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# Sweden's Renewable Energy Plans and the Future for Offshore Windpower

Berlin 22 March 2016

# Energy Agency for Southeast Sweden

- Non-profit company
- Owned by municipalities, county councils and regional councils in the southeast part of Sweden
- Projects financed by funds from Swedish authorities and the EU
- Works for a sustainable energy system

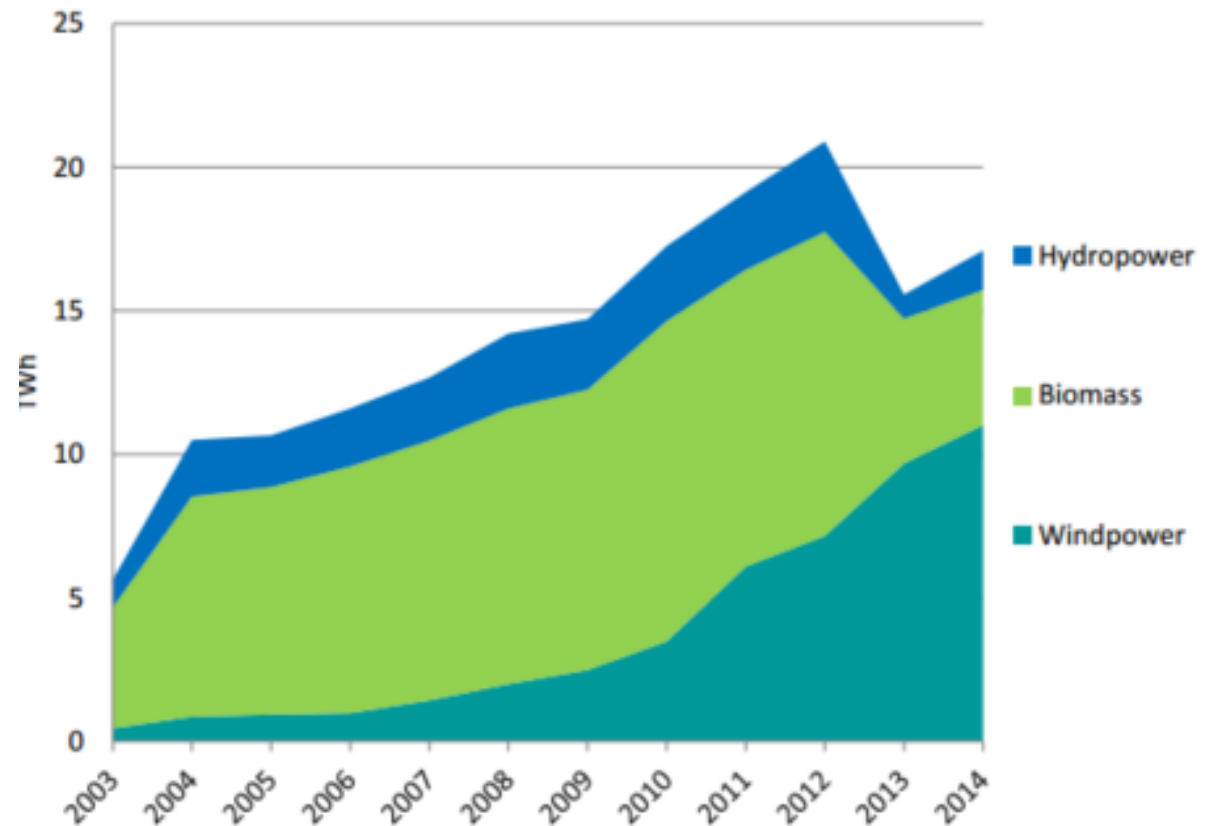


# Electricity (Green) certificates



- Current subsidiary system for new renewable electricity production
- Started 2003
- 1 certificate/produced MWh for 15 years production
- Financed by electricity consumers
- Market solution, no fixed price

**Figure 19** Electricity production per type of power in the electricity certificate system 2003 – 2014, TWh



Source: Swedish Energy Agency, The Account Management System Cesar.

# Goals



## Targets for 2030

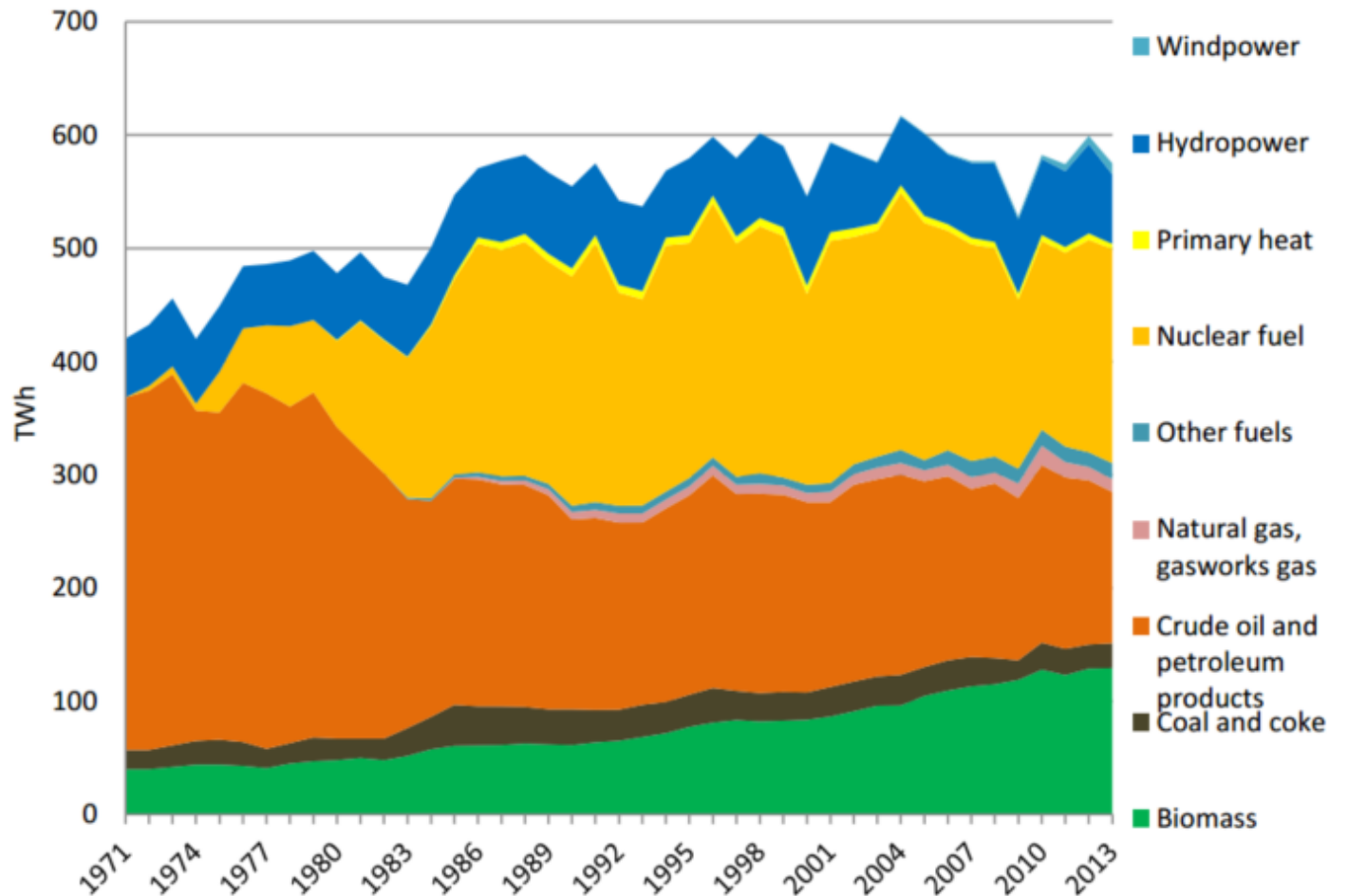
- 40% cut in greenhouse gas emissions compared to 1990 levels
- 27% share of renewable energy consumption
- 27% energy savings compared with the business-as-usual scenario

## Goals for 2020

- ✓ 50 % of total energy use from Renewable Energy sources
- ✓ 10% renewable energy in transport sector
- 20 % more efficient energy consumption ref. 2008 (GDP)
- ✓ 40% cut in greenhouse gas emissions compared to 1990 levels
- **Renewable electricity production:**  
2012 -> 2020 increase with 28,4 TWh (18 left) - With Norway

# Sweden- Total energy supply 1971 – 2013

- Hydro
- Nuclear
- Oil
- Biomass

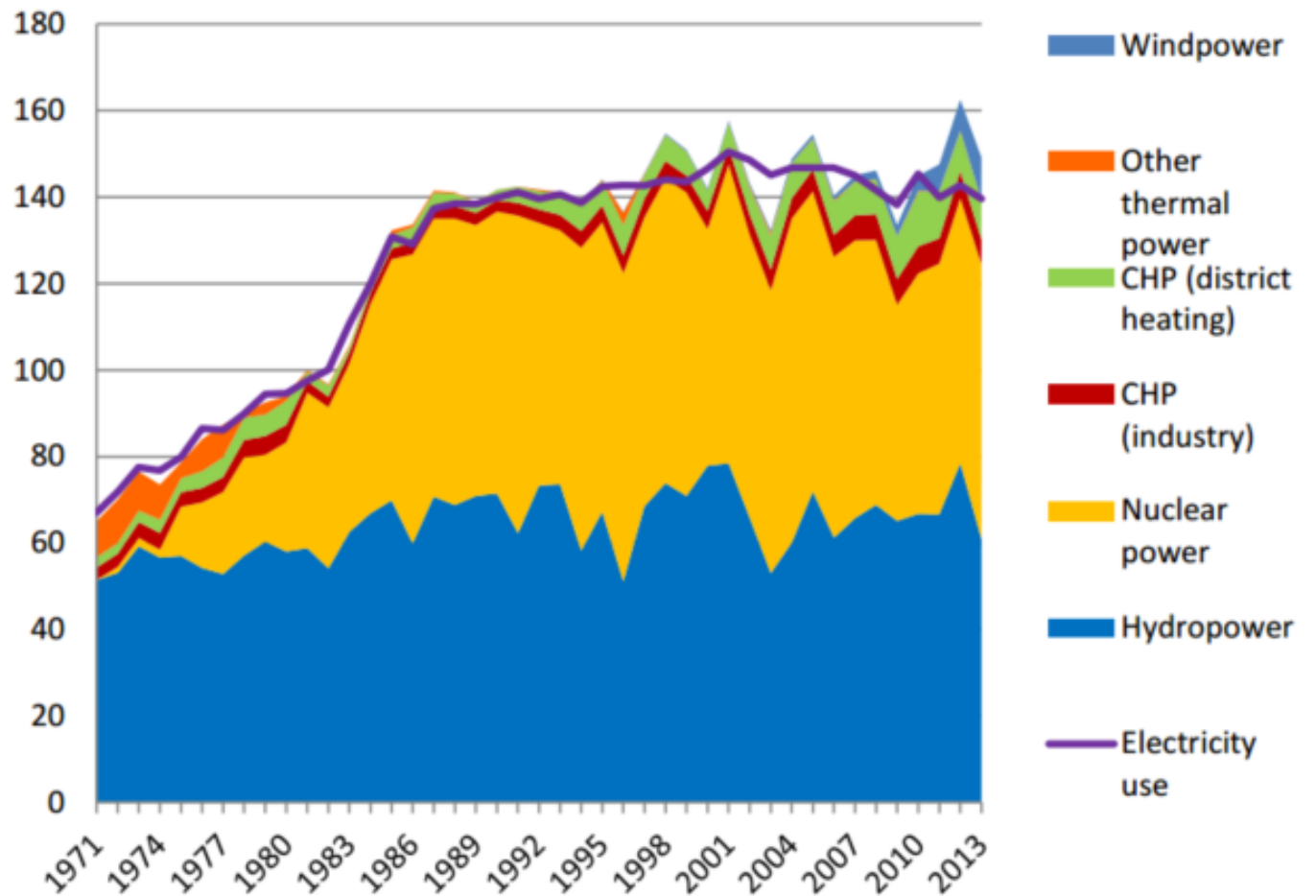


# Sweden- Electricity supply 1971 – 2013

Share:

- Hydro 40 %
- Nuclear 40%
- Biomass 10 %
- Wind 10%

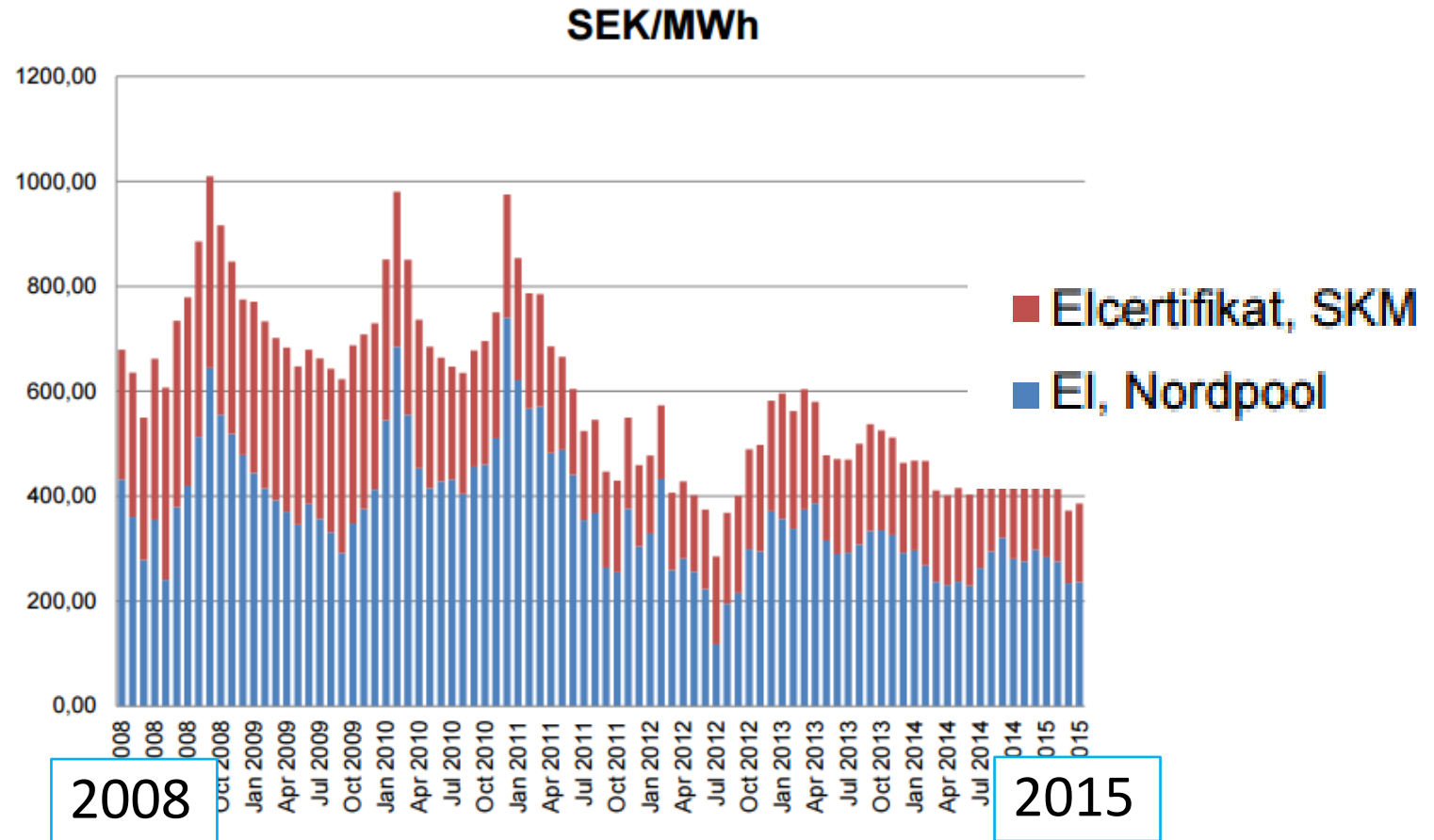
➤ Electricity export



Source: Swedish Energy Agency and Statistics Sweden.

# Price for Renewable Electricity (Nordpool)

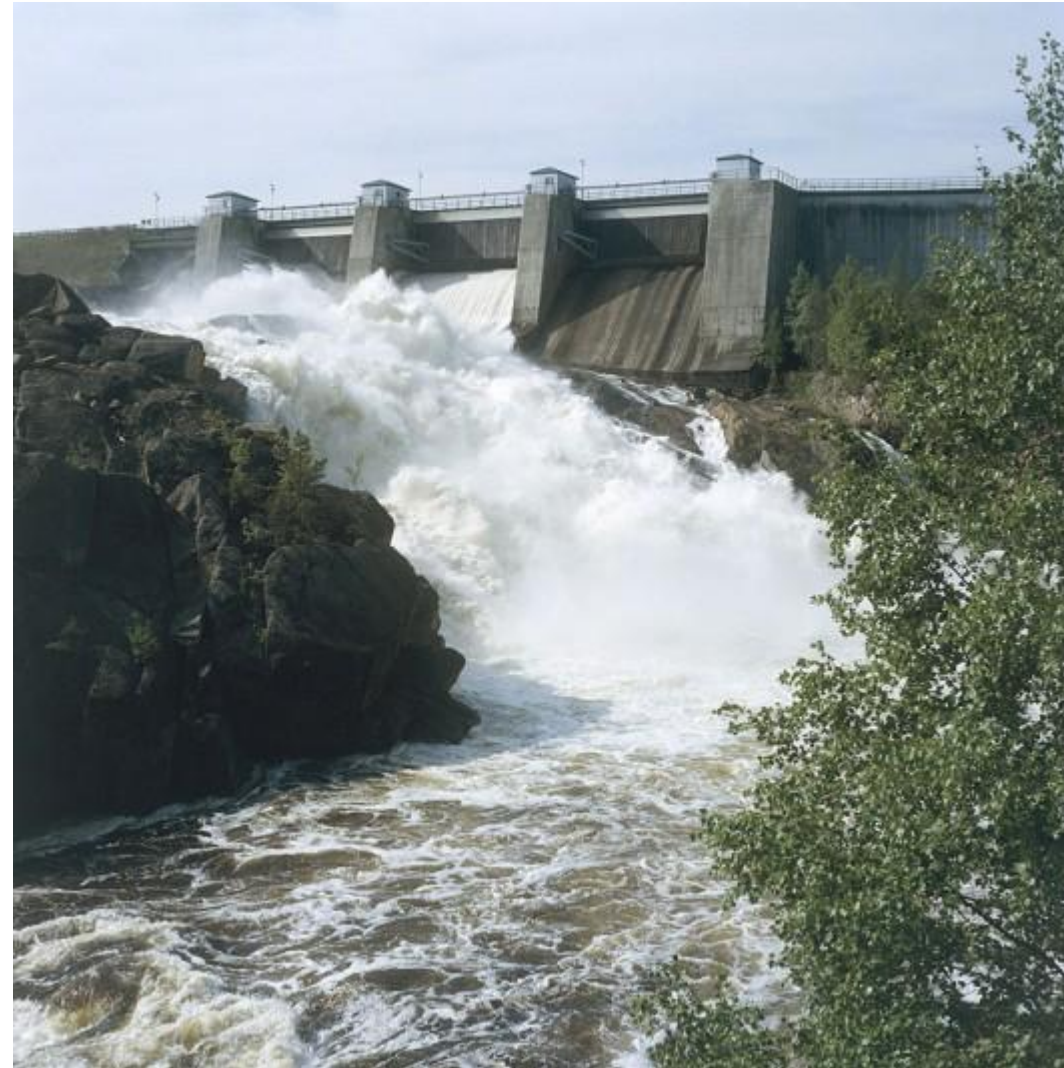
- Historically low prices
  - Low activity in new investments
  - Low profitability in existing plants





# Hydro

- 1880 - Small scale private initiatives
- 1900-1960 Large scale Government initiatives
- 1970 All but 4 large rivers developed
- Potential: 10 – 30 TWh





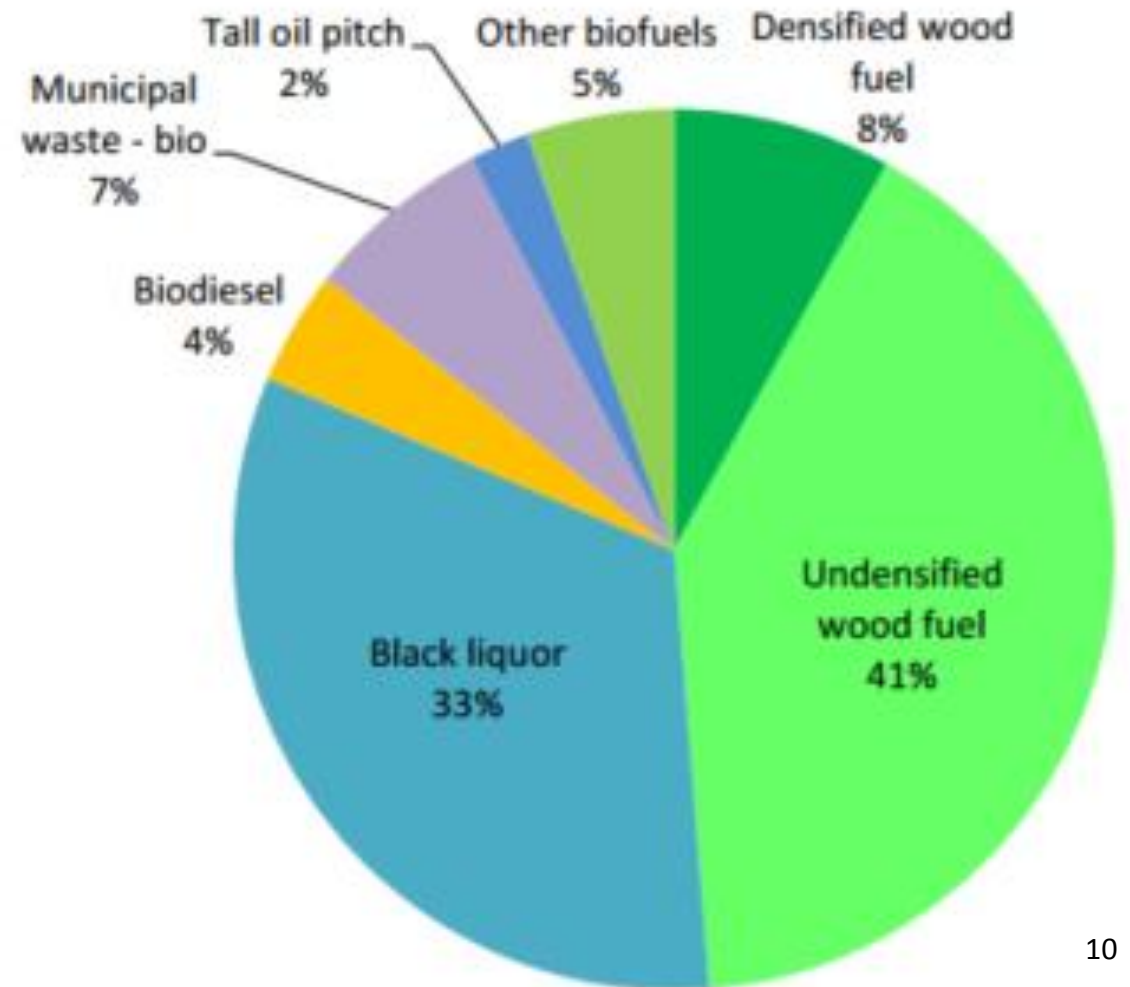
# Nuclear

- 12 reactors built  
1970 - 1985
- Refferendum 1980
  - Safe phasing out?
- Barsebäck closed  
1999/2005
- 4 reactors will be closed  
before 2020
- Remaining 6 reactors?



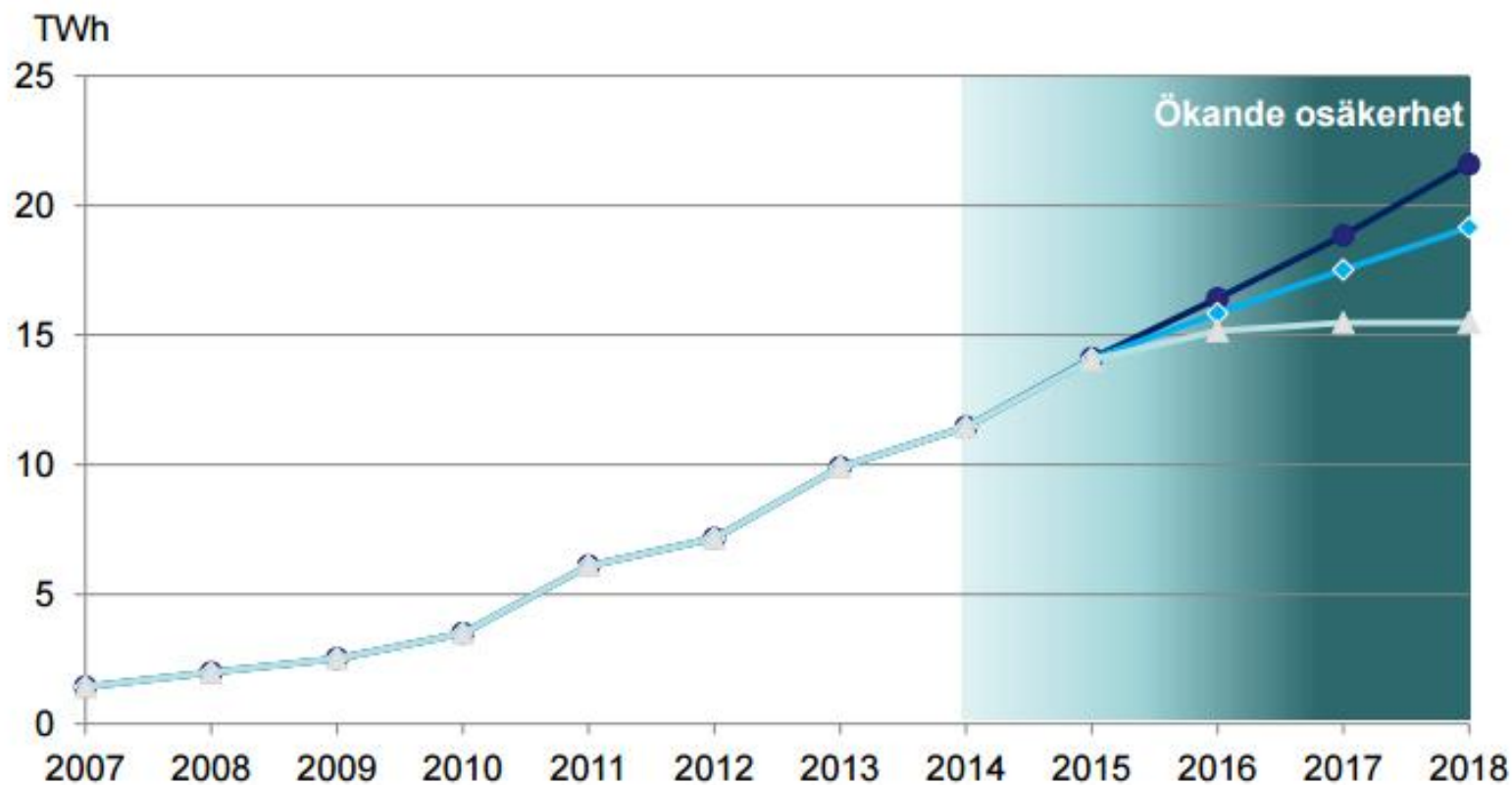
# Bio energy

- 128 TWh Bio energy:
  - 55 TWh District heating
  - 37 TWh Industry
  - **14 TWh Electricity**
  - 8 TWh Bio fuel
  - 14 TWh Small scale etc
- Wood and Black liquor
- Potential: 40-70 TWh



# Wind power

- Pioneer during 1970/80:  
Large scale 2-3 MW  
Wind Turbines (WT)
- 2015:
  - 3300 WT
  - 76 offshore
- 16 TWh/y

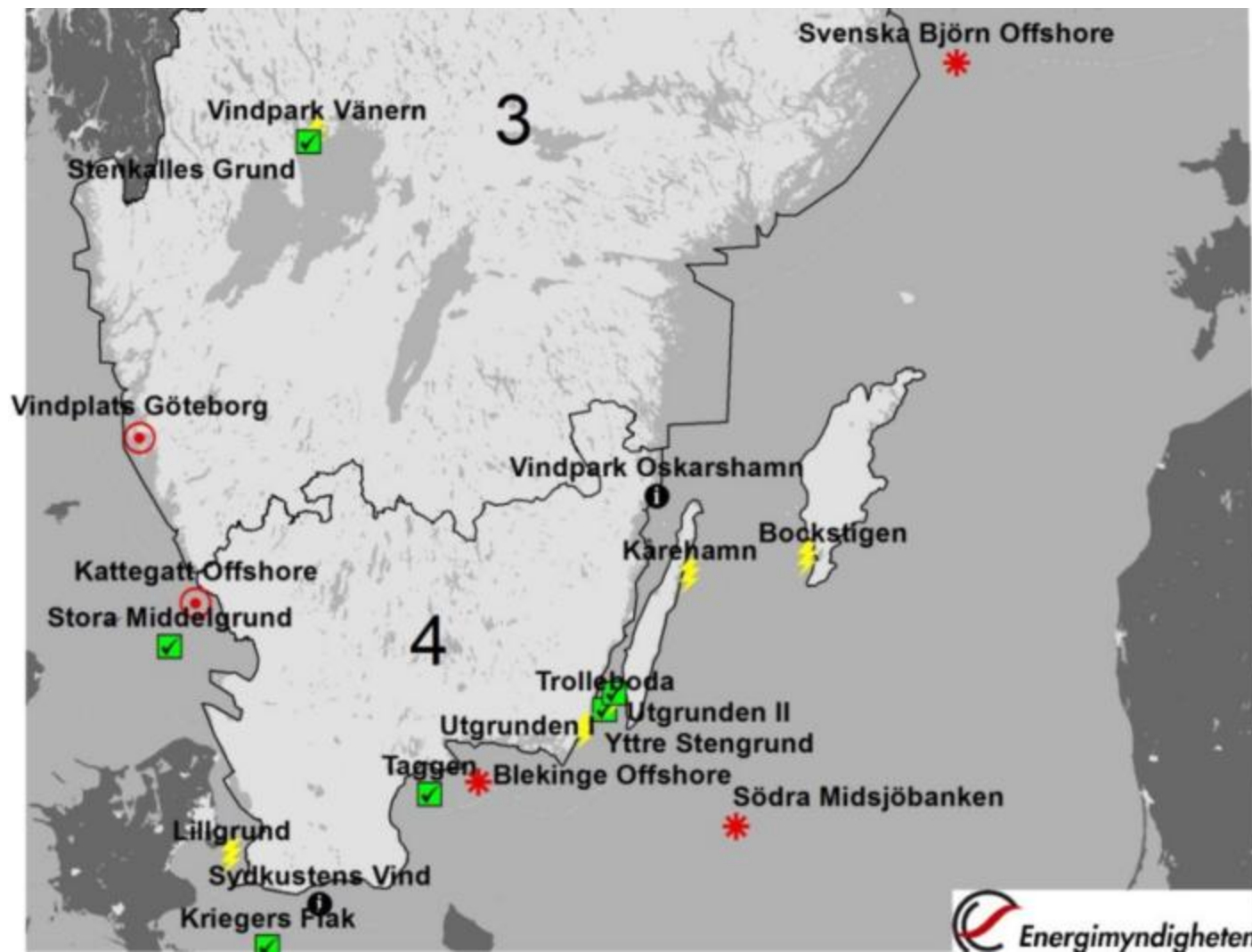


# Offshore Wind – Existing WT

Project	Owner	Started Year	Note	Number of WT	Installed Power MW	Production 2013 GWh	
Bockstigen	Momentum	1998		5	2,8	6	
Utgrundet 1	Vattenfall	2000		7	10,4	32	
Yttre Stengrund	Vattenfall	2001	Removed 2015	5	10	15	
Lillgrund	Vattenfall	2008		48	110,4	348	
Vindpark Vänern	Vindpark Vänern, ReWind offshore	2010	Lake	10	30	105	
Kårehamn	E.ON	2013		16	48	182	
				<b>Total brutto:</b>	<b>91</b>	<b>212</b>	<b>688</b>
				<b>Total netto:</b>	<b>76</b>	<b>172</b>	<b>568</b>


# Offshore Wind - Potential

- Permits for 473 WT – 10 TWh
  - Kriegers Flak
  - Stora Middelgrund
  - Taggen
  - ...
- Applications for 1000 WT
  - Blekinge Offshore: 500-700 WT
  - Midsjöbankarna: 300 WT





# Initiatives- Plans for Renewables



Sweden will be one of the world's first fossil-free welfare countries

> Environment

- Energy commission:
  - All parliament parties
  - Sweden energy strategy beyond 2025
  - Result 2017 (2016)
  - *Support for Offshore Wind?*



# Future for Offshore wind in Sweden

- Challenges.
  - Profitability
  - Consents
  - Grid – export capacity
- Subsidiaries
  - Today same for all RES
  - Dedicated Offshore?
- Need for new Goals



**Huge Potential**  
✓ Wind Resource  
✓ Projects  
✓ Space - BSR



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