Statistics and forecast – Q3 2022

2022-10-29

Svensk Vindenergi (SWEA, Swedish Wind Energy Association) statistics and forecast are updated quarterly.

The figures are produced with data from turbine manufacturers and other market participants.

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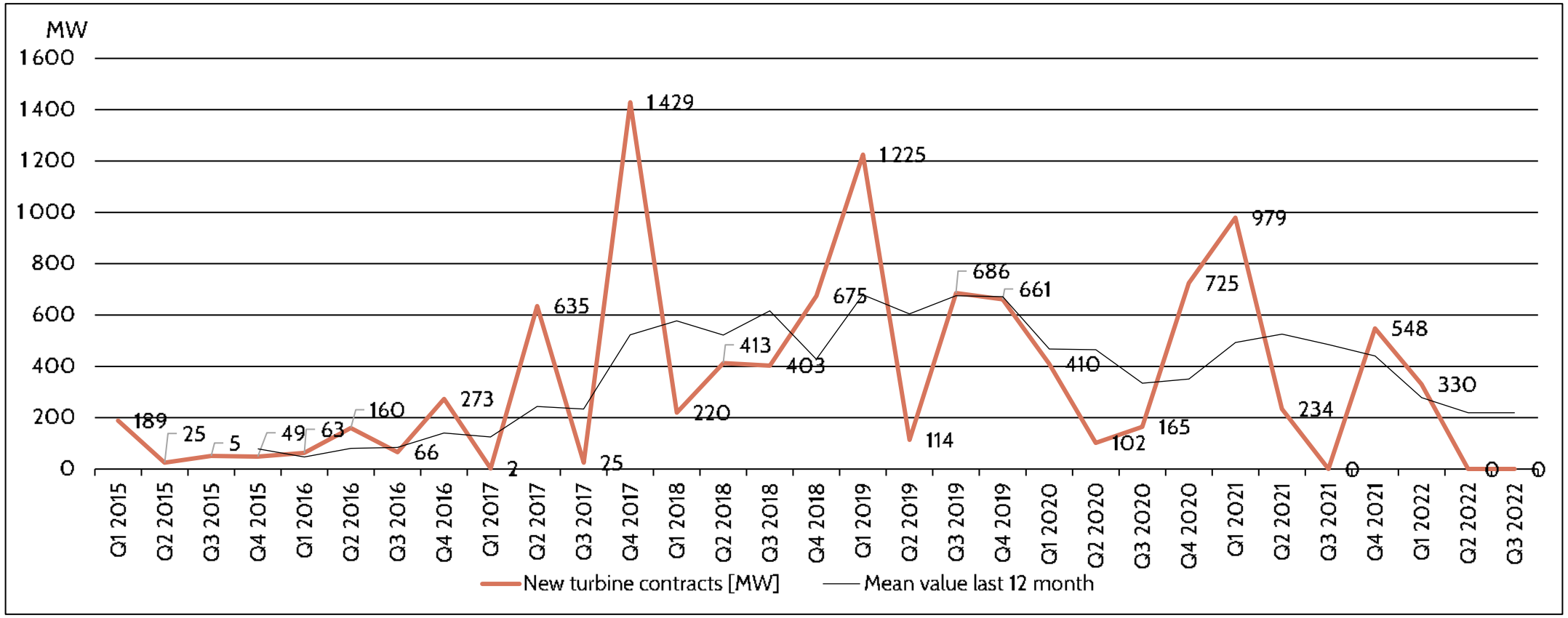
Turbine contracts per quarter [MW]

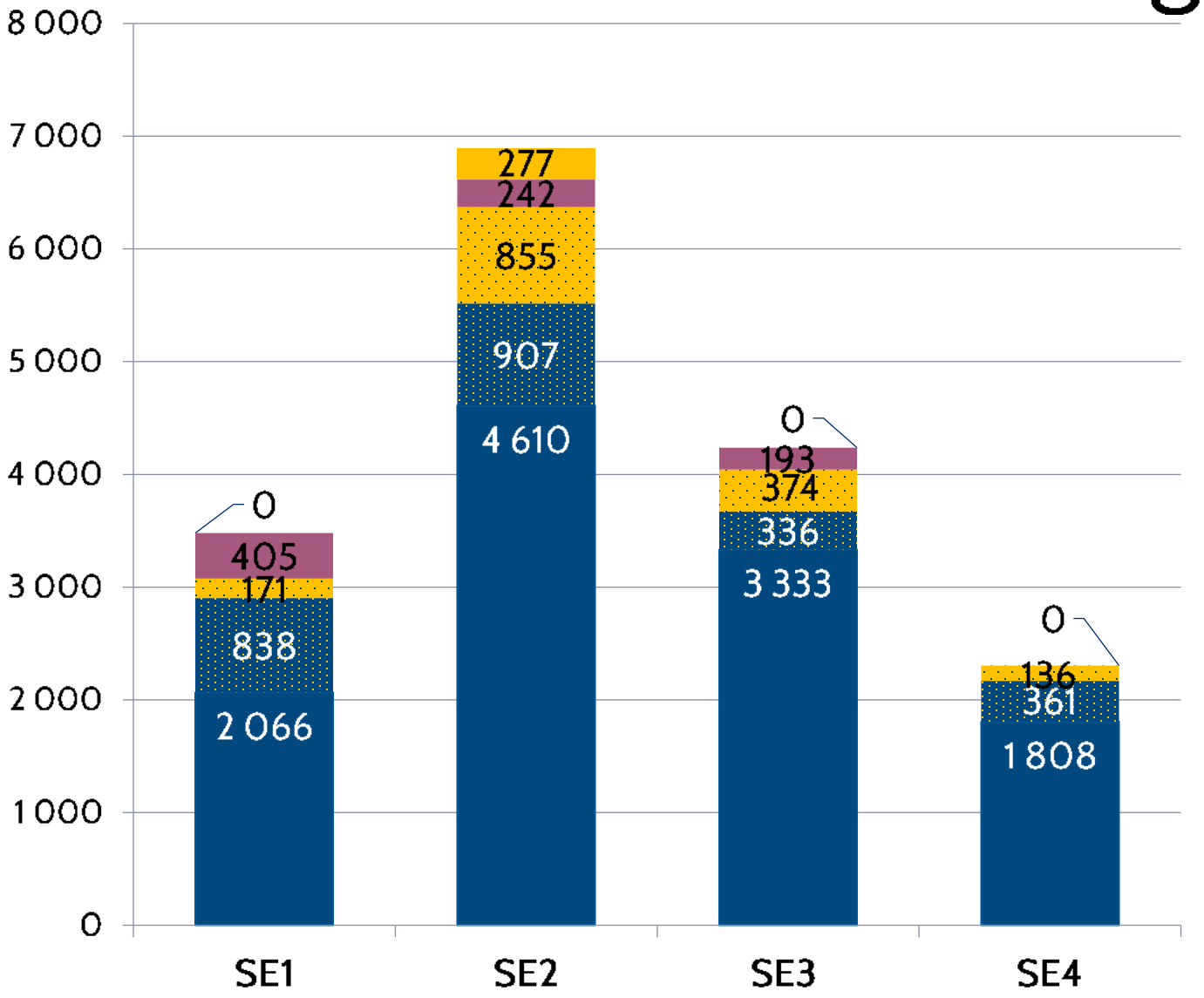


Scheduled comissioning [MW]

According to turbine manufacturers order books for installations

2021	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2022 (Tot)	2023	2024	2025
1432	744	215	606	875	2441	1537	1095	1085

Scheduled comissioning* [MW]



Added 2025 (signed)

Added 2024 (signed)

Added 2023 (signed)

Added 2022 (signed)

In operation 31/12 2021

* Firm and binding orders

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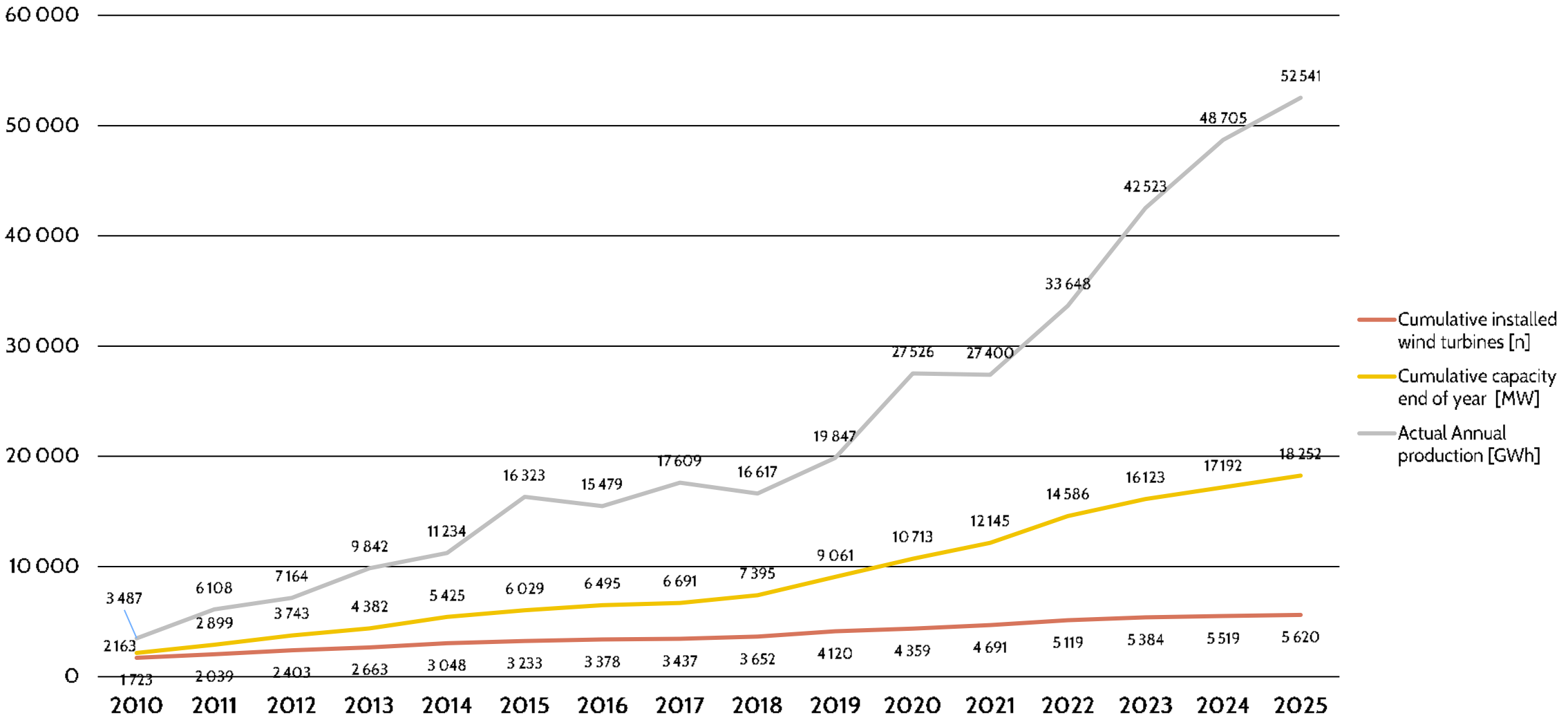
Short term forecast, 2022-09-30

- The capacity growth is at a record level.
- The pace is likely to slow down after 2024, due to lack of permits.
- In the end of 2025 the accumulated installed capacity will pass 18 000 MW and a production of 52 TWh, making wind power the second largest source of power in Sweden.
- The short term forecast is based on investment decisions and an estimate of buildable projects and new projects based on the permitting situation.

Short term forecast, 2022-09-30



Project portfolio 2022-09-30

Under construction	Onshore	Offshore	Total
Windturbines	795	0	795
Capacity (MW)	4 376	0	4 376
Estimated annual production (TWh)	14,5	0,0	14,5

Firm and unconditional turbine orders, based on investment decisions.

Permitted	Onshore	Offshore	Total
Windturbines	1 066	210	1 276
Capacity (MW)	6 059	2 767	8 826
Estimated annual production (TWh)	20,3	12,0	32,3

Estimation based on Vindbrukskollen and reports from SWEA:s members.

In permission process	Onshore	Offshore	Total
Windturbines	1 360	2 095	3 455
Capacity (MW)	8 844	39 655	48 499
Estimated annual production (TWh)	29,6	175,9	205,5

Estimation based on Vindbrukskollen and reports from SWEA:s members.

Under construction

Project	Developer	In operation	WTG:s	MW	Pricearea	County	Municipality
"MB North" Markbygden	Svevind	2022	63	253	SE1	Norrbotten	Piteå
Hocksjön	Jämtkraft	2022	23	131	SE2	Jämtland	Sollefteå
Skaftåsen	Arise	2022	35	210	SE2	Jämtland	Härjedalen
Grönhult	Vattenfall Vindkraft	2022	12	67	SE3	Västra Götaland	Tranemo
Hån	Cloudberry Wind	2022	5	21	SE3	Värmland	Årjäng
Kingebol	European Energy	2022	6	37	SE3	Västra Götaland	Åmål
Knöstad	Eurowind Energy	2022	8	50	SE3	Värmland	Säffle
Aura / Önusberget	Svevind	2023	138	759	SE1	Norrbotten	Piteå
Ersträsk North, Markbygden	ENERCON	2023	32	134	SE1	Norrbotten	Piteå
"MB South" Markbygden	Svevind	2023	97	405	SE1	Norrbotten	Piteå
Björnberget	RES Renewable Norden	2023	60	372	SE2	Västernorrland	Ånge
Gubbaberget	RES Renewable Norden	2023	12	74	SE2	Gävleborg	Ljusdal
Klevberget	OX2	2023	24	146	SE2	Västernorrland	Ånge
Storbrännkullen	Neoen	2023	10	57	SE2	Jämtland	Ragunda
Stor-Skälsjön	Eolus Vind	2023	42	260	SE2	Norrbotten	Piteå
Femstenaberg	Rabbalshede Kraft	2023	7	46	SE3	Västra Götaland	Strömstad
Frykdalshöjden - N Länsmansberget	Bixia Byggvind	2023	10	62	SE3	Värmland	Sunne
Grevekulla	European Energy	2023	6	36	SE3	Östergötland	Ydre
Hultema	VKS Vindkraft Sverige	2023	11	72	SE3	Jönköping	Vaggeryd
Lursäng	Rabbalshede Kraft	2023	3	20	SE3	Västra Götaland	Tanum
Rosenskog	Eolus Vind	2023	3	18	SE3	Västernorrland	Timrå
Rödene	RES Renewable Norden	2023	13	86	SE3	Västra Götaland	Alingsås
Stöllsäterberget	wpd Scandinavia	2023	8	46	SE3	Dalarna	Malung-Sälen
Timmele Hällunda	Eolus Vind	2023	2	8	SE3	Västra Götaland	Ulricehamn
Tormoseröd	Kraftö Vind	2023	11	73	SE3	Västra Götaland	Tanum
Furuby	BayWa re Scandinavia	2023	10	62	SE4	Kronoberg	Växjö
Karskruv	OX2	2023	20	86	SE4	Kronoberg	Uppvidinge
Marhult	OX2	2023	7	32	SE4	Kronoberg	Uppvidinge
Skåramåla	European Energy	2023	8	50	SE4	Kronoberg	Tingsryd
Ranasjö- och Salsjöhöjden	Arise	2024	39	242	SE2	Västernorrland	Sollefteå
Lebo	Arise	2024	5	33	SE3	Kalmar	Västervik
Lervik	Eurowind Energy	2024	7	46	SE3	Kalmar	Västervik
Skallberget/Utterberget	Eolus Vind	2024	12	79	SE3	Dalarna	Avesta
Tjärnäs	Eolus Vind	2024	4	26	SE3	Dalarna	Hedemora
Kölvallen	Arise	2025	42	277	SE2	Gävleborg	Ljudal

New wind power per county 2022-2025

County	WTG:s	MW	TWh*
Norrbotten	369	1 828	6,1
Västernorrland	213	1 306	4,3
Västerbotten	168	845	2,7
Jämtland	121	664	2,1
Gävleborg	65	417	1,4
Kronoberg	92	431	1,4
Västra Götaland	62	387	1,3
Jönköping	42	232	0,8
Kalmar	48	234	0,8
Dalarna	31	190	0,6
Värmland	31	167	0,6
Östergötland	6	36	0,1
	1 248	**6 737**	**22,0**

County	WTG:s	MW	TWh
Blekinge	0	0	0,0
Gotland	0	0	0,0
Halland	0	0	0,0
Skåne	0	0	0,0
Stockholm	0	0	0,0
Södermanland	0	0	0,0
Uppsala	0	0	0,0
Västmanland	0	0	0,0
Örebro	0	0	0,0
	0	**0**	**0,0**

* Estimated annual normal production

Theme Q3 2022

Policy for accelerated wind power growth

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The new governments energy policy

- In order to form a government, four parties entered into an agreement called the "Tidö Agreement" in which they agreed on energy and climate policy, among other things.

- In this agreement they propose a new energy goal and focus on regulatory issues regarding nuclear power, new climate policy, security of supply and competitiveness.

Wind power contributes to the new governments policy

- **Security of supply**: Since the 2010s, when wind power was greatly expanded, the number of hours Sweden has had to import electricity has decreased significantly

- **Stop climate change**: As increased electricity generation replaces coal and gas power in our neighbouring countries, or used for electrification of transport and industry in Sweden, annual emissions could be reduced by around 27 million tonnes

- **Resilience**: Today's centralised and import-based energy system is vulnerable to incidents. Decentralised domestic production of electricity and fuels provides greater resilience.

- **Competitiveness**: Climate transition in industry and transportation will result in doubled use of electricity in 20-25 years in Sweden. During the same period half of today's electricity generation will fall for the age limit and need to be replaced.

The new Governments energy goals

- Meet a doubled electricity demand, at least 300 TWh, in 2045
- 100 % fossil free electricity system (instead of 100 % renewable)
- Net zero green house emissions by 2045 (no change)

300 TWh 2045 = 10 new TWh per year

Production, TWh	**2021**	**2022**	**2023**	**2024**	Share 2024
Hydro	70,6	66,3	66,3	66,3	35,8 %
Wind	27,4	36,0	44,0	48,3	26,1 %
Nuclear	51,0	52,0	52,0	52,0	28,1 %
Solar	1,1	1,6	2,2	3,0	1,6 %
CHP	15,3	15,2	15,3	15,5	8,4 %
	165,5	**169,4**	**180,0**	**185,1**	
Use	**139,4**	**137,2**	**137,7**	**139,5**	
Export	**26,1**	**32,2**	**42,3**	**45,6**	

Energimyndighetens kortsiktsprognos 2022-08-26

About 80 TWh of today's electricity generation will reach its age limit and must be replaced up until 2045.

Electricity consumption is expected to increase from 140 to 300 TWh by 2045.

300-(170-80) = 210 TWh = 10 TWh/year needs to be comissioned 2023-2045.

All power sources that can contribute to achieving Sweden's climate goals need to be increased.

300 TWh = major grid investments

- The investment need for the electricity grid at all levels are SEK 668 billion.
  - 367 billions in district grid investments
  - 110 billions in regional grid investements
  - 191 billions in national grid investments

- 53 percent are reinvestments to replace the current grid infrastructure - will need to be made over the next 10-12 years.

Elnätsinvesteringar för ett fossilfritt Sverige 2045 (Sweco 2022)

Harmonise climate and energy goals

Energy goal:	100 % fossil free (instead of 100 % renewable) electricity system by 2040
Climate goal:	Net zero greenhouse gas emissions by 2045
SWEA:s proposition:	100 % fossil free energy system by 2045

Almost achieved: A 100 % fossil free electricity system by 2040.

In line with Sweden's climate goal: A 100 % fossil free energy system by 2045.

If the energy system is to become fossil free by 2045, electricity production will need to be scaled up to 500 TWh per year.

100 % fossil-free energy system – up to 500 TWh

- If the energy system is to become fossil-free by 2045, electricity production will need to be scaled up from 170 to at least 500 TWh per year (170+330=500) but probably more according to our assumptions*
- Sweden has a lot to gain from stepping up the climate transition and we have no time to lose, we must act now to meet the massive energy needs of the future.
- All the conditions are in place to become a pioneer of innovation and a leader in the development of technological solutions.

Potential (estimated)	TWh
Air travel switches to hydrogen/e-fuel	10
Electricity use in road transport becomes the norm	30
Server halls, including export of calculations, are growing	40
Chemical industry moves to renewable raw materials	50
New electricity-intensive industry (battery production, etc.)	50
Maritime transport (methanol, hydrogen, ammonia)	70
The heating sector switches to Power to Heat/Fuel	80
	330

*DN debatt Power Circle, Svensk Solenergi, Vätgas Sverige och Svensk Vindenergi

A green and competitive industry

Excerpt from the "Tidö Agreement":

- Sweden's international competitiveness is based on access to affordable energy.

- Swedish business is a powerhouse of prosperity and innovation, but now also an important environmental movement - a world leader in sustainability and green transformation.

Green industry with flexible electricity use

- Virtually all electrified future scenarios involves a significant increase in solar and wind power, which means, that above all, flexibility is needed.
- In the Swedish TSO's scenario "Fossil free 2045 with double electricity use and no nuclear power" flexibility increases significantly compared to today.
- 79 % of the increase in consumption consists of flexible consumption in the form of electric vehicles and hydrogen production.
- To increase competitiveness, a lot of low-cost electricity is needed to support industrial electrification and climate transition.
- Wind power has the fastest set up and the lowest production costs of the types of power that can be expanded on a large scale.

Wind power = lowest production cost

Current production cost (LCOE) for different types of power*

• Onshore wind	24-36 öre/kWh
• Solar (park)	29-52 öre/kWh
• Offshore wind	51-55 öre/kWh
• Biopower	47-59 öre/kWh
• Nuclear	49-64 öre/kWh
• Solar (roof top)	53-107 öre/kWh
• New nuclear in FIN, FRA, GBR	90-130 öre/kWh

* El från nya anläggningar dec 2021

New wind power pushes down electricity prices and increases competitiveness

- As more wind power enters the electricity system, the price of electricity will be lowered*
  - Each additional TWh of wind power reduces the annual average price by 0.4 öre/kWh in SE3 and SE4.
  - When 20 TWh of new wind power is added in 2022-2025, the price will be reduced by 8 öre/kWh in southern Sweden (SE3 and SE4).
  - The price effect is greater when fuel and CO2 prices are high in Europe, and somewhat less when they are low.

* Vindkraftens elprispressande effekt 2022–2025, analys av Sweco

Remove barriers for wind power growth

- Harmonise the climate and energy goals for a 100 % fossil free energy system by 2045

- Update all the government agencies' appropriation directives to promote the expansion of electricity production and electricity grid to achieve Sweden's climate goals.

- Introduce a financial incentive for municipalities to contribute to the expansion of electricity generation.

- Follow REPowerEU, EU's plan to make the Union independent of Russian fossil fuels:
  - No more than one contact point for an applicant during the authorisation process.
  - The authorisation process covers all permits needed for construction, upgrade and operation, as well as the assets required for their connection to the electricity grid.
  - Maximum two years authorisation process (one year for REPowerEU) for power plants. The time limits include all relevant procedures with the authorities involved.
  - Coordinated and more predictable permit processes for offshore wind power
    - Introduce a more predictable permitting process with the Swedish Armed Forces
    - Introduce a "one-stop-shop" for permits

- Update the martime spatial plans to realise the full potential of offshore wind power

- Adjust the Swedish Environmental Code's portal paragraph, as proposed by the so called "klimaträttsutredningen" (committee of inquiry), to clearly state the importance of reducing climate impact.

Thank you!

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