4:th quarter 2021

Including figures for full year 2021

Statistics and forecast

Daniel Kulin, Swedish Wind Energy Association

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SWEA:s statistics and forecast for the Swedish wind power market are updated quarterly. The figures are produced with data from turbine manufacturers and other market participants.

SWEA, Swedish Wind Energy Association – Svensk Vindenergi

2022-02-08

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Sumarize: Development 2021 and forecast 2022

Added capacity in 2021

Total power	2,10	GW
Turbines	476	pcs
Annual normal production from added turbines	6,8	TWh
1:st year contribution from turbines added 2021**	2,4	TWh
1:st year utilisation of added capacity	36%	
Wind index 2021:	92	

Total by the beginning of 2022

Capacity	12,2	GW
Turbines	4835	pcs
Annual normal production*	33,1	TWh

Added during 2022 - forecast

Turbines added	414	pcs
Number of turbines end of year	5 249	pcs
Capacity addition	2,2	GW
Capacity end of year	14,3	GW
Estimated 1:st year production new turbines:	2,4	TWh
Energy production added (full normal-year production)	7,2	TWh
Estimated actual production***	35,5	TWh
Annual normal production end of year	40	TWh

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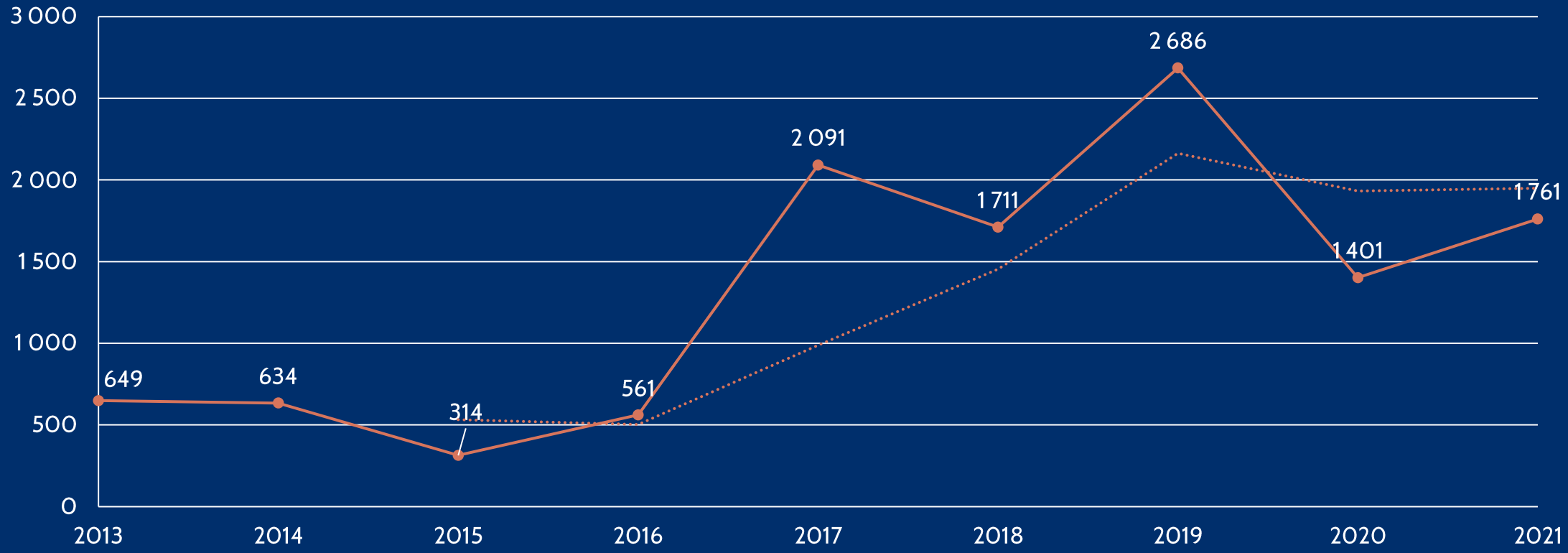
Annual wind power market in Sweden

The swedish market continue to attract investments and represents annual investment volume of € 2 bn.
The signed capacity for 2021 landed at 1761 MW (1,76 GW) and the tree-year mean is around 2 GW annualy.
Orders signed 2021 are to be comissioned during 2022-2024



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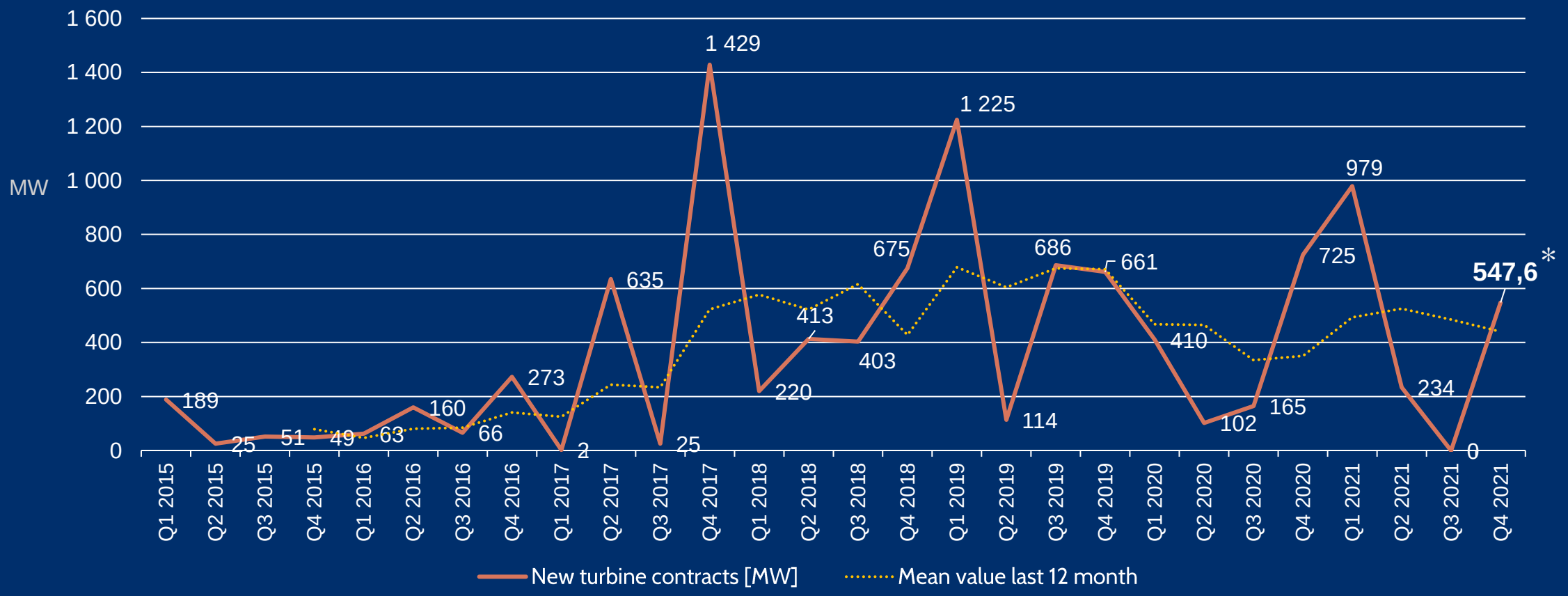
Turbine contracts per quarter

550 MW of new tubine orders were signed in the 4:th quarter of 2021, compared with the fourth quarter average of 808 MW for the last 4 years. In total; 1,76 GW was contracted during 2021, whereof 87 % in first and last quarter.



** Q4 2021, the rare event that a project was sold by one OEM to another occured, wich introduces an error in total volumes and makes turbine orders significantly higher than added comissioning.*

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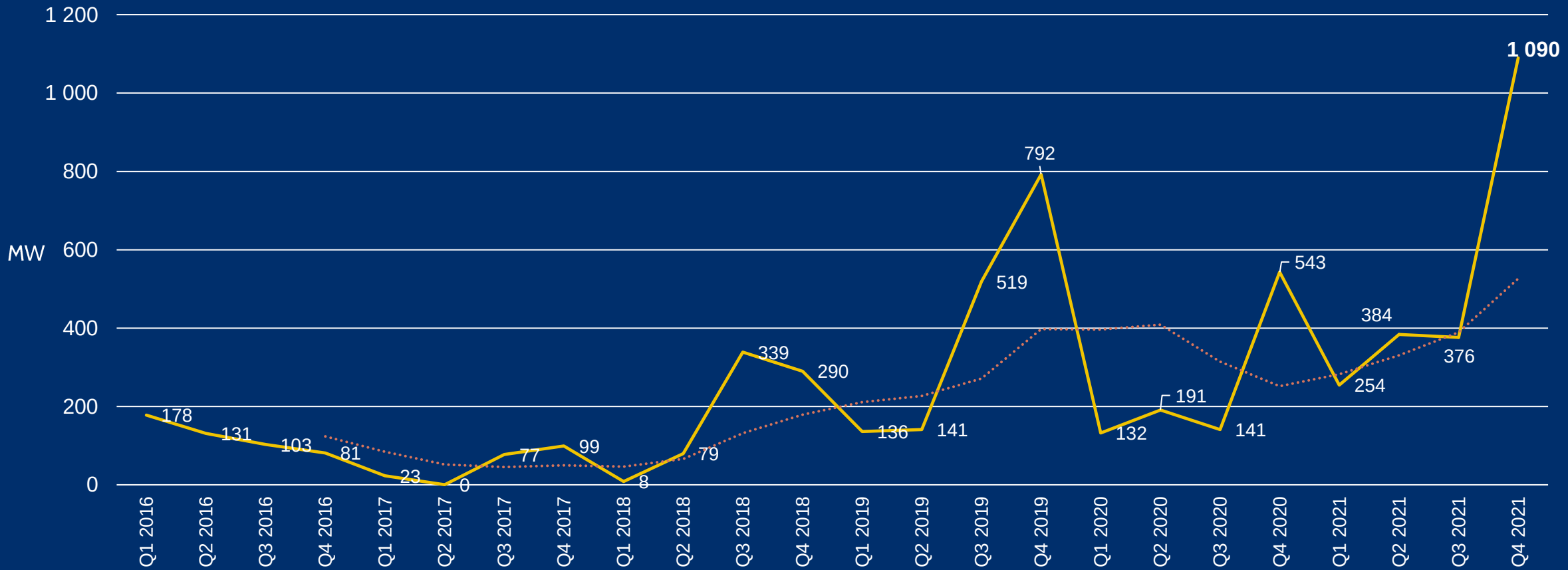
Comissioning per quarter [MW/quarter]C

Commissioning soared to a new record high of 1,09 GW during fourth quarter. Annualy, record breaking 2,1 GW was comissioned, compared with 1 GW in 2020 and 1,5 GW in 2019. Decomission is not measured and considered negligible.



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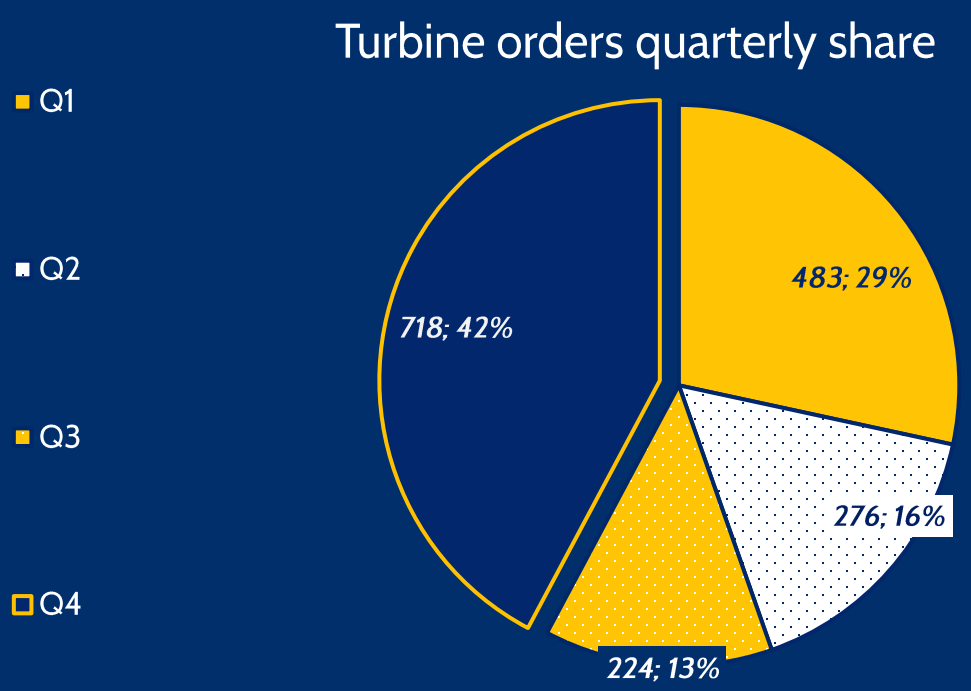
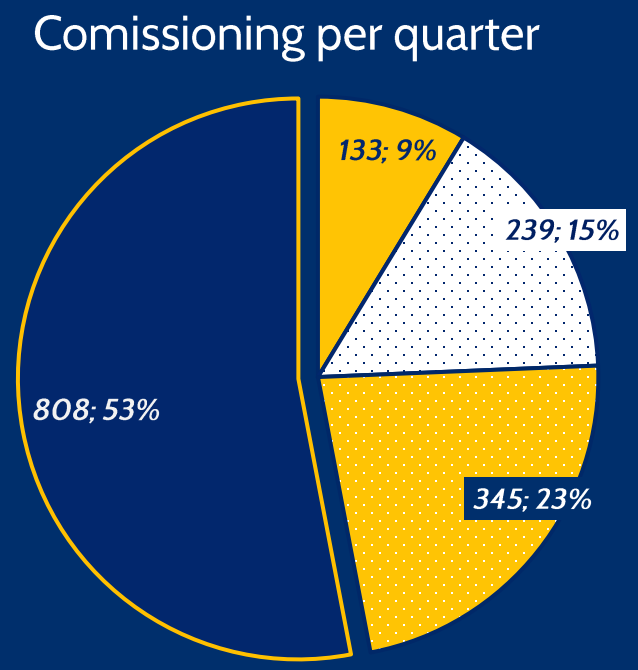
Turbine contracts and comissioning [MW] average 2016-2021

The fourth quarter nomaly exceeds rest of the year both in tems of sales and comissioning.





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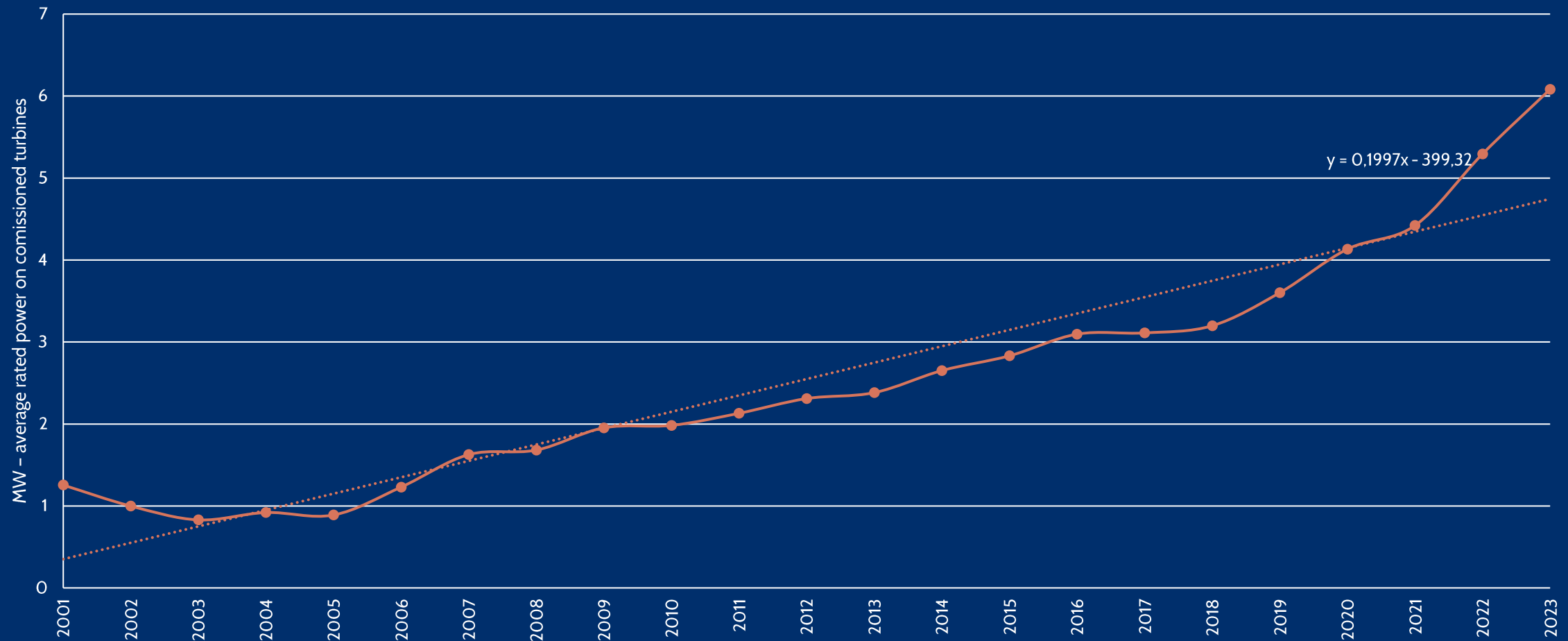
Technology development.

Power rating on installed turbines are up 0,2 MW/year over the last 20 years – and increasing.



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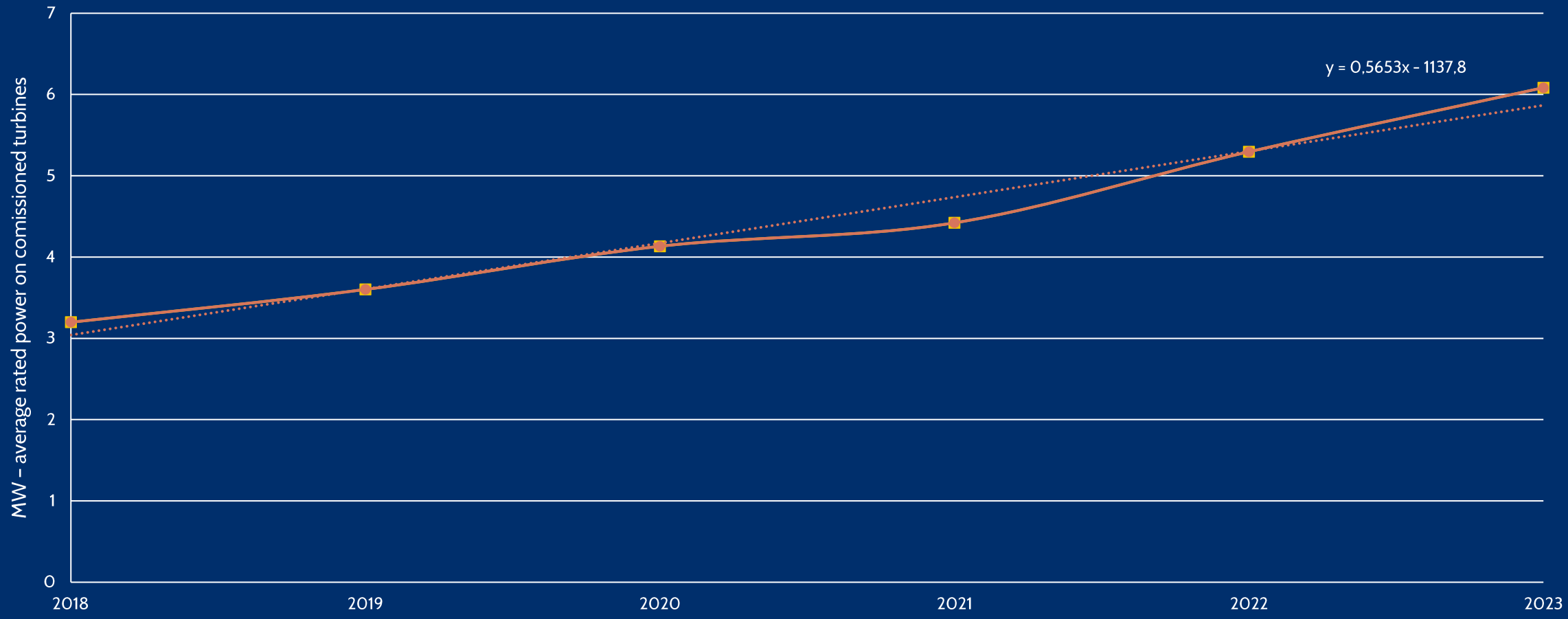
Technology development is increasing.

Power rating on installed turbines are up 0,57 MW/year over the last 5 years.



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Short term forecast, 2022-02-08

- The capacity growth is at record high levels [7 TWh or 2 GW per year]
- Investment pressure is high on permitted projects, for all in SE3 and SE4.
- The rate of addition is likely to slow down after 2024, due to lack of permits, especially in the southernmost bidding areas, SE3 and SE4.
- Towards 2025; the ackumulated installed wind power is likely reaching 18 GW, with normal year production reaching above TWh, making wind power the second largest source of power in Sweden.
- Short term forecast is based on investment descisions and an estimation of buildable projects and new projects based on the permitting situation.

Scheduled comissioning
– record high scheduled comission for 2021 and 2022

Time plan according to turbine manufacturers order books for wind power installations during year (MW) *

2020	*2021 Q1*	*2021 Q2*	*2021 Q3*	2021 Q4	2021 (Tot)	2022	2023	2024
988	*297*	*270*	*457*	**1090**	**2104**	2192	1016	904
				Difference since last quarter:	*-113**	*-260 **	*+418**	*+502**

*When delayed, turbine ratings may change, why sum is not always "0".
Also, in this quarter, the rare event that a project was sold by one OEM to another occured, wich makes turbine orders significantly higher than added comissioning.

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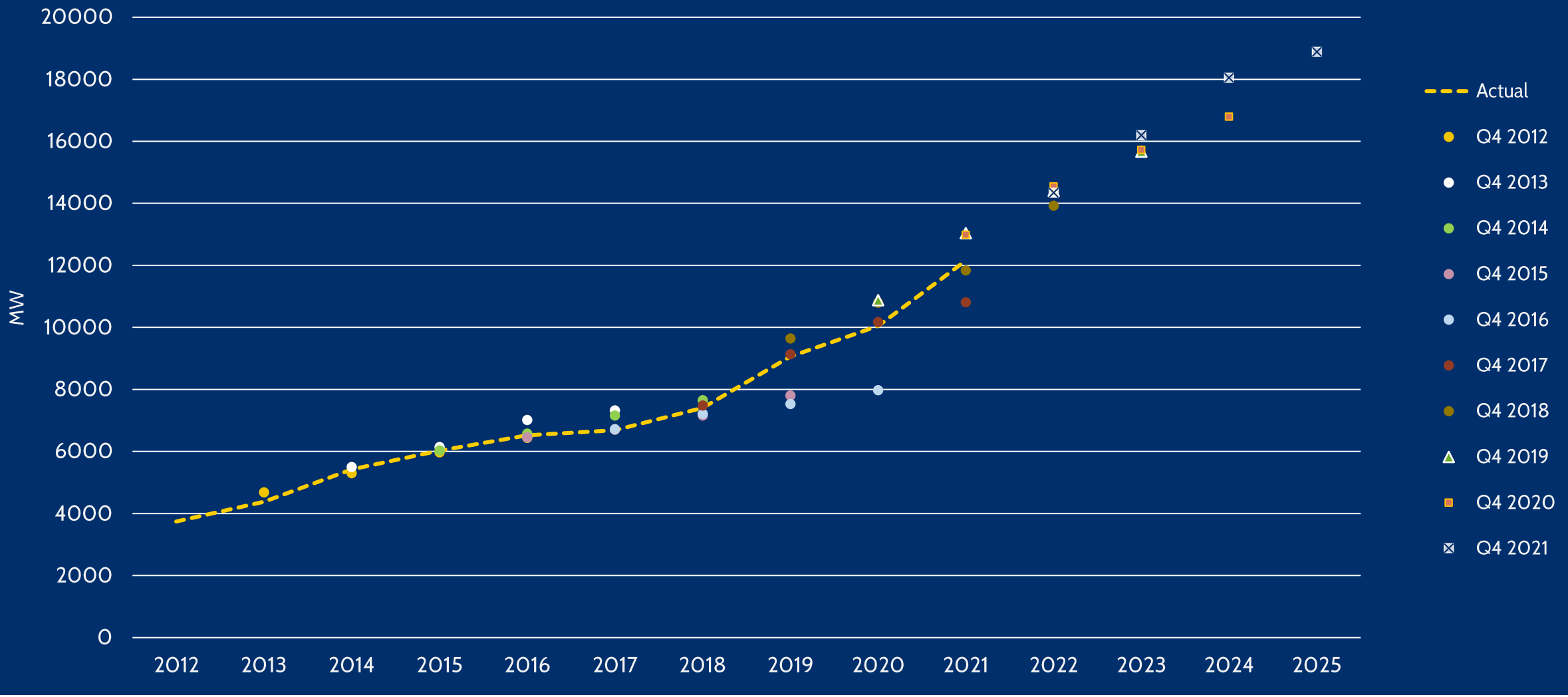
Previous Q4-forecasts vs actual installed wind power capacity



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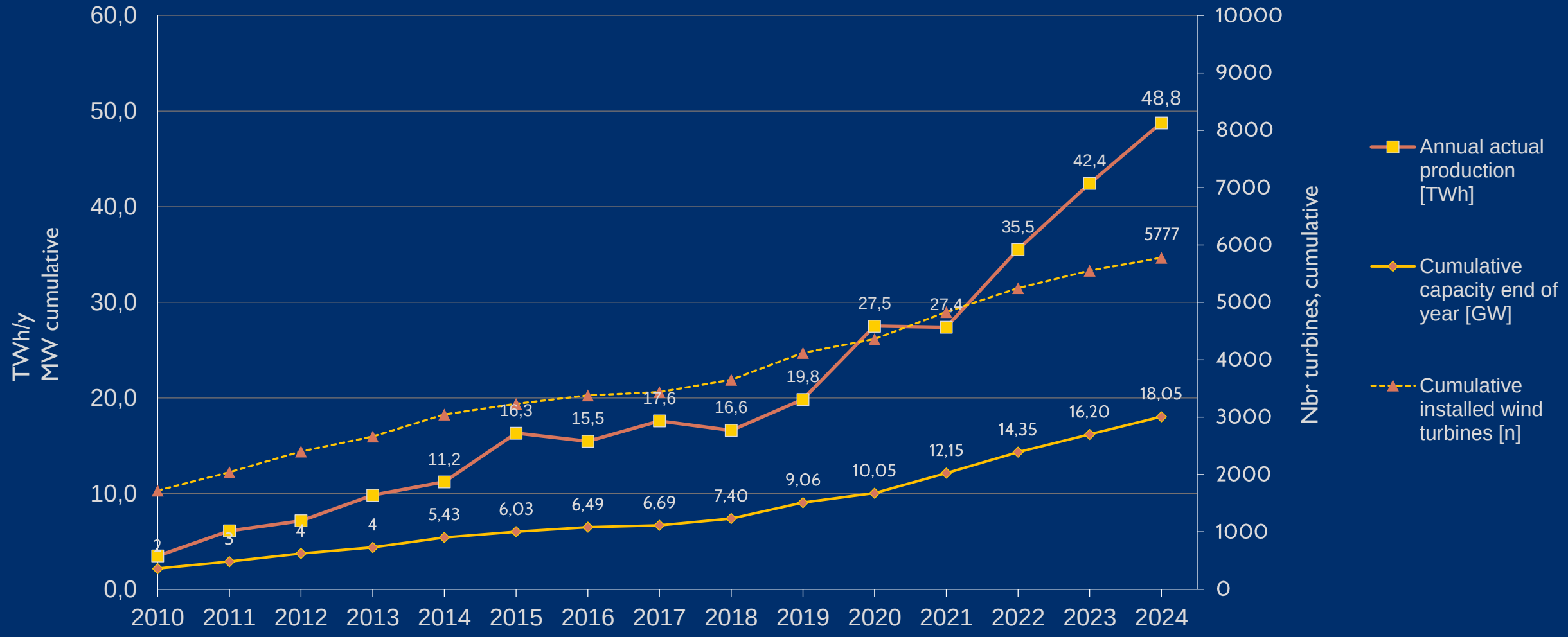
Short term forecast, 2022-02-08



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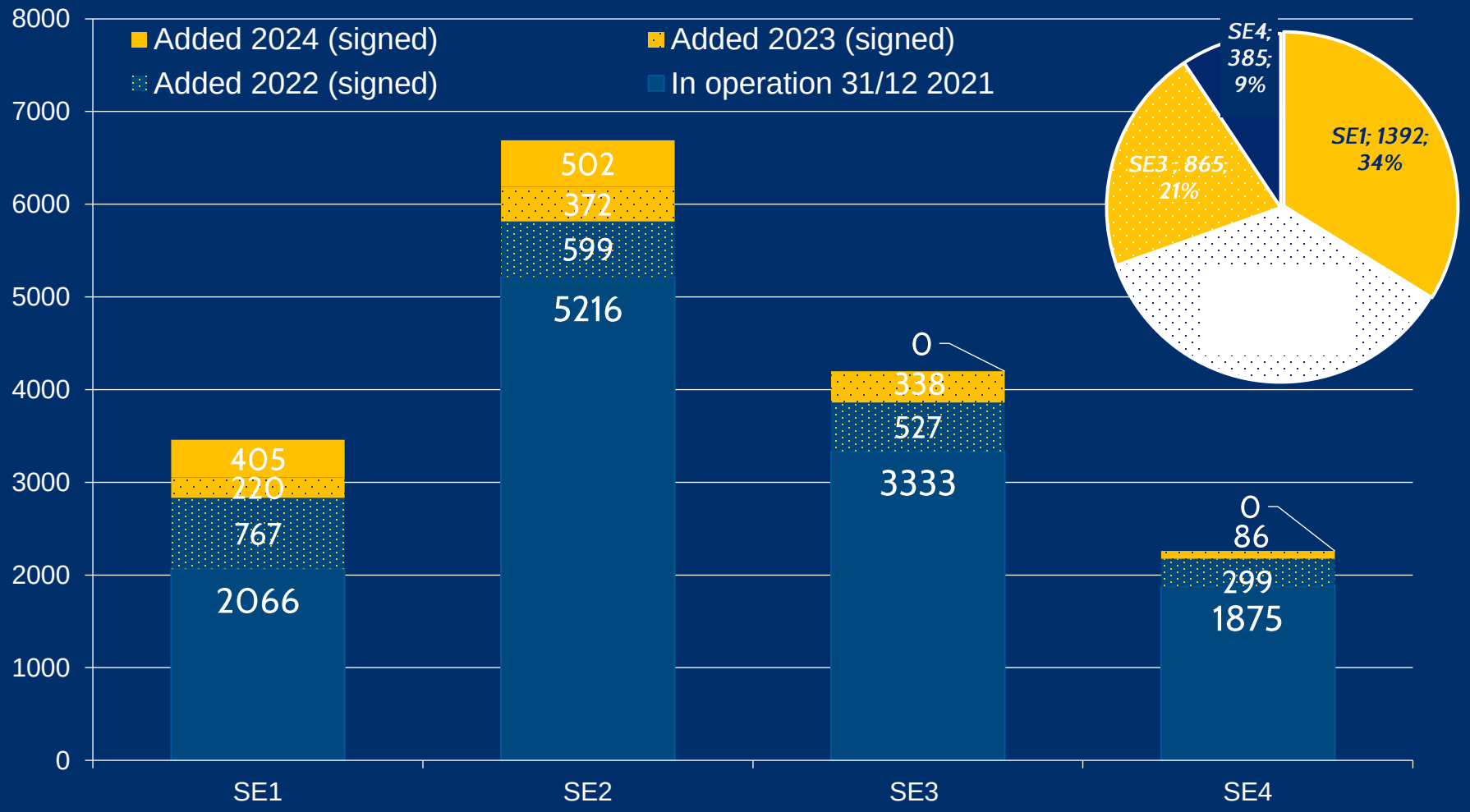
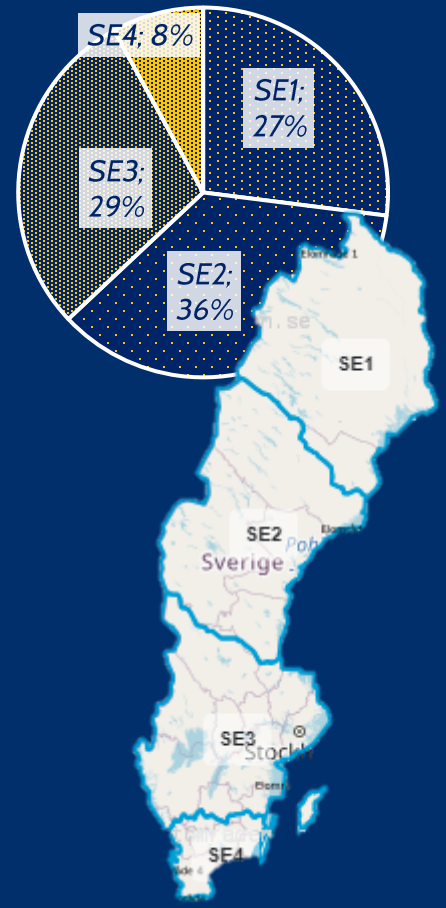
Bidding area break down of scheduled comissioning [MW]

SE1 and SE2 has a bigger area and punches despite that somewhat above its size.



Estimated Bidding-zone-area of total land area in Sweden
[% of 450 000 km2]



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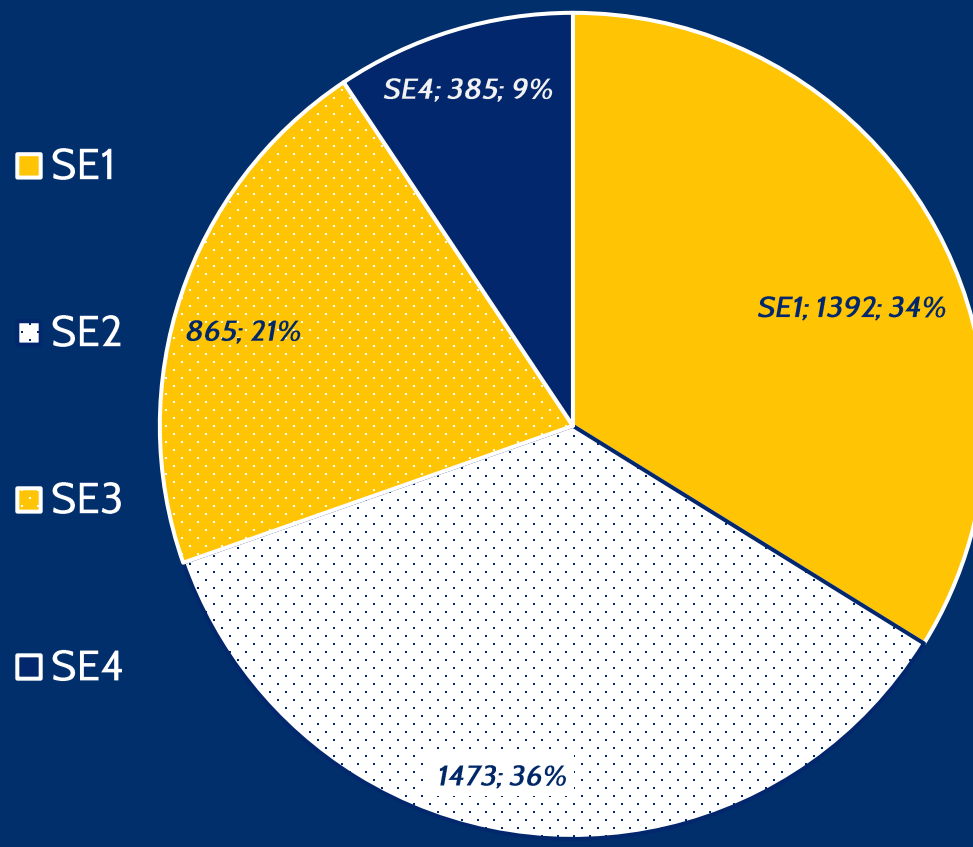
Turbine contracts [MW] - share of ongoing and scheduled comissioning on bidding zone

Why are the SE1 and SE2 are dominant

- *Many municipalities use their ”veto” to slash new project development in the south.*
- *Rigid restrictions linked to Swedish armed forces and airports lock down many locations*
- *Despite stronger price signals on both electricity market and grid fees, permitting new project is still key to development.*



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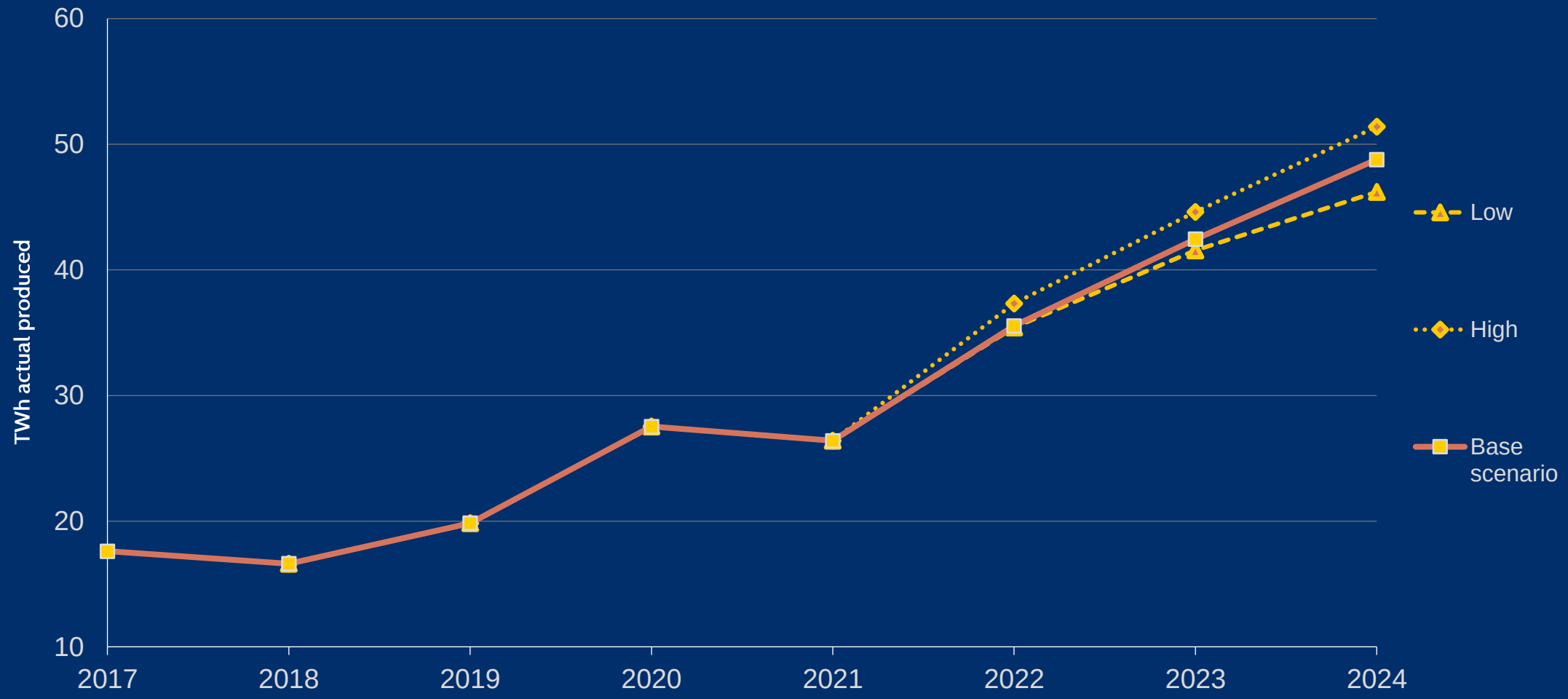
Wind power production forcast – all cases

In the near term, a strong growth regarding electricity production is forecasted for all cases



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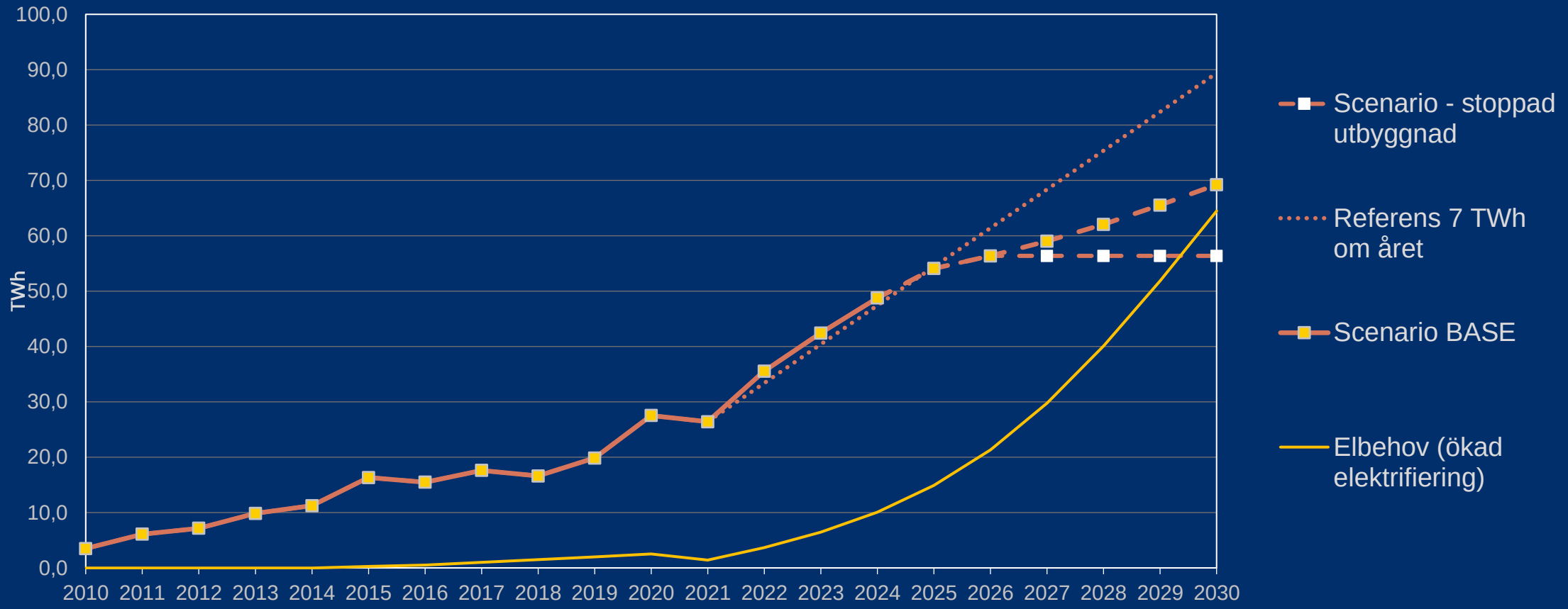
2030 long term forecast, 2022-02-08

- Three different scenarios; low, base and high
  - In High, the future is based on the historical strong trend. Buildout continues and no projects are decomissioned!
  - In Base, the future is based on estimation of success rate and lead time in todays project portfolio in permitting and consultation process. For future years there is an assumption of continuation of historical trend.
  - In Lowm, some projects are cancelled and only 50 % of the permitting in base case is assumed
  - Stop-scenario is included as a reference, with no new sales after 2023 and no new comissioning after 2025
- Investment pressure is high on permitted projects, and getting higher, but without new permits, no investments can be made.
- The rate of addition is key to keep up electrification, hence the reference line at 6, 7, 8 TWh in figures.
- Lead times are up to 10 years for wind power, why actions in the past years are influencing market possition in the future.
- The capacity growth is at record high levels [7 TWh or 2 GW per year] but likely decreasing due to lack of buildable projects

Wind power production forcast – base and ”stop”-case

In the near term, a strong growth regarding electricity production is forecasted for all cases



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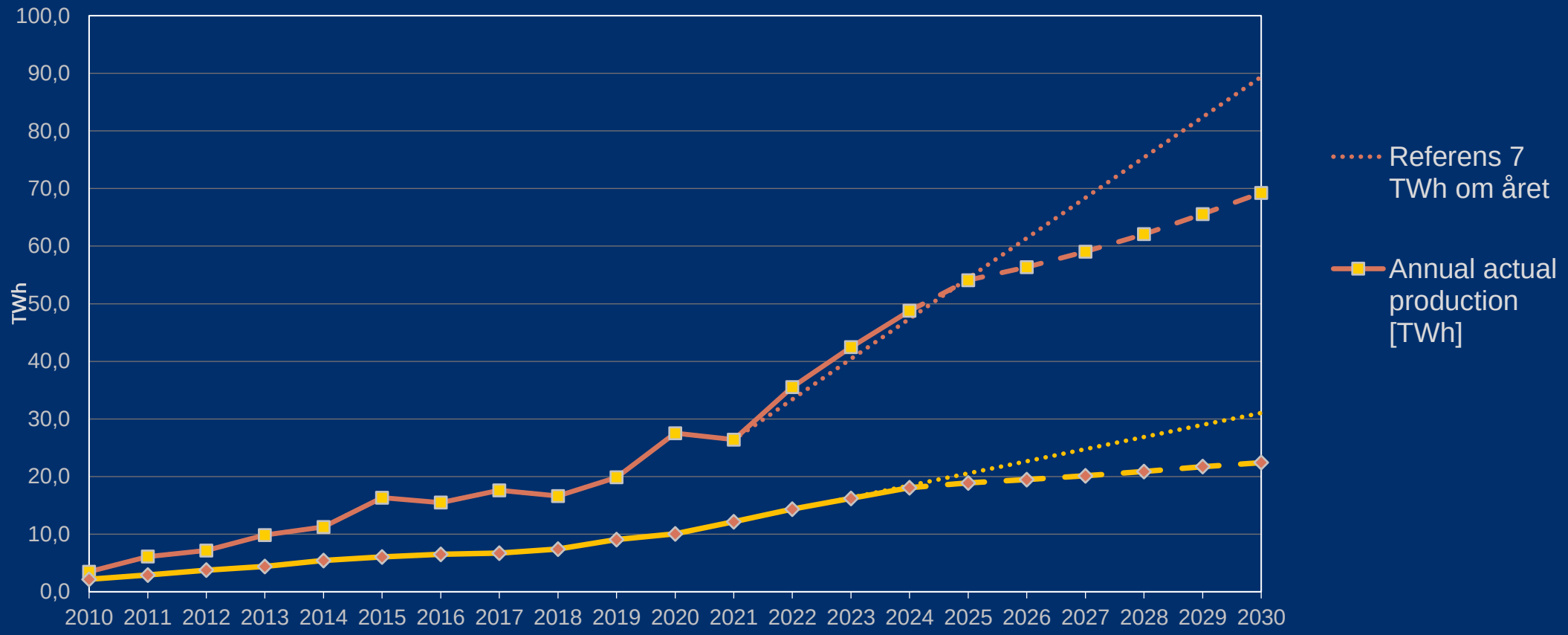
Wind power production forcast – base scenario with reference line at 7 TWh

The near term growth ratio is not set to last without further actions.



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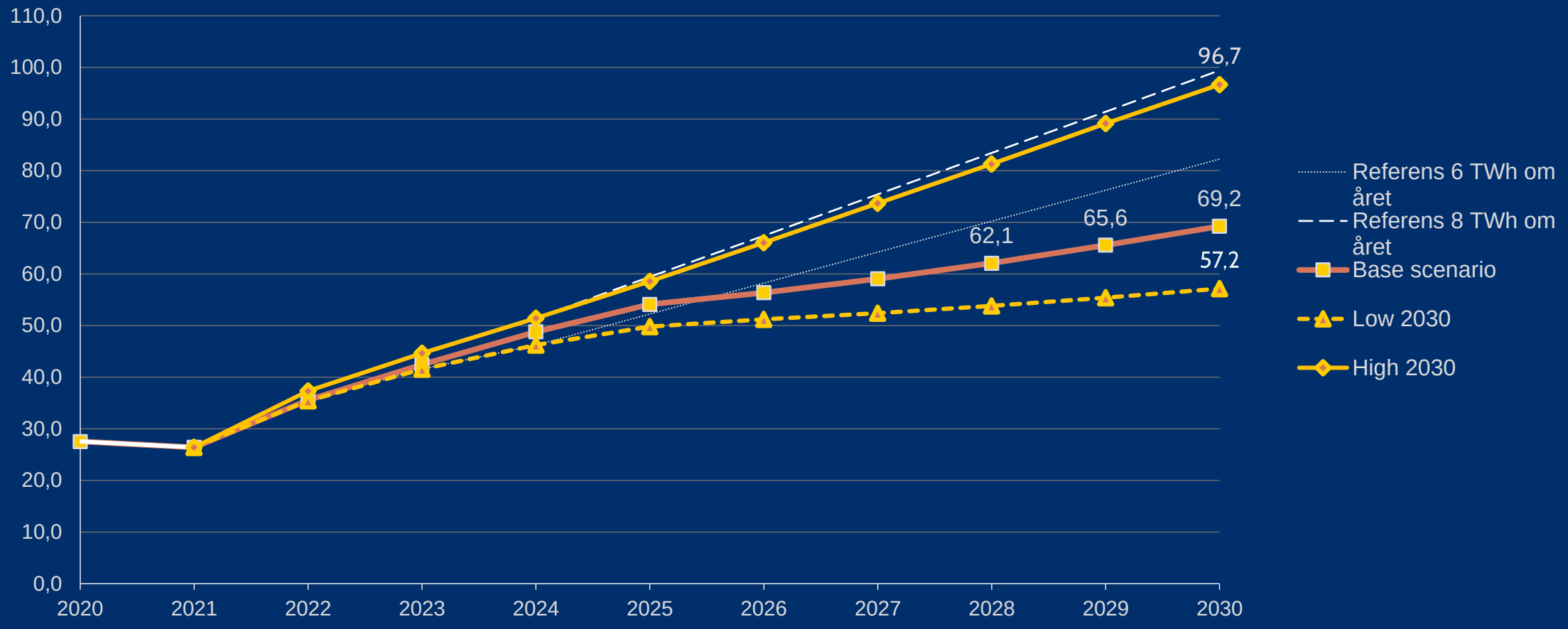
Support lines at 6 and 8 TWh growth rate

The base case shows some recovery but growth rate is falling to below 1,5 GW (4 TWh) annualy



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Theme: consultation process

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Comissioning is the last step and there are losses in each step...

Early asessment

- Basic conditions fulfilled. Wind rescource, grid, opposing interests

Consultation process

- Armed forces, Sapmi, Local interests, Nature, etc.

Environmental permit process

- Formal assessment of the environmental and societal aspects

Permit granted

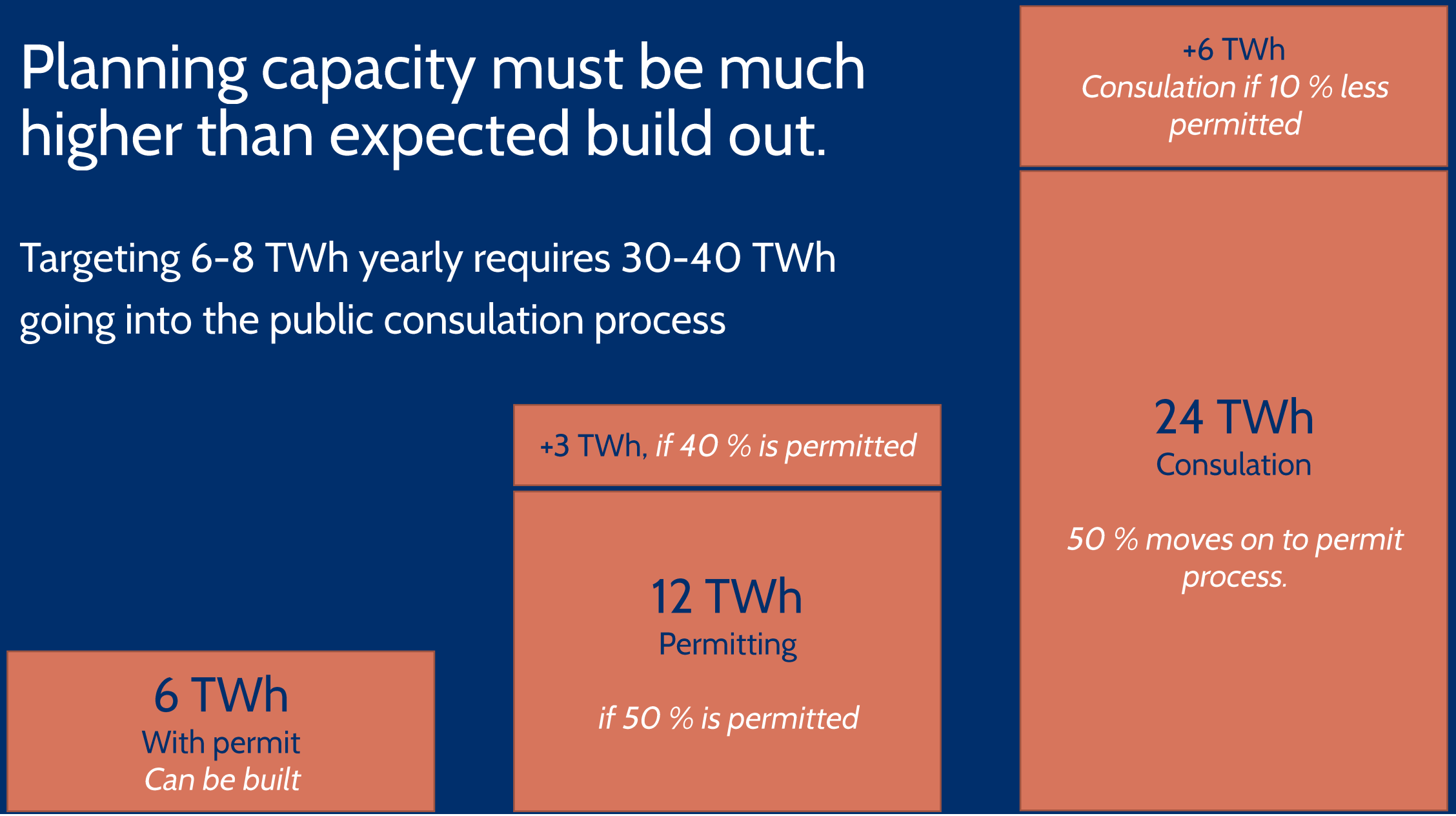
- Going through the financing process. Is project competible?

Comissioning

- Turbines built and connected

Planning capacity must be much higher than expected build out.

Targeting 6-8 TWh yearly requires 30-40 TWh going into the public consulation process



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