

The support schemes for renewable energy – and the models in NEP

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EU RES directive applies to all Nordic countries, but

Support schemes differ between the countries

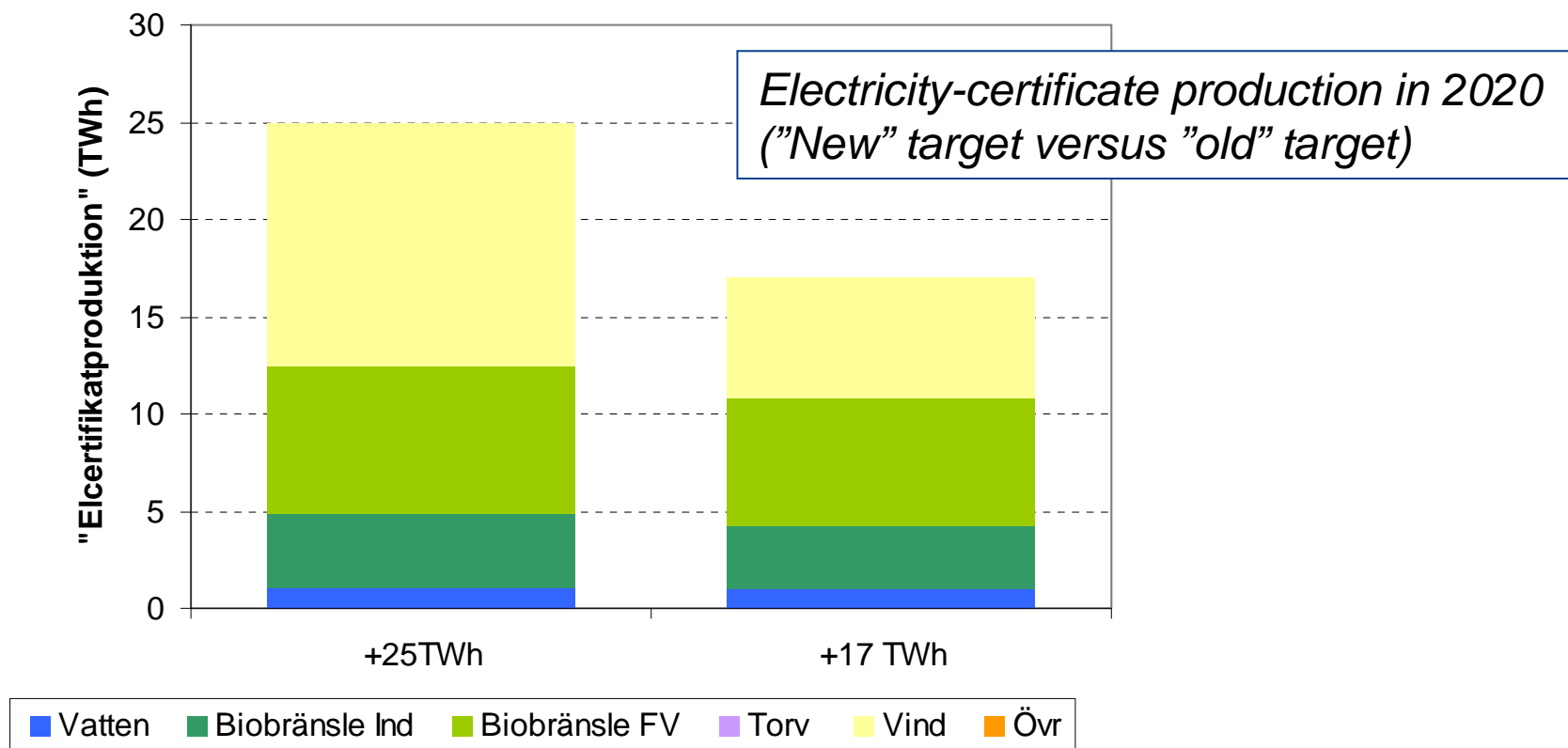
- *Denmark*: From 17 to 30 % RES in 2020
 - Technology specific feed in tariffs and premiums
- *Finland*: From 28 to 38 % RES in 2020
 - Target price with feed in premium proposed for biogas and wind
- *Norway*: From 58 % to *to be negotiated* in 2020
 - Join Swedish certificate scheme or continue investment subsidies?
- *Sweden*: From 40 to 49,5% in 2020
 - Green certificate market main support mechanism for renewable electricity

Different support schemes: Not cost-efficient from a common Nordic point of view

- Different marginal support to different technologies
 - Within one country
 - Between countries
 - Comparative advantages not exploited
- Some investments exposed to market risks, others not
 - Incentives differ when it comes to incentives to take generation profiles, location, grid issues, etc. into account

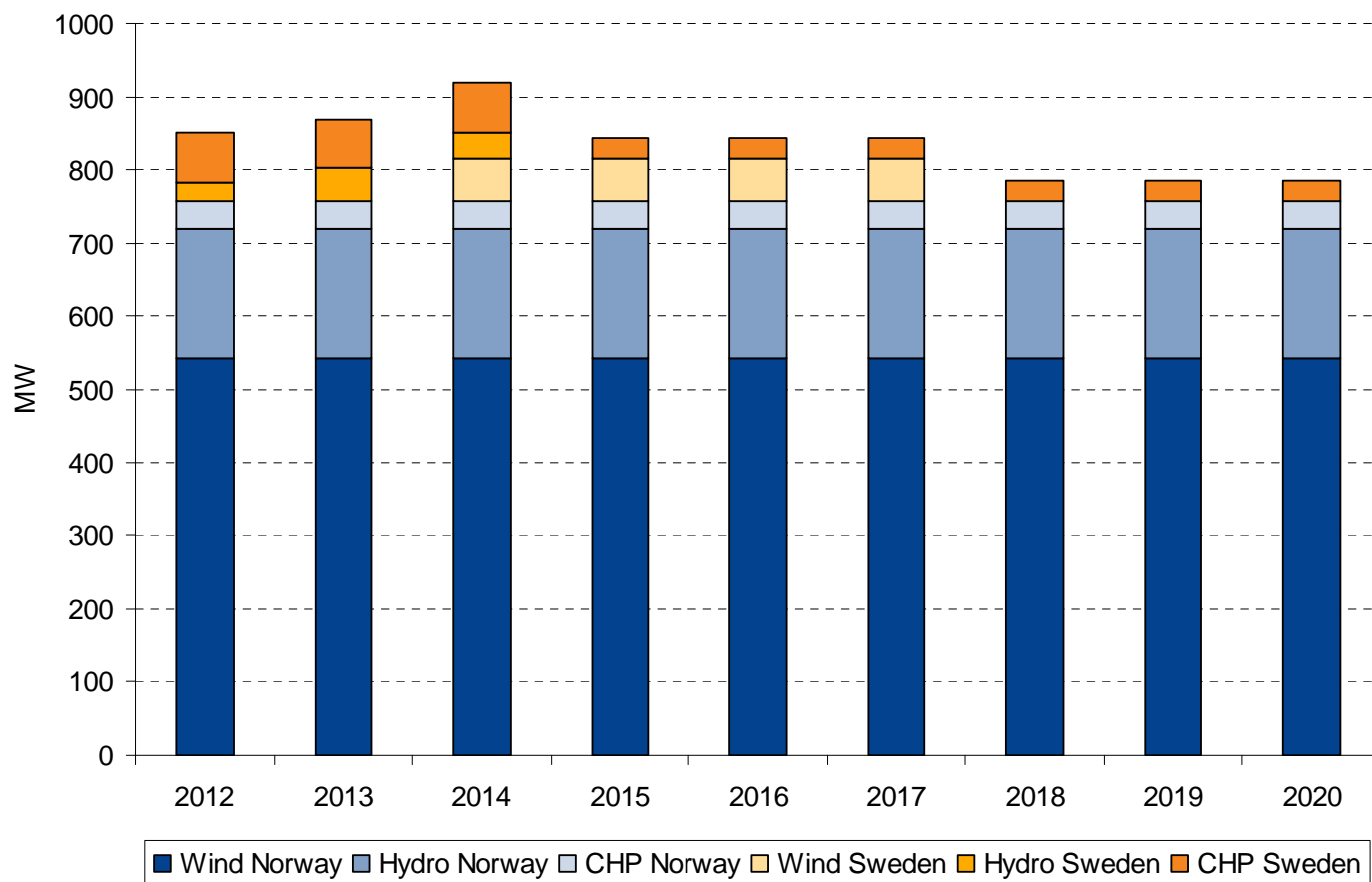
Markal-Nordic model: Separate Swedish market

Wind power the lion's share of the new target



Econ certificate model: Common Swedish-Norwegian market

Wind and hydro in Norway replace Swedish wind



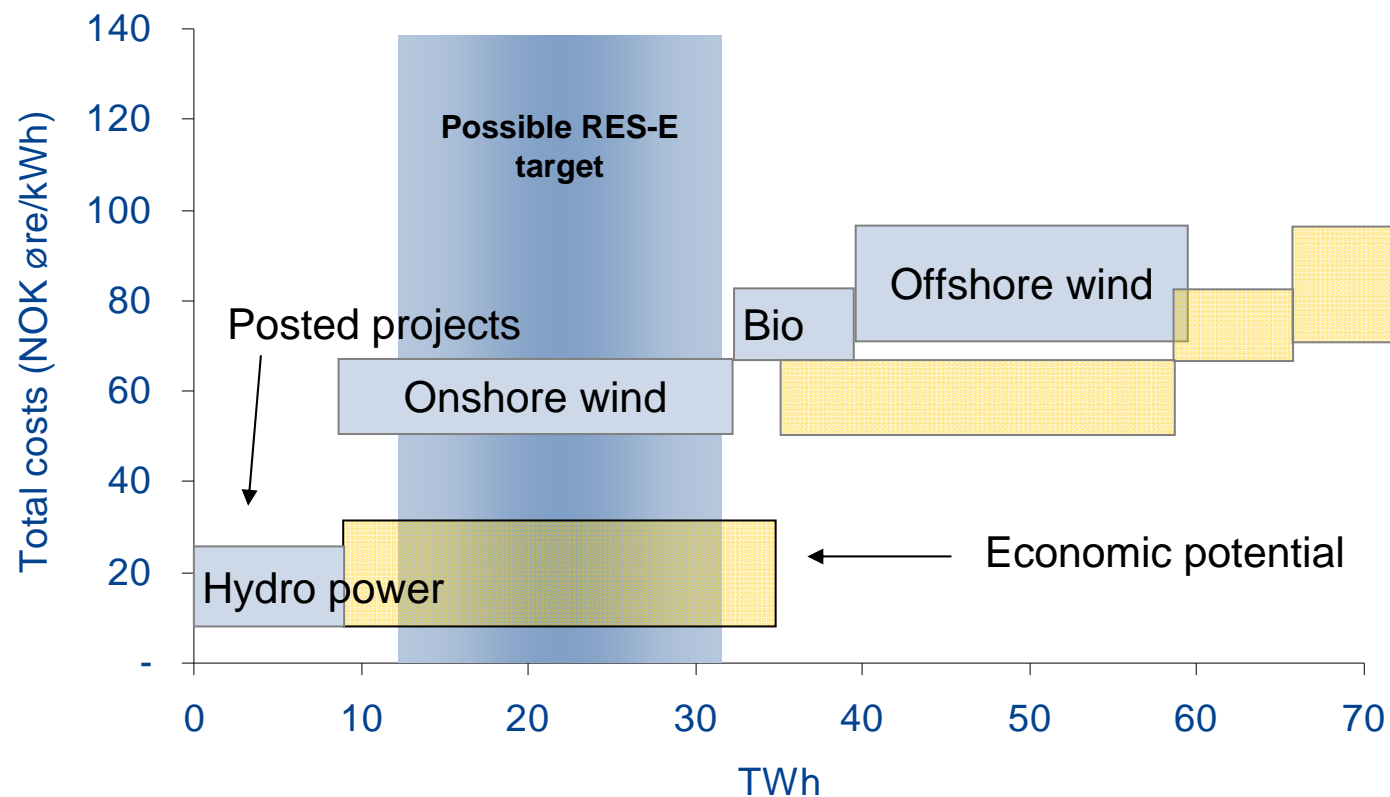
What do we know?

Potentials and costs are very uncertain

- Model assumptions are not harmonized
- Market simulations must be based on a number of assumptions about the future
 - Wind conditions, hydro potentials, public acceptance, investor behavior, grid connection, system costs, etc.
 - Wind: Conditions vary between and within countries
 - New data change views and prospects
 - Hydro: Small scale and local – diverse grid conditions and investors

Example:

Estimating the supply curve for Norway



Aggregated supply curve for renewable electricity in Norway (2020)

Can we trust/use the model results?

- Inputs are not harmonized and models differ
 - Assumptions on costs and potentials vary between models
 - And models differ in the options and trade-offs included
- Lessons to be had?
 - All model runs yield reasonable solutions
 - No doubt that potentials are adequate
 - Results indicate substantial flexibility: A number of technology and locational configurations are possible
- ➔ **Good basis for the market to find an efficient solution**
 - In the end, the market should decide



Model analysis are based on assumptions and expectations

Model results are not the full truth

- Lessons learned from coordinated energy modeling apply even in this case:
 - Involve stakeholders! Discuss assumptions.
 - Harmonize inputs! But not necessarily all 😊
 - Results between different model approaches will both vary and be similar – Understand why!
 - Using several models increases our common understanding of the crucial issues
 - Recognize national political and cultural differences!

