IS FURTHER DEVELOPMENT OF WIND ENERGY IN DENMARK PROMOTING THE ESTABLISHMENT OF PUMP BACK AND PUMPED HYDRO IN SWEDEN?

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Energinet November 7 2013

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Investigations in Hydro power, Wind Energy and Energy market.

Examples of projects

- Code of Conduct for the Swedish Wind Energy Industry (2012)
- EU-projects about hydro power (2008-ongoing)
- Analyst in reports for the Swedish Energy Market Inspectorate and the Ministry of Enterprise, Energy and Communications (2013)
- Wind energy cooperatives Denmark vs Sweden (2012)

www.powerquest.se

STORAGE IN SWEDEN – FEW ASPECTS

Large subject and therefore only pick a few things to talk about.

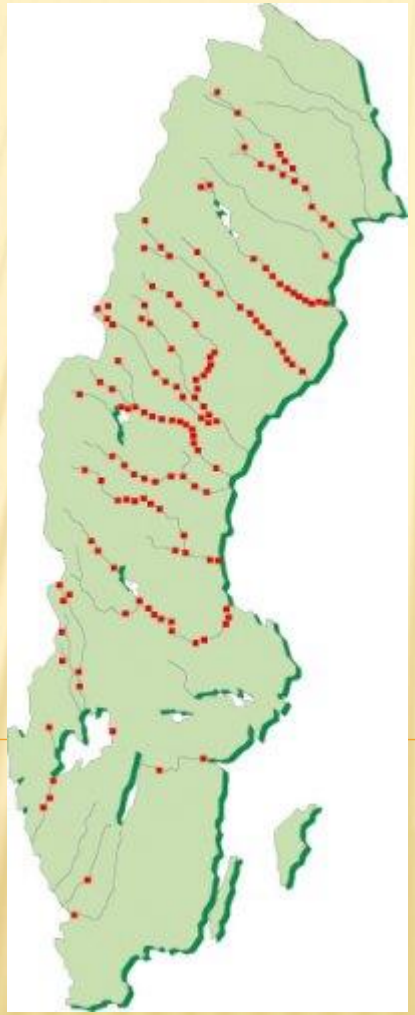
- Hydropower and pump-back
- Market in Sweden
- The grid and transmission

SWEDISH HYDRO

	Pump-back	Total Hydro (approximate figures)
Number of plants in operation	2	1,500*
Installed capacity	90 MW	16,600 MW
Yearly production , average	~0.1 TWh	65 TWh
Share of total power production	~ 0.1%	45%
Usage	Hourly to seasonal balancing	Base load and balance

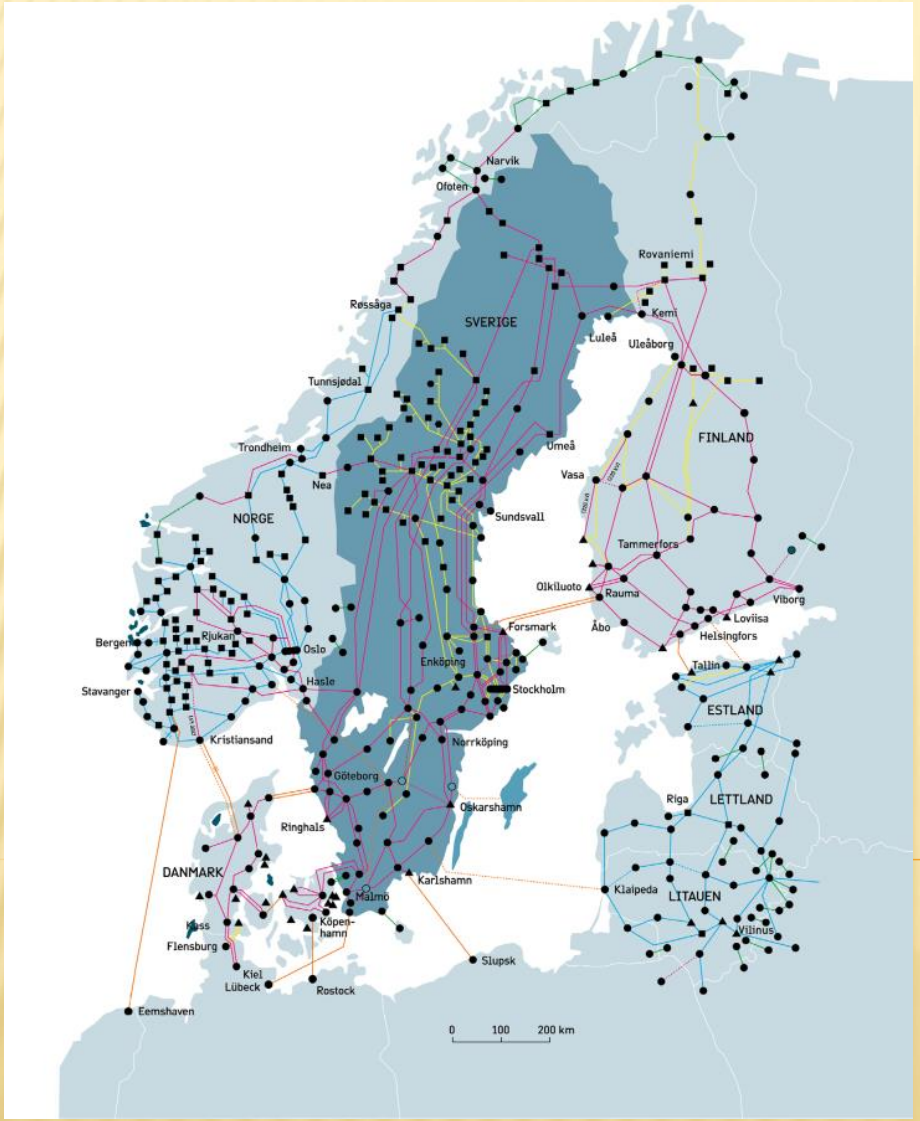
* Source: vattenkraft.info (Svensk Vattenkraftförening indicate a higher number.)

LARGE HYDRO SWEDEN (>10MW) HYDRO POWER PRODUCTION



Source: Svensk Energi

GRID CAPACITY DEN - SWE

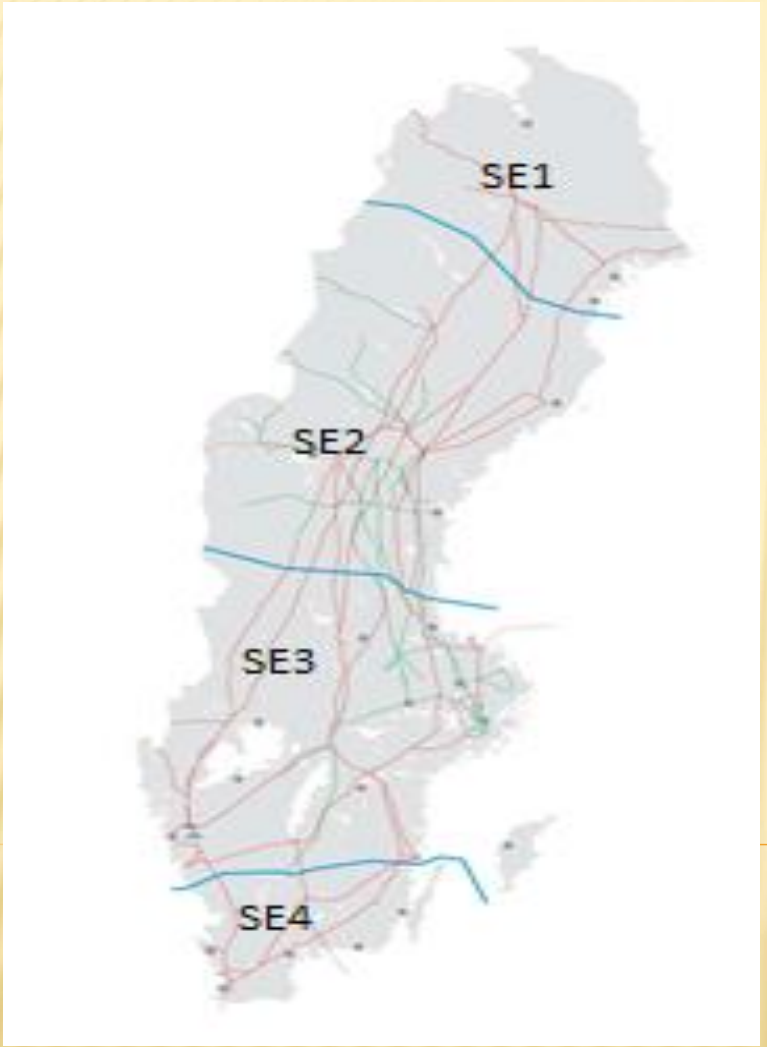


DK1 (Jylland) -SE3: up to 740 MW

DK2 (Själland)-SE4: up to 1 700 MW

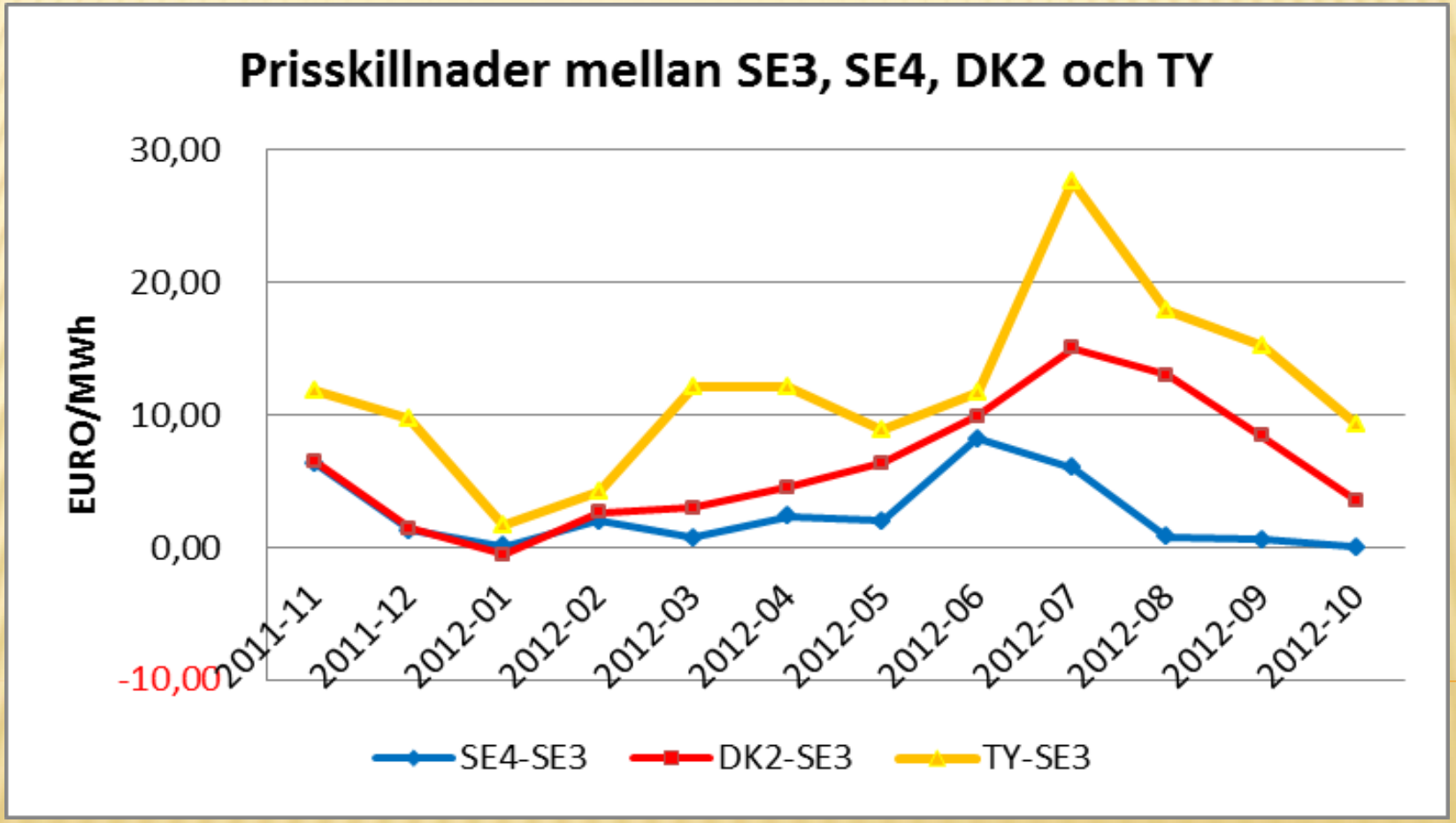
Source: Svenska Kraftnät

PRICE DIFFERENCES IN SWEDEN

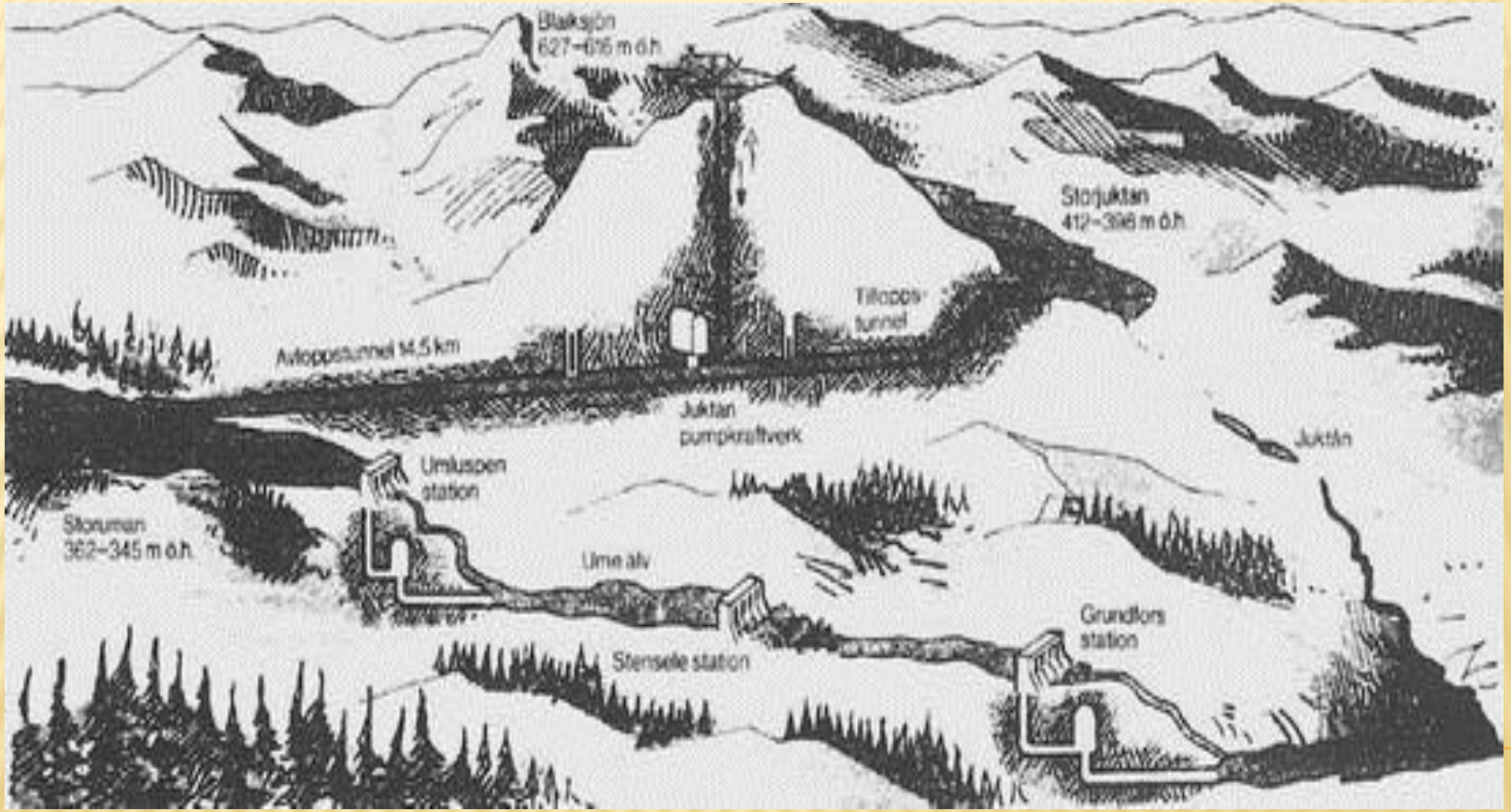


In November 2011 the Swedish electricity market was divided into 4 prices areas.

EXAMPLE - PRICE DIFF IN SWE & DEN



JUKTAN



Source: Vattenkraft.info & Krafttag i norr

JUKTAN – PUMPED STORAGE TAKEN OUT OF OPERATION

	Pumped-storage/pump hydro	Hydro power plant
Byggår (Built)	1973-79	1996*
Antal aggregat (No. units)	1 reversibly	equal
Effekt (Capacity)	335 MW	26 MW
Fallhöjd (Height)	275 meters	85 meters
Normal årsproduktion (prod)	-	90 GWh
Ägare (Owner)	Vattenfall	

* Small price differences and deregulated market.

Source: Vattenkraft.info

VOICES FROM THE SWEDISH POWER INDUSTRY

New pump-back is not of interest today but with increased differences in price we may look into it.

There are many places where you technically can build pump-back.

One condition for new pump-back is a strong grid in place and this work has already begun.

But even so it may be too difficult/costly or even impossible to get permission due to the Swedish environmental law (Miljöbalken).

CONCLUSIONS

Denmark’s wind do/will affect the Swedish market but due to the transmission capacity it’s limited.

No new pump-back plants planned today.

Future development on pump-back depend on several things as the price of power, the strength of the grid and the legal conditions for building.

Possible future?

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Genom en enorm tunnel mellan Vättern och Vänern vill man utvinna energi. Foto: Sandra Neergaard Petersen/SR Skaraborg

MARIESTAD

Vision om världens största kraftverk

Publicerat: lördag 23 oktober 2010 kl 11:04 , Nyheter P4 Skaraborg

Sverker Lindbo har storslagna planer på att bygga världens största kraftverk i Mariestad Genom en enorm tunnel under jord vill han växla vatten mellan Vänen och Vättern för att utvinna energi.

Mariestads Kraftverks AB & others

50 km tunnel between the lakes Vänern & Vättern

Cost: 250 billion SEK

Installed capacity: 50,000 MW