

Long-term models robustness review in Norsk Hydro towards 2015

> Hans Ole Riddervold Trondheim 23/5-2013

Outline for presentation

- Hydro in brief
- Long-term model review in Hydro
- Method for quantification



Norsk Hydro's smelters and power plants in Norway 12.5 TWh consumption – 9.5 TWh production





Renewable production in Norway







- Telemark
 - 6 power stations, 590 MW installed capacity
 - 3.2 TWh normal production
 - Basis for early industrial developments at Rjukan
- Røldal-Suldal
 - 7 power stations, 580 MW installed capacity
 - 2.7 TWh normal production
 - Developed to supply smelter at Karmøy in 1960s
- Sogn (Tyin and Fortun)
 - 5 power stations, 712 MW installed capacity
 - 3.0 TWh normal production
 - Developed to supply smelter in Årdal
 - Tyin is Hydro's largest power station



Value of correct input to Long-term models

- Process description for evaluation of models



HYDRO

Mapping

- Main focus areas for evaluation of models



First draft mapping of cost benefit



- (A) Forbedring vannregresjonen i Fairprice, vurdere å la denne styre mer av utfallsrommet.
- (B) Prisavsnitt og marginaltapssatser
- (C) Øke antall simuleringer (fairprice) og antall prispunkter for Markov transformasjon.
- (D) Nye markeder (sertifikat, frekvens, elbas, rk, rkom)



Analysis

- including method for quantification
- Price input is considered to be one of the most important input parameters in relation to management of the power portfolio.
- Hydro uses a multiregression model to generate pricescenarios for the LT models
- Different sensitivities have been evaluated:
 - Increased / decreased volatility
 - Changes to price structure and effect of parameters strengthening or weakening the structure
 - Effect have been investigated in relation to changes in WV, production and incomes
- The effect of including marginal loss adjustments in price-partions used in LT models will be presented



What is the consequence of operating with the wrong strategy ?

• Established 3 models with 3 different strategies:

(1) Without price-partions (pp)

(2) Static price-partions

(3) Dynamic marginal loss adjusted price-partions

 Compare results from the models by running with different watervaluematrix (strategy)



Methode

- Directory A: Static price-partions strategy w/pp
- Directory B: Without price-partions startegy wo/pp
 - Copy directory A, rename to directory C
 - Run directory C with watervalues from directory B
- Directory C : Static price-partions strategy wo/pa

Compare income from the A & C to evaluate effect of operating with the "wrong" strategy.

Example 1 : Company X is operating a system using model-input without intraweek price-structure. The realized spot prices are delivered with structure. Loss: ~ 1 NOK/MWh/year

Example 2 : Company X implements price partions to take into account the observed price-structure. The realized marginal loss adjusted spotprices differ considerably from the static model used as input : Loss: ~ 1 NOK/MWh/year









