Statistics and forecast Q4 2023

2024-02-09

swedish wind energy association

Top 4 Tubine Order Quarter To Date

- 730 MW new turbine orders made in Q4 2023, making it fourth best quarter to date.
- In totalt 1 244 MW new turbine orders in 2023. This is somewhat lower than record years of 2017-2021, but a recovery from the bottom year of 2022.
- New wind power comissioning at continued high levels during 2023, in total 1 973 MW comissioned.
- Binding area SE2 by far has the largest share of installed capacity. SE3 overtook SE1 in installed wind power capacity in 2023.
- In totalt 34,5 TWh wind power electricity generation in 2023.

Wind Power Expansion Depending on Investment Climate

- Up until 2026 an additional 9,83 TWh electricity generation from wind power.
- We estimate that wind power will produce 55 TWh in 2026 and that wind power will be Sweden's second largest power source by 2025. In 2026, wind power could account for 28 per cent of Sweden's electricity production.
- The expansion of new wind power production after 2026 is dependent on Sweden having a continued attractive investment climate.
- If the investment climate improves, expansion could accelerate. This requires, among other things, more efficient permitting processes and long-term rules of the game.

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Orders, Commissioning and Expansion 2023

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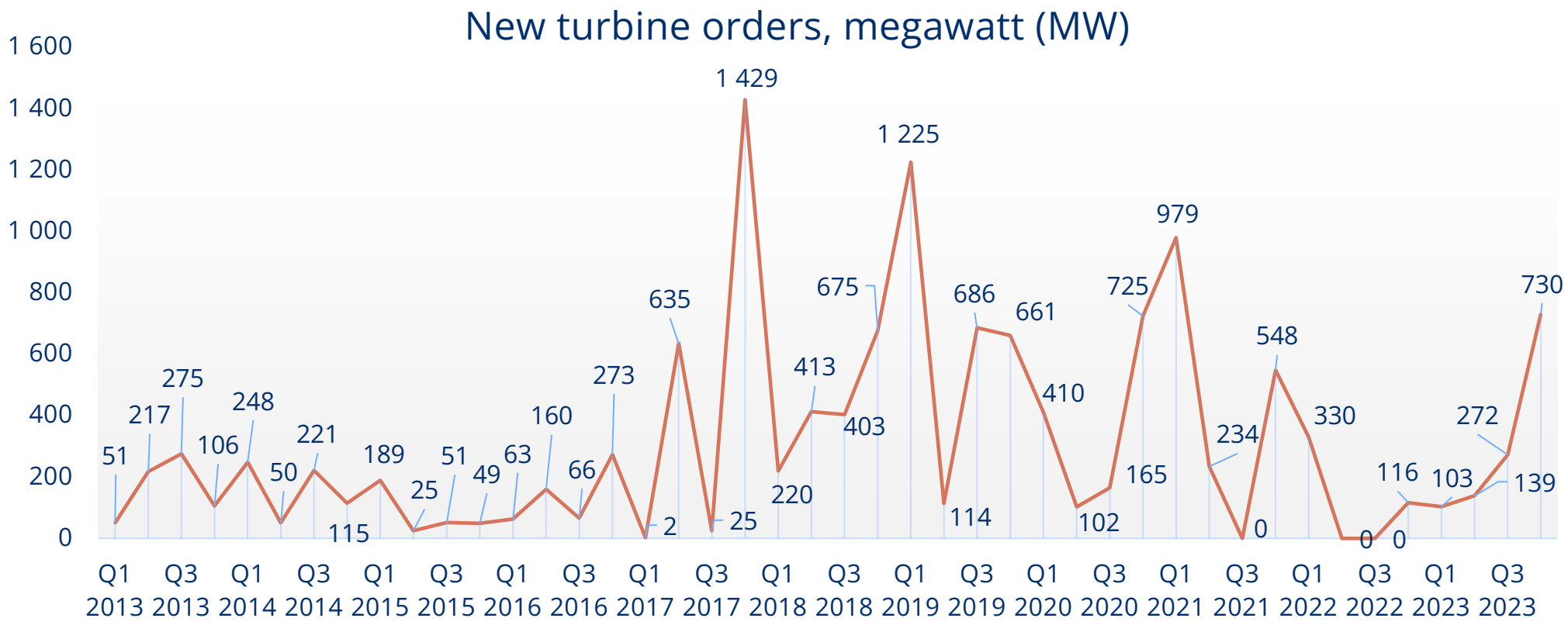
Q4 2023: Top 4 Duarter To Date

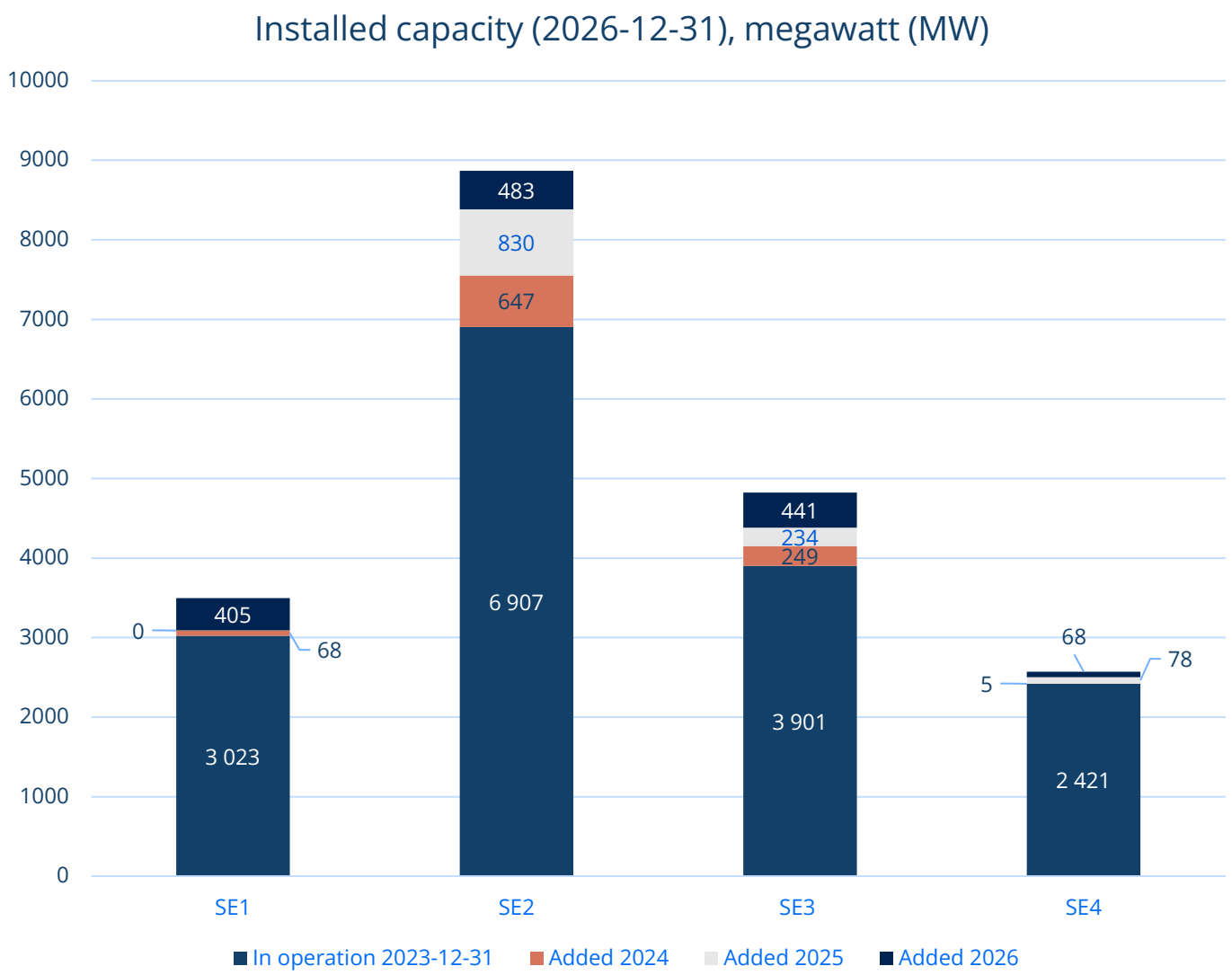


Continued High Levels of Commissioning

Commissioning, megawatt (MW)

Commissioned 2022-12-31	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2023 (Tot)	2024	2025	2026	Commissioned 2026-12-31
14 278	151	938	647	238	1 973	968	1 136	1 398	19 759

More Wind Power in SE3 than SE1



Projects with ordered WTGs incl. 739 MW in announced projects.

Total: 19 759 MW to 2026

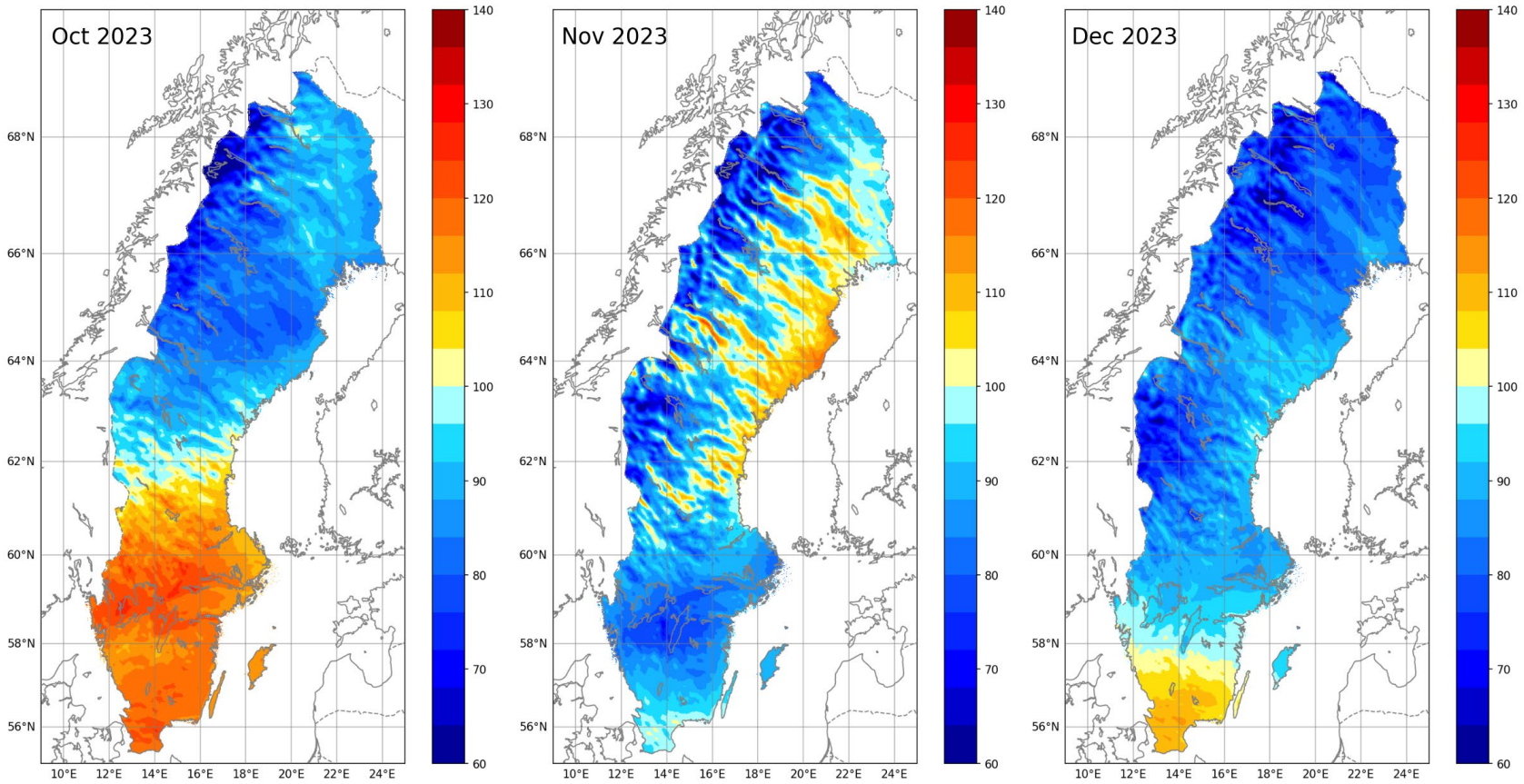
Wind Power Commissioned in 2023

Project	Developer	Owner	WTG	MW	TWh	Bindning Area	County	Municipality
Hocksjön	Jämtkraft	Jämtkraft & Persson Invest	23	131	0,44	SE2	Jämtland	Sollefteå
Stor-Blåliden, Pilot 2	Svevind	Statkraft & GE Capital	3	17	0,05	SE1	Norrbotten	Piteå
Rödene	RES Renewable Norden	Mirova & Octopus Renewables	13	86	0,29	SE3	Västra Götaland	Alingsås
Frykdalshöjden - N Länsmansberget	Bixia Byggvind AB	Tekniska verken i Linköping Vind	10	62	0,17	SE3	Värmland	Sunne
Gubbaberget	RES Renewable Norden	Komipo & Sprott (50/50)	12	74	0,25	SE2	Gävleborg	Ljusdal
Skaftåsen	Arise	Foresight, KLP, Arcano, BAE, Polhem Infra	35	210	0,70	SE2	Jämtland	Härjedalen
Skåramåla	European Energy	European Energy	8	50	0,17	SE4	Kronoberg	Tingsryd
Furuby	BayWa re Scandinavia	ERG	10	62	0,21	SE4	Kronoberg	Växjö
Knöstad	Eurowind Energy	Eurowind Energy	8	50	0,17	SE3	Värmland	Säffle
Storberget 5 / Sängsjön	Åsele Vindkraft Storberget	Åsele Vindkraft Storberget	1	4	0,02	SE2	Västerbotten	Åsele
Grevekulla	European Energy	European Energy	6	36	0,10	SE3	Östergötland	Ydre
Örken 2, Munkabol	RWE Renewables Sweden	RWE Renewables Sweden	2	8	0,03	SE4	Halland	Halmstad
Ersträsk North	ENERCON	Greencoat Renewables	32	134	0,45	SE1	Norrbotten	Piteå
Björnberget	RES Renewable Norden	Prime Capital & Enlight	60	372	1,24	SE2	Västernorrland	Ånge
Femstenaberg	Rabbalshede Kraft	Rabbalshede Kraft	7	46	0,15	SE3	Västra Götaland	Strömstad
Sundby	Cloudberry Wind	Cloudberry Wind	9	32	0,09	SE3	Södermanland	Eskilstuna
Skallberget/Utterberget	Eolus Vind	BKW	12	79	0,26	SE3	Dalarna	Avesta
Tjärnäs	Eolus Vind	BKW	4	26	0,09	SE3	Dalarna	Hedemora
Marhult	OX2	Octopus Renewables	7	32	0,10	SE4	Kronoberg	Uppvidinge
Karskruv	OX2	Orrön Energy	20	86	0,29	SE4	Kronoberg	Uppvidinge
Klevberget	OX2	Renewable Power Capital	24	146	0,49	SE2	Västernorrland	Ånge
Rosenskog	Eolus Vind	BKW	3	19	0,06	SE3	Västra Götaland	Falköping
Tormoseröd	Kraftö Vind	Fu-Gen & Alpiq	11	73	0,24	SE3	Västra Götaland	Tanum
Lursäng	Rabbalshede Kraft	Rabbalshede Kraft	3	20	0,07	SE3	Västra Götaland	Tanum
Hultema	VKS Vindkraft Sverige	Reichmuth Infrastruktur	11	72	0,24	SE3	Östergötland	Motala
Stöllsäterberget	wpd Scandinavia	wpd Scandinavia	8	46	0,16	SE3	Dalarna	Malung-Sälen
			342	1 973	6,50			

Wind Index October–December 2023

KJELLER VINDTEKNIK
Part of Norconsult

KVT Monthly wind index [%]



Kjeller Vindteknikks Wind Index. Average winds per month in relation to the reference period 2000-2019.
Red colours = higher average winds, blue colours = lower average winds.

Sweden was largely characterised by calm wind conditions in October-December 2023 (compared to the reference period 2000-2019).

The reason is, in part, a relatively weak jet stream. This has led to low pressure in the western wind belt moving mainly south of, or over, southern Sweden.

An exception to this is the coast of Norrland, where there were stronger average winds in November compared to the reference period.

In October, the storm Babet over Denmark contributed to a period of strong winds, which is clearly visible in the wind index.

Forcast on Wind Power Expansion in Sweden

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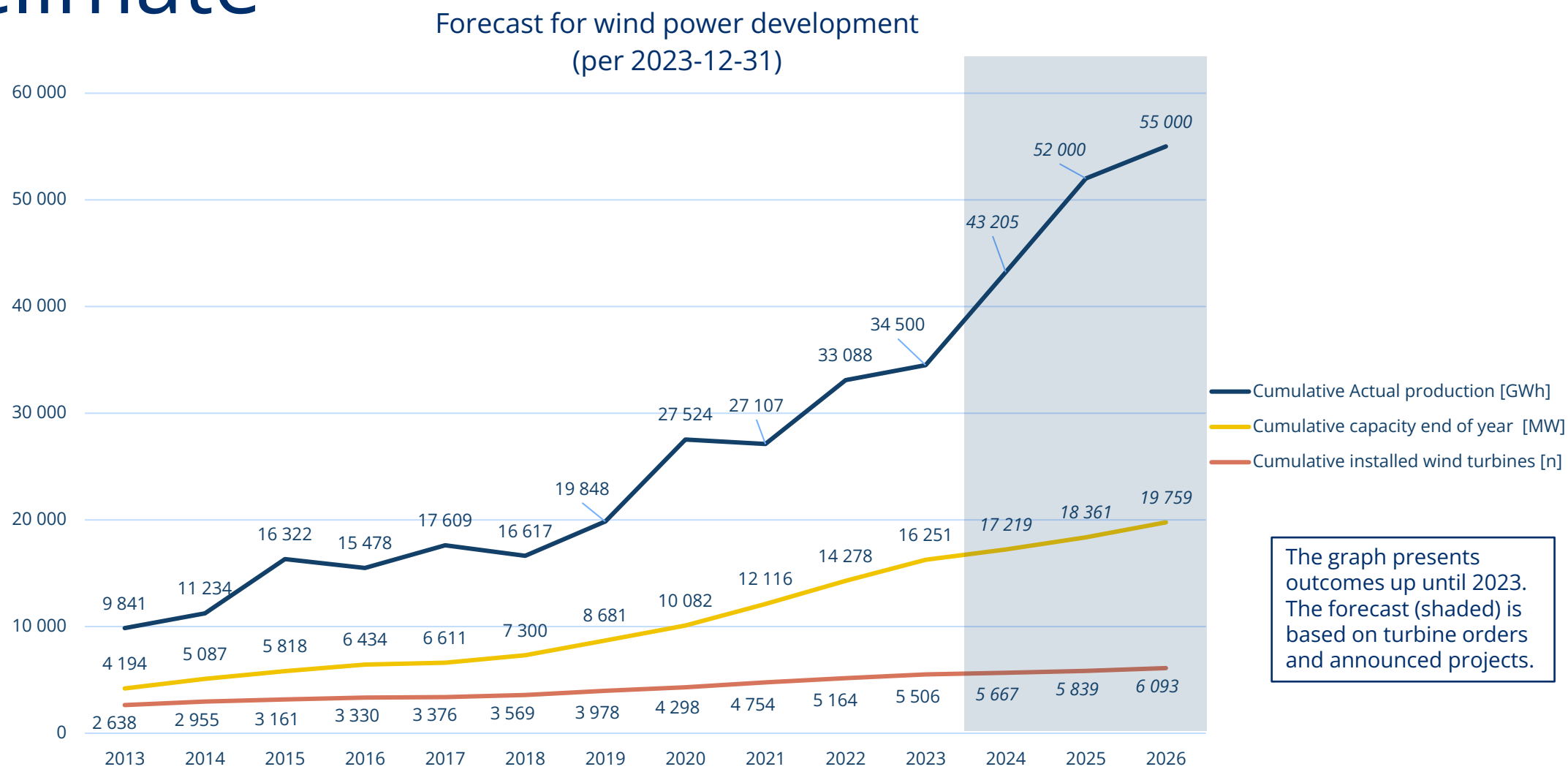
Wind Power Under Construction Until 2026

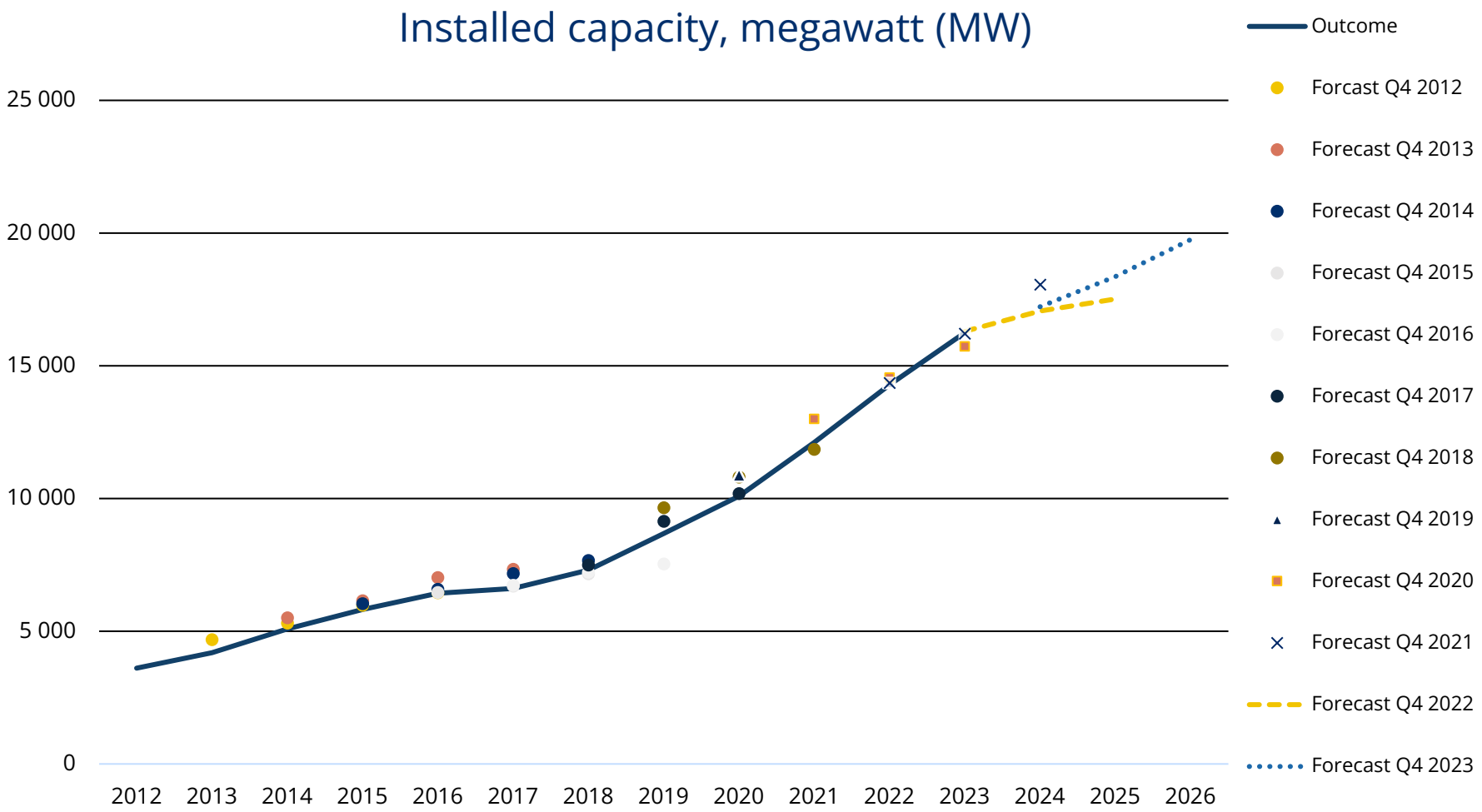
Project	Developer	Start year	Owner	WTG	MW	TWh	Binding area	County	Municipality
Lebo	Arise	2024	Arise	5	33	0,11	SE3	Kalmar	Västervik
Lervik	Eurowind Energy	2024	Eurowind Energy	7	46	0,15	SE3	Kalmar	Västervik
Fäbodliden II	Fred. Olsen Renewables	2024	Fred. Olsen Renewables	4	17	0,06	SE2	Västerbotten	Vindeln
Storbrännkullen	Neoen Renewables Sweden	2024	Neoen Renewables Sweden	10	57	0,16	SE2	Jämtland	Ragunda
Ranasjö- och Salsjöhöjden	Arise	2024	TRIG & InfraRed	39	242	0,81	SE2	Västernorrland	Sollefteå
Stor-Skälsjön	Eolus Vind	2024	MEAG & Hydro Rein	42	260	0,81	SE2	Västernorrland	Timrå
Tomasliden	wpd Scandinavia	2024	wpd Scandinavia	10	68	0,20	SE1	Västerbotten	Norsjö
Hallösa	Kraftö Vind	2024	Prime Capital	13	59	0,19	SE3	Jönköping	Jönköping
Munkhyttan I	Cloudberry Wind	2024	Cloudberry Wind	3	18	0,06	SE3	Örebro	Lindesberg
Riberget	OX2	2024	Fu-Gen	11	70	0,23	SE2	Gävleborg	Ljusdal
Älgkullen	SR Energy	2024	SR Energy	15	93	0,27	SE3	Dalarna	Smedjebacken
Trelleborgs Hamn, kajen	ENERCON	2024	Trelleborgs Hamn	2	5	0,02	SE4	Skåne	Trelleborg
Kölvallen	Arise	2025	Foresight & Arise	42	277	0,92	SE2	Gävleborg	Ljusdal
Knäsjöberget	Kabeko Kraft	2025	Renewable Power Capital	14	98	0,33	SE2	Västernorrland	Kramfors
Storhöjden	Kabeko Kraft	2025	Renewable Power Capital	22	154	0,51	SE2	Västernorrland	Kramfors
Vitberget	Kabeko Kraft	2025	Renewable Power Capital	23	161	0,54	SE2	Västernorrland	Kramfors
Sörlidsberget	Kabeko Kraft	2025	Renewable Power Capital	21	140	0,47	SE2	Västernorrland	Sollefteå/Kramfors
Rosenholm	SR Energy	2025	SR Energy	5	23	0,06	SE4	Kronoberg	Uppvidinge
Älmedal	SR Energy	2025	SR Energy	9	56	0,15	SE4	Kronoberg	Uppvidinge
Bruzaholm	Vattenfall Vindkraft	2025	Vattenfall Vindkraft	21	139	0,46	SE3	Jönköping	Eksjö
Velinga	Vattenfall Vindkraft	2025	Vattenfall Vindkraft	12	60	0,18	SE3	Västra Götaland	Tidaholm
Fasikan	Arise	2026	SCA	15	105	0,35	SE2	Västernorrland	Sollefteå
Horshaga	SR Energy	2026	SR Energy	11	68	0,19	SE4	Kronoberg	Uppvidinge
Maximus, MB South	Svevind / Enercon	2026	EEP	97	405	1,35	SE1	Norrbotten	Piteå
Ånglarna	OX2	2026	EWZ	18	115	0,36	SE3	Dalarna	Falun
				471	2 769	8,93			

Expansion Requires Favourable Investment Climate

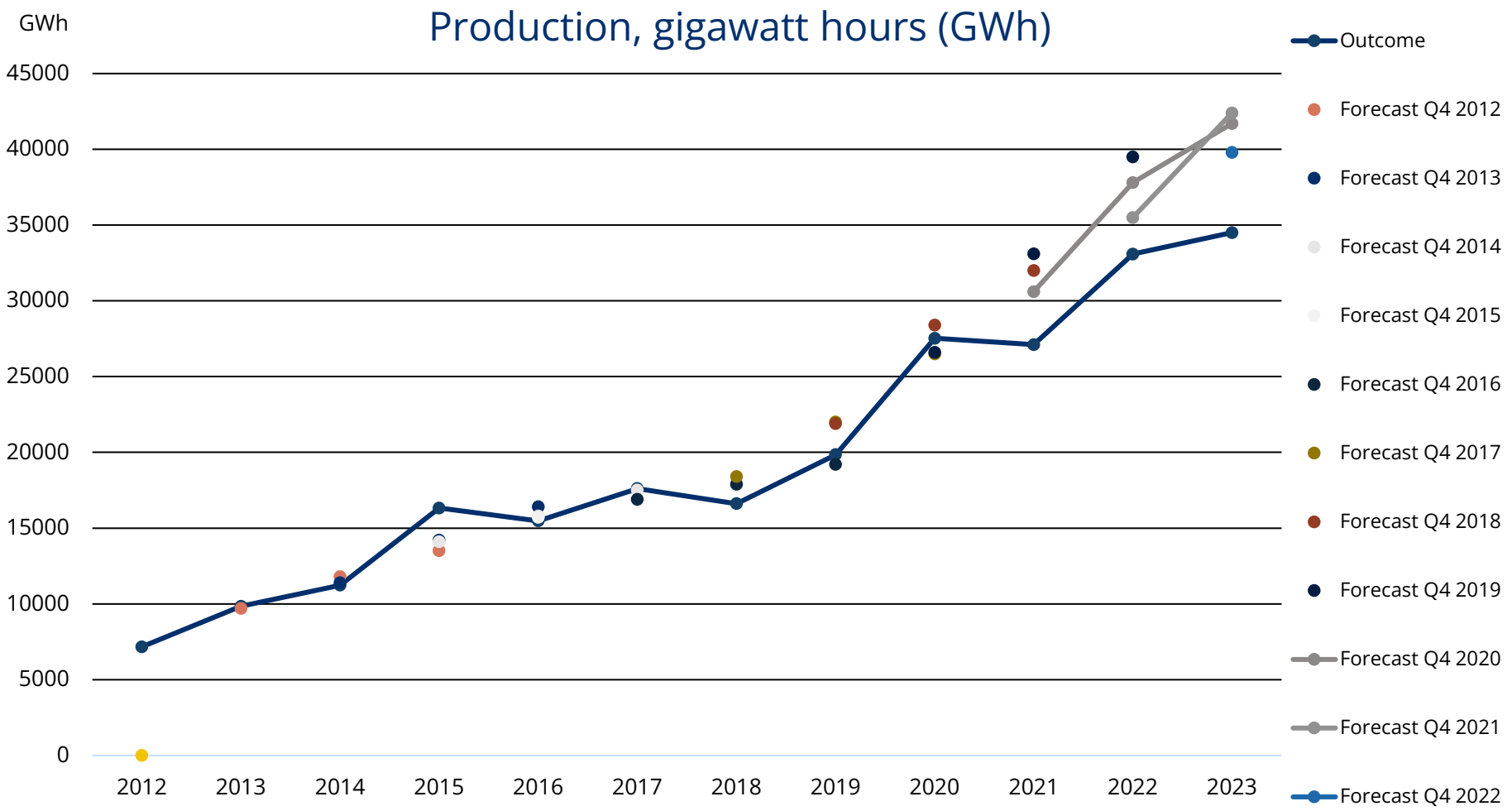


The graph presents outcomes up until 2023. The forecast (shaded) is based on turbine orders and announced projects.

Forecast vs. outcome wind power development



Forecast vs. outcome wind power development



Swedish Wind Power Project Portfolio

Commissioned in 2023	Onshore	Offshore	Total
Project	26	0	26
WTG	342	0	342
Capacity (MW)	1 973	0	1 973
Normal annual production (TWh)	6,50	0,00	6,50

Permit granted	Onshore	Offshore	Total
Project	44	4	48
WTG	784	167	951
Capacity (MW)	4 721	2 279	7 000
Normal annual production (TWh)	15,14	9,77	24,90

Under construction	Onshore	Offshore	Total
Project	25	0	25
WTG	471	0	471
Capacity (MW)	2 763	0	2 763
Normal annual production (TWh)	8,91	0,00	8,91

Permitting process	Onshore	Offshore	Total
Project	54	22	76
WTG	898	2 708	3 606
Capacity (MW)	5 977	44 565	50 542
Normal annual production (TWh)	20,32	190,52	210,83

Announced	Onshore	Offshore	Total
Project	11	0	11
WTG	133	0	133
Capacity (MW)	853	0	853
Normal annual production (TWh)	2,80	0,00	2,80

Consultation	Onshore	Offshore	Total
Project	53	28	81
WTG	1 206	3 155	4 361
Capacity (MW)	8 418	55 643	64 061
Normal annual production (TWh)	28,18	241,87	270,05

Project Portfolio per Binding Area: Onshore Wind Power

SE1	WTG	MW	TWh
Under construction	107	473	1,55
Announced	0	0	0,00
Permit granted	140	844	2,98
Permitting process	149	1 016	3,51
Consultation	773	11 080	42,22

SE2	WTG	MW	TWh
Under construction	243	1 576	5,15
Announced	60	367	1,22
Permit granted	576	3 442	10,73
Permitting process	1 120	15 904	62,80
Consultation	1 097	13 330	55,00

SE3	WTG	MW	TWh
Under construction	94	563	1,78
Announced	73	486	1,58
Permit granted	200	2 643	11,01
Permitting process	966	13 531	57,61
Consultation	2 021	33 569	147,40

SE4	WTG	MW	TWh
Under construction	27	151	0,42
Announced	0	0	0,00
Permit granted	85	1 071	4,57
Permitting process	1 321	19 091	82,53
Consultation	470	6 082	25,43

Project Portfolio per Binding Area: Offshore Wind Power

SE1	WTG	MW	TWh
Under construction	0	0	0,00
Announced	0	0	0,00
Permit granted	0	0	0,00
Permitting process	0	0	0,00
Consultation	339	8 060	32,16

SE2	WTG	MW	TWh
Under construction	0	0	0,00
Announced	0	0	0,00
Permit granted	51	1 020	3,50
Permitting process	714	12 543	51,23
Consultation	827	11 435	48,43

SE3	WTG	MW	TWh
Under construction	0	0	0,00
Announced	0	0	0,00
Permit granted	100	1 325	5,59
Permitting process	775	12 906	56,53
Consultation	1 665	31 093	139,21

SE4	WTG	MW	TWh
Under construction	0	0	0,00
Announced	0	0	0,00
Permit granted	67	954	4,18
Permitting process	1 168	18 096	79,26
Consultation	324	5 055	22,07

Swedish Wind Power Project Portfolio Glossary

SWEA presents the project portfolio based on the stage the wind power projects are in.

Under construction: All permits have been granted and tubines have been ordered.

Announced: Projects with permits and ready with investors, but where investment decisions have not yet been taken.

Permit granted: Projects with environmental permits, where the network concession (electricity network licence) remains.

Permitting process: Projects that have applied for an environmental licence to the county council or government.

Consultation: The consultation procedure under the Swedish Environmental Code has been initiated.

Topic: Offshore Wind Power in Sweden

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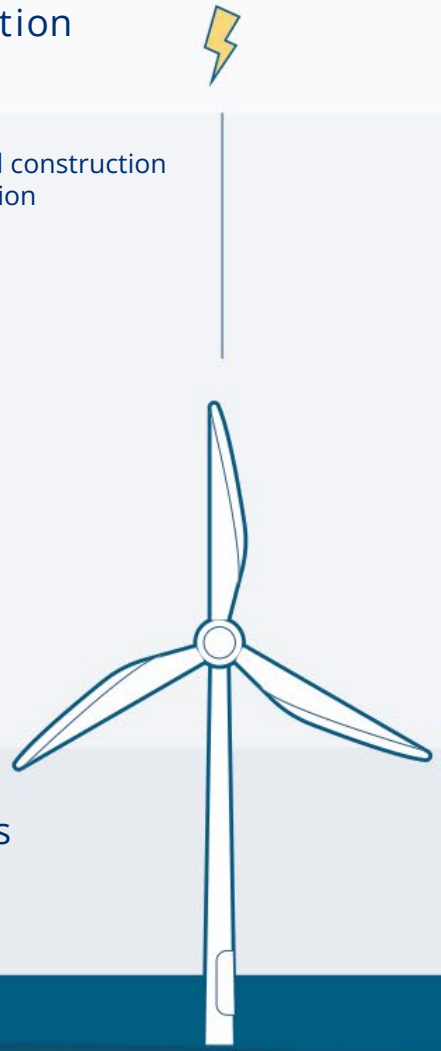
Faster Permitting Process Needed

Permitting process

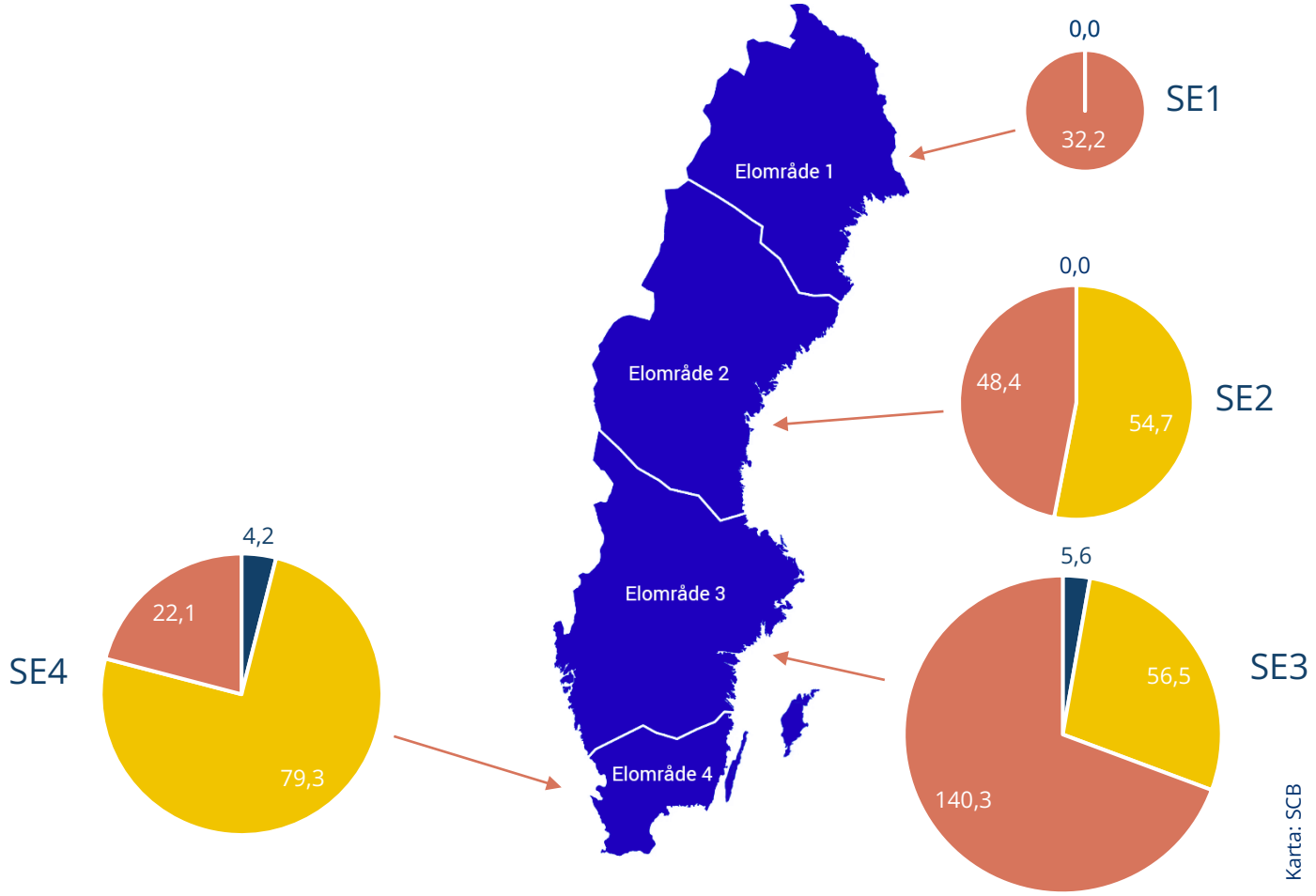
Phase	Early planning	Consultation	Permitting	Final planning	Construction
Moment	• Bottom surveys with survey permit • Inventories • Area studies	• Consultation with authorities, organisations, the public and individuals affected by the project • Preparation of an Environmental Impact Assessment.	Depending on the location of the wind farm: • Sweden's economic zone (SEZ): several environmental and grid licences under the Environmental Code, the SEZ Act and the Continental Shelf Act. • Territorial waters: several environmental permits under the Environmental Code and grid licences under the Electricity Act.	• Final design of the park • Procurement of equipment and components	• Park and grid construction • Grid connection
Time	1,5-2 years	1 year	8-10 years	1-1,5 years	2-3 2years

Exclusivity

Financial closure



Offshore Wind Power Under Development



Karta: SCB

443 TWh Offshore wind power under develpoment * (113 GW)

- Granted permits (in total 9,8 TWh)
- In permitting process (in total 191 TWh)
- In consultation (in total 242 TWh)

*not including 120 TWh 27 GW in early planning

Offshore Wind Power in Permitting Process

- 16 projects awaiting environmental permit from the government (see picture).
  - The government is also assessing the Långgrund project in territorial waters.
- Four projects in the Swedish economic zone have received a decision from the government, of which three have been granted an environmental permit (see picture).
- Another seven projects are applying for an environmental permit in territorial waters: Kattegatt Offshore, Storgrundet, Gretas Klackar 1 and Utposten 2.

Offshore Regulations Under Evaluation

- Revision of the Maritime spatial plans: indicative target to enable 120 TWh offshore energy (dec 2024)
- Inquiry Commission ob Off Shore Wind Power Utredningen om havsbaserad vindkraft (Jun 28 2024) will investigate exclusivity and a more streamlined regulation
- Grid connection of OffShore Wind Anslutning av havsbaserad vindkraft. TSO Svenska Kraftnät is planning to be able to conenct 14,5 GW until 2041 (half of the indicative targets in the maritime spatial plans)

Development of Wind Power in Sweden 2030-2035

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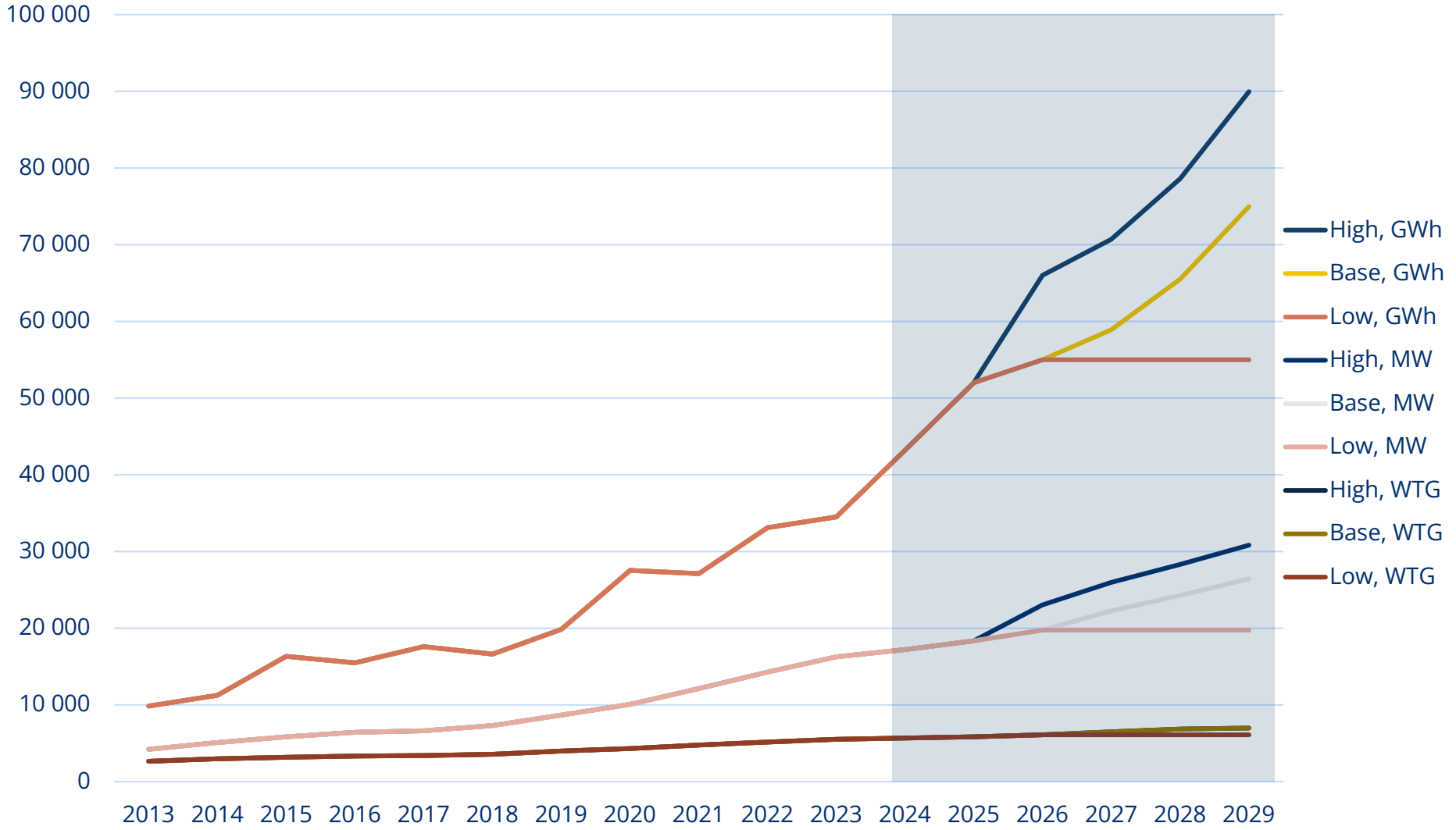
Three scenarios: wind development to 2029



High case scenario
- Faster authorisation processes
- Investment climate improves
- All current permitted land-based projects are realised
- All current permitted offshore projects are realised
- New turbine capacity increases and production increases by 20 per cent.
- Announced projects are realised
- Ordered turbines delivered

Baseline scenario
- Ordered turbines delivered
- Announced projects are realised
- 50 per cent of today's permitted onshore projects are realised
- All of today's permitted offshore projects are realised

Low scenario (most improbable)
- Ordered turbines delivered
- No new wind power is added after 2026: no realised permitted projects, announced projects and no new permits granted.

Possibility of at least 144 TWh new wind power by 2035

In 2022, wind power produced 33 TWh (normal annual production 36 TWh).

- In 2023, 6.5 TWh of wind power was added in Sweden.
- In 2024-2026, 11.7 TWh will be added from projects with investment decisions and announcements.
- If two-thirds of the permitted onshore wind power is realised, 11.4 TWh of onshore wind power can be added in 2026-2027.
    - 6.5 + 11.7 + 11.4 = 29.6 TWh of new wind power in 2023-2027 (9,130 MW)

- If all four permitted offshore wind farms are realised, 9.8 TWh of offshore wind power can be added in 2029-2030.
- If 50 per cent of wind turbines in the onshore projects in the permitting process are realised at a steady rate, 10.2 TWh of onshore wind power can be added in 2026-2035, half of which before 2030.
    - 6.5 + 11.7 + 11.4 + 9.8 + 5.1 = 44.4 TWh of new wind power in 2023-2030 (12,903 MW)

- If 50 percent of offshore wind turbines in the permitting process are approved and realised, 95.3 TWh of offshore wind power can be added in 2030-2035.
    - 6.5 + 11.7 + 11.4 + 9.8 + 5.1 + 5.1 + 95.3 = 144.7 TWh of new wind power in 2023-2035 (30,680 MW).

In 2036, wind power could produce 36 + 144 = 180 TWh.

Assessment commentary

- Cautious assessment of wind power expansion up to 2035
- Assessment is based on assumptions about the degree of realisation based on outcomes in permit applications.
- The increased electricity consumption of 70 TWh that industry has announced by 2030 can be met by 44 TWh of new wind power and current electricity exports.

Statistics and forecast Q4 2023

2024-02-09

Erik Almqvist
Electricity grid and market
+46 (0)73 025 78 46

Lina Kinning
Offshore wind
+46 (0)70 190 86 53

swedish wind energy association