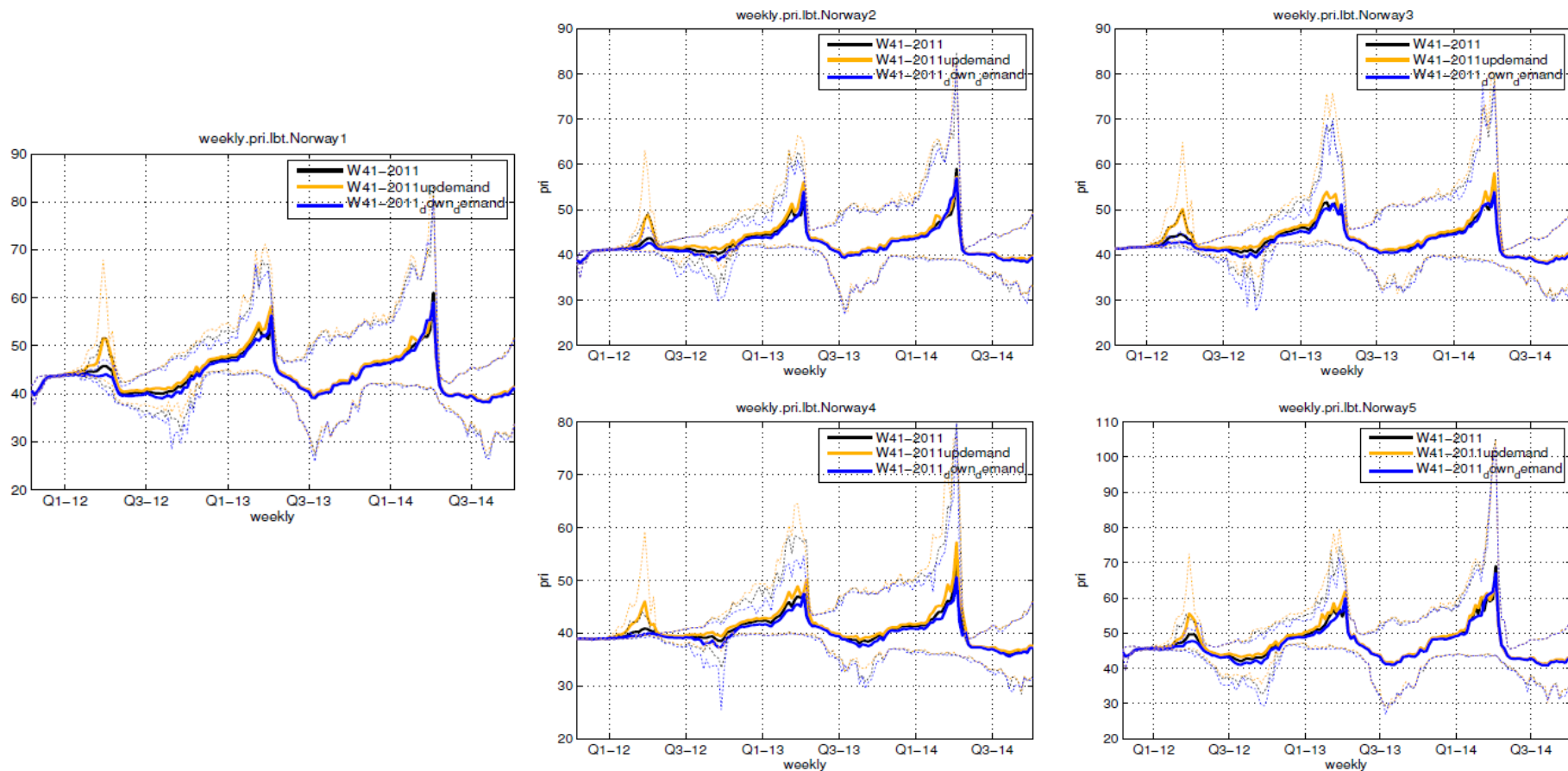
# Scenario run: Cold and warm winter

- In order to assess the upside and downside risk we have run two scenarios:
  - 3 °C warmer Jan - March
  - 3 °C colder Jan - March
- 3 °C equals roughly 2400 MW load in the Nord Pool area
- Everything else is equal to the original run, including water values before the scenario simulation
- Warm: Q1 mean down €0.8/MWh
- Cold: Q1 mean up €1.4/MWh

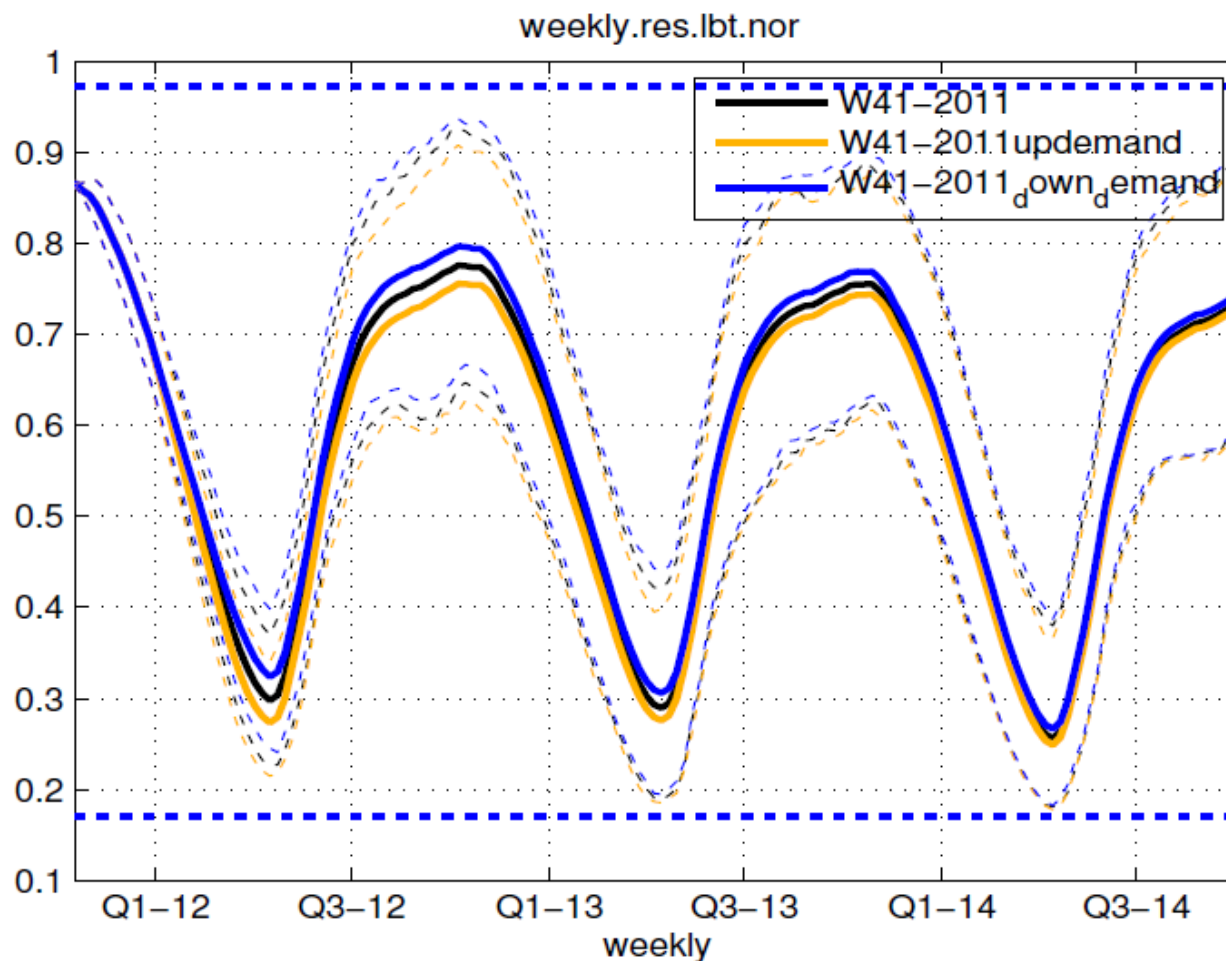
System price forecast, scenario run



# Scenario run: Area Price forecast



# Scenario run: Reservoir forecast, Norway



# Conclusions:

- a) Very volatile hydrology this year
- b) Prices around SRMC coal this winter
- c) Little risk even with quite cold winter