Suomen Tuulivoimayhdistys

Update on (Finnish) wind power

16.5.2023

Heidi Paalatie
Finnish Wind Power Association

Finnish Wind Power Association (STY, FWPA)

Suomen Tuulivoimayhdistys

- Valued industry association for wind power
- Established in 1988
- Over 210 company members, app. 160 private members
  - Wide range of companies related to wind power field
- 8 employees – hiring two more in 2023!
- HQ in Jyväskylä
- Spreads the word about the wind power, active participant in public discussion, publishes magazine ”Tuulivoima”, organizes seminars and courses

www.fwpa.fi, www.tuulivoimayhdistys.fi

www.windfinland.fi, www.tuulivoimalehti.fi


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Suomen Tuulivoimayhdistys

Energy (energia)

Electricity, heat, traspont fuels

≠

Power (sähkö)

One of the energy products

Watts & watt hours

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Power

- kW – kilowatt
- MW - megawatt
- GW – gigawatt
- TW – terawatt

- 1000 kW = 1 MW
- 1000 MW = 1 GW and so on

Amount of power

- kWh – kilowatt hour
- MWh – megawatt hour
- GWh – gigawatt hour
- TWh – terawatt hour

- 1000 kWh = 1 MWh and so on

E.g. electricity production of one 6,2 MW wind turbine is app. 25 GWh / year

Global growth of cumulative onshore & offshore wind power

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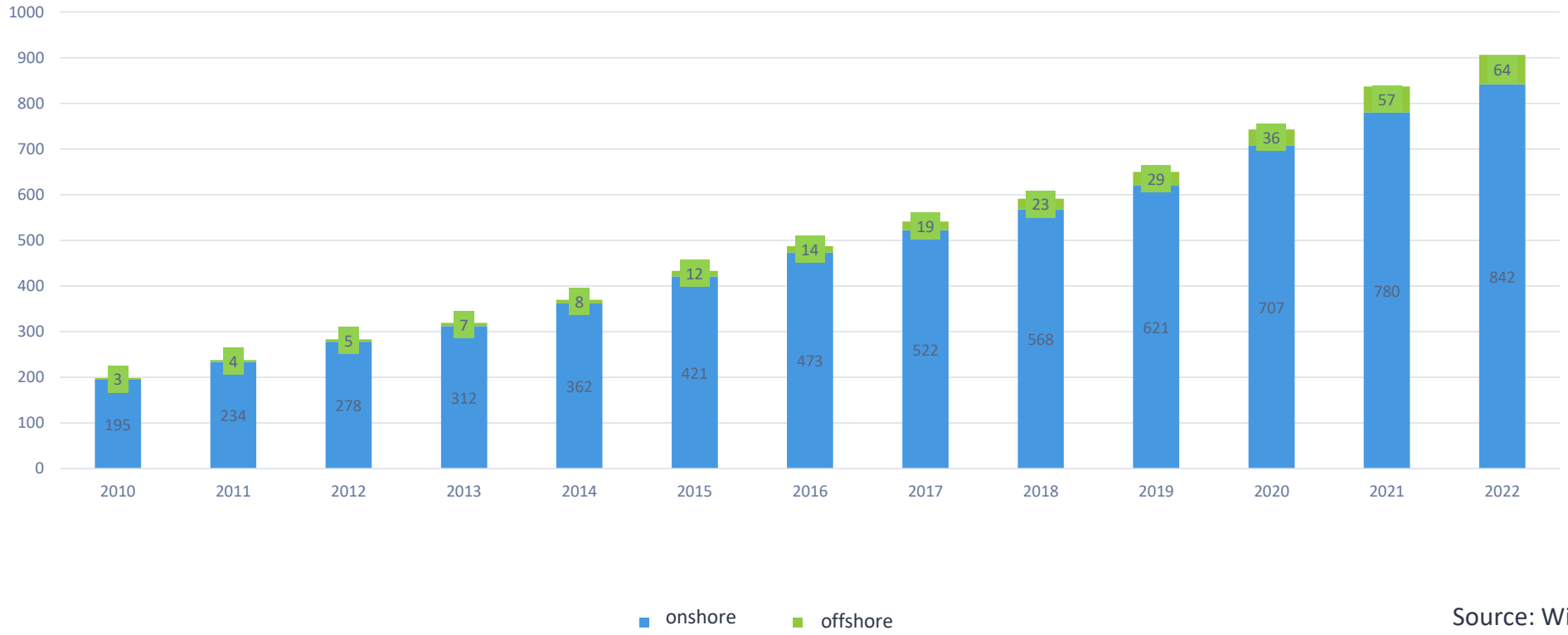

Source: Wind Europe

Global leaders of wind power

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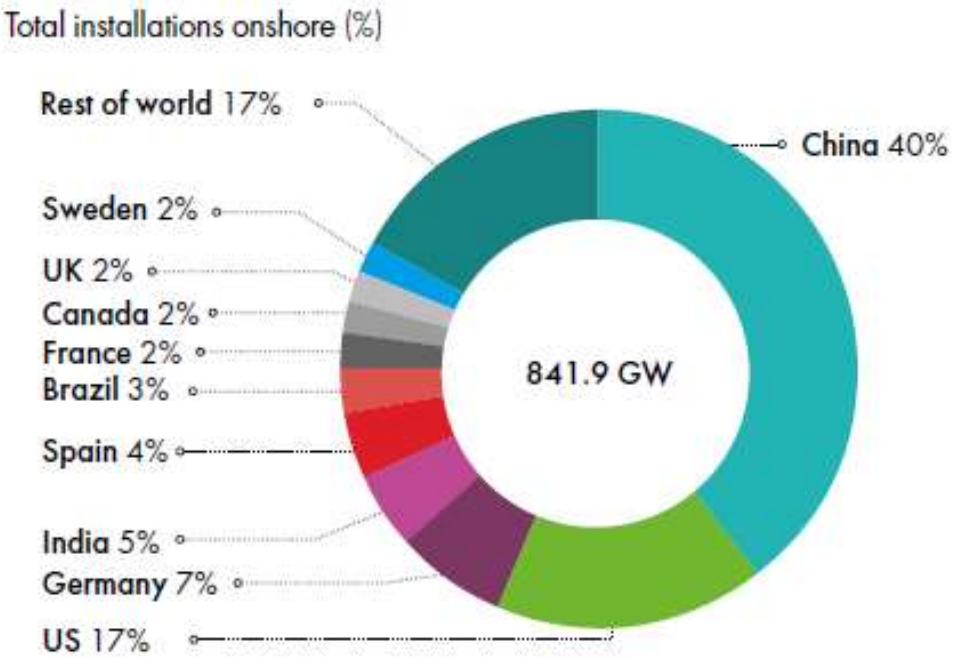
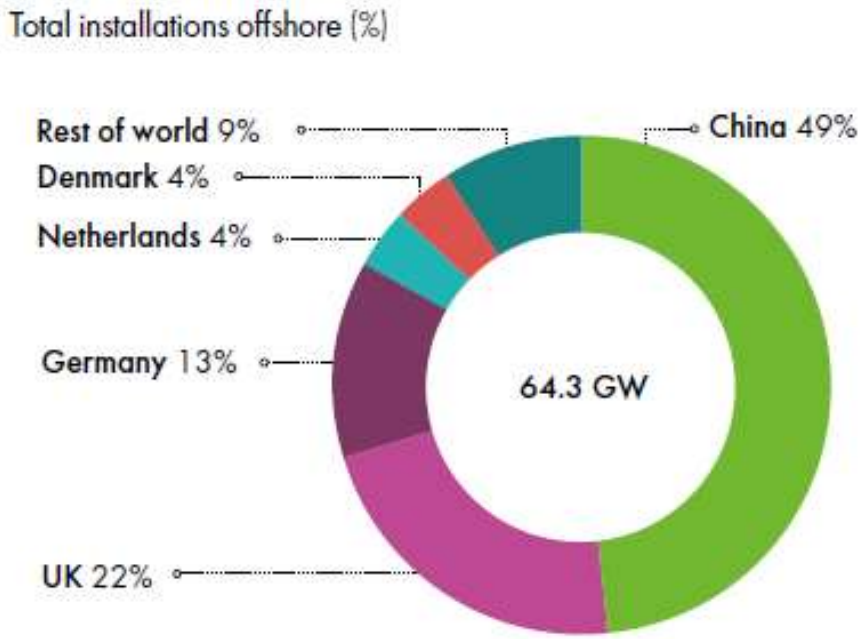




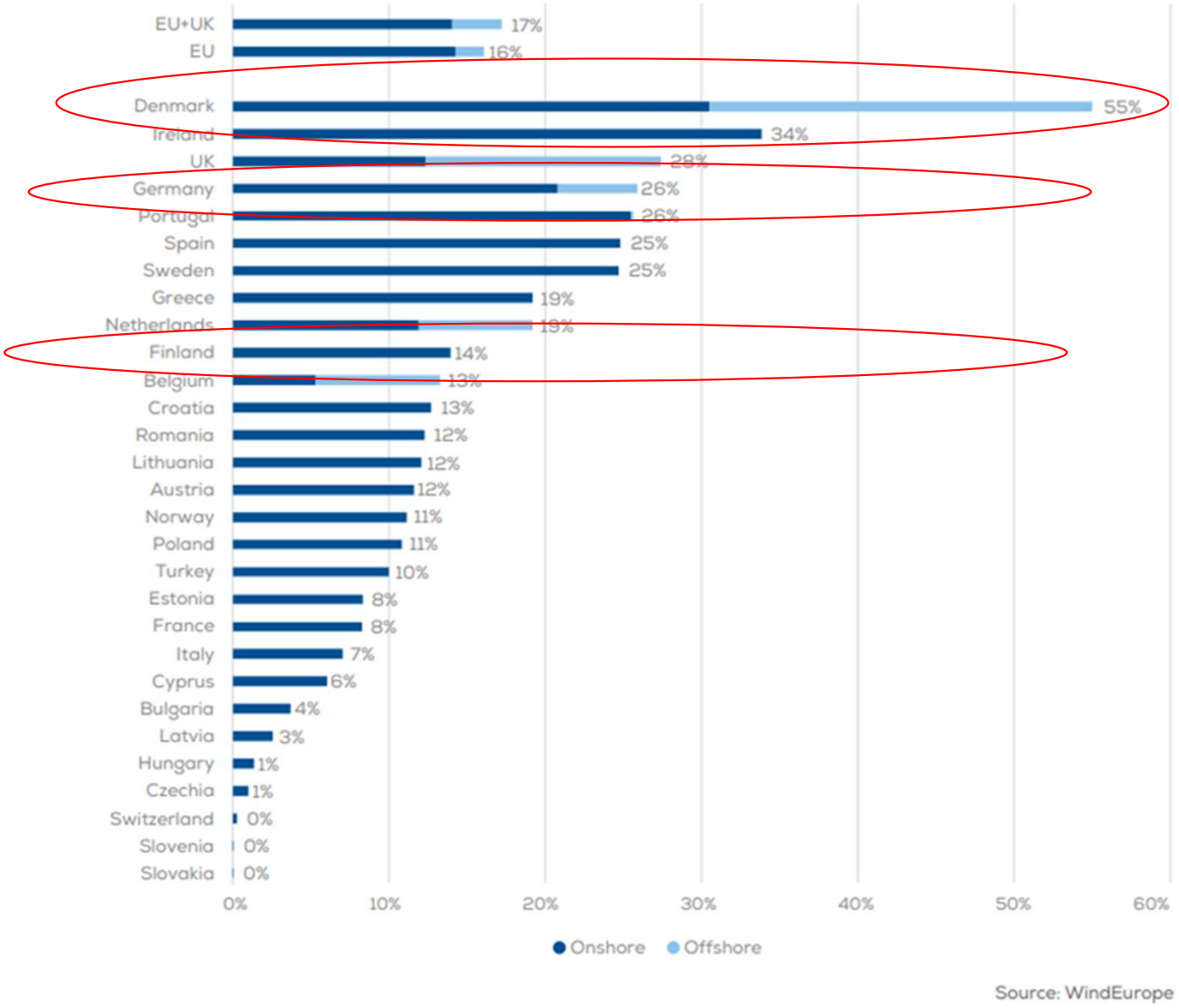
Source: GWEC

Wind power in Europe 2022

Top 6 (onshore & offshore)

- Germany (66 GW)
- Spain (30 GW)
- UK (28 GW)
- France (21 GW)
- Sweden (15 GW)
- Turkey (12 GW)

Vs. Finland 5,7 GW 2022



New wind power capacity in Europe 2022 (MW)

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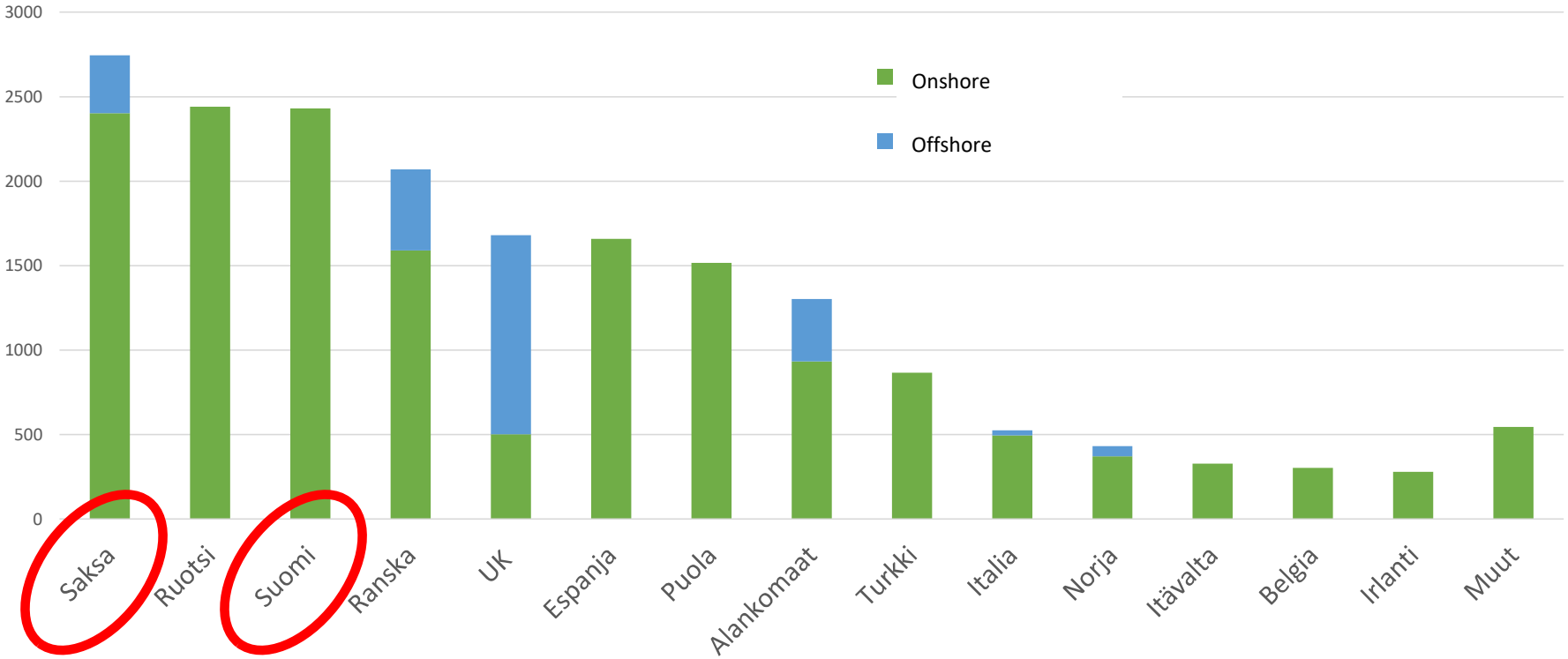

Cumulative capasity in the Nordic region

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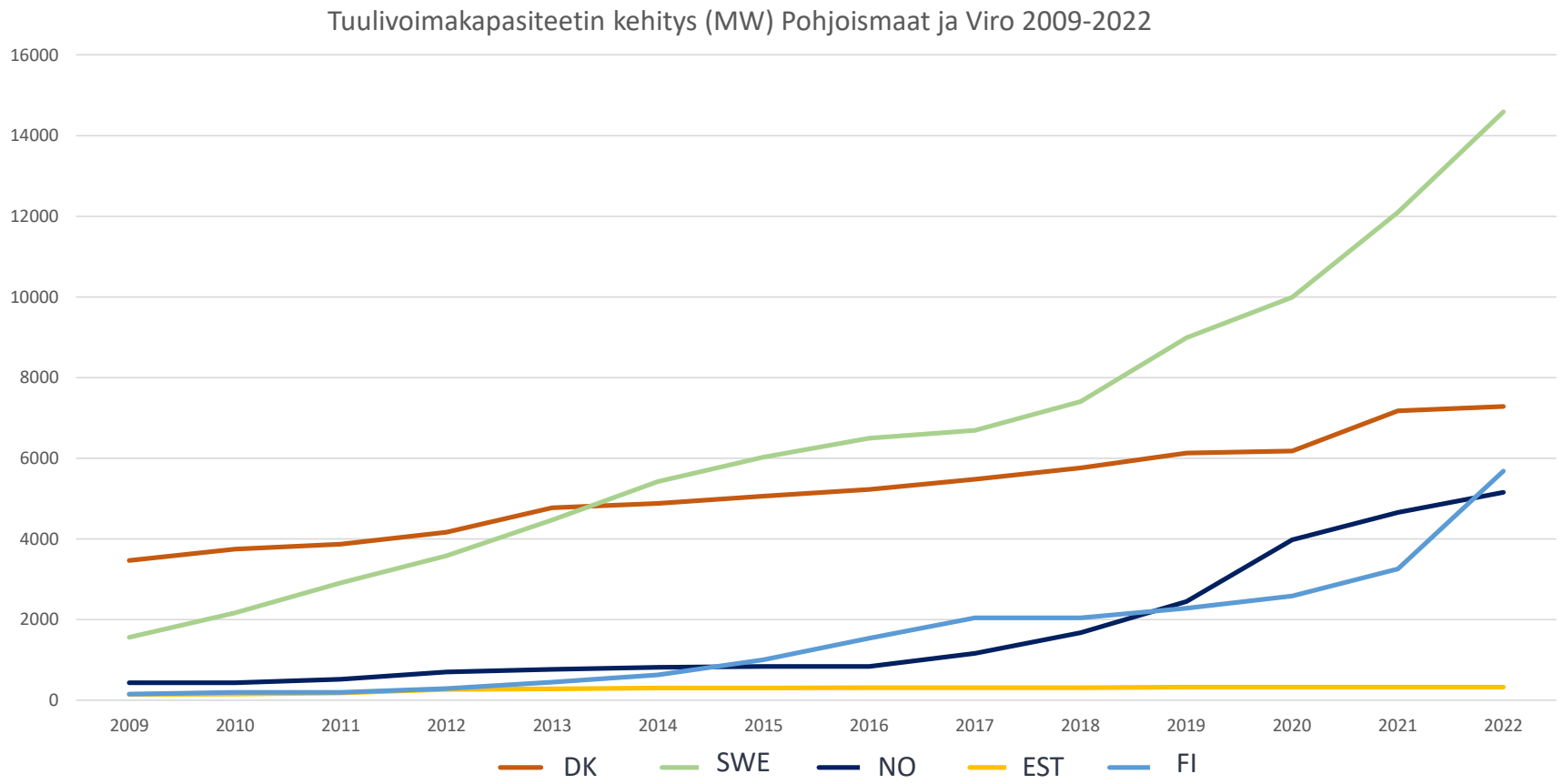

Electricity clean
– but work to do in all energy

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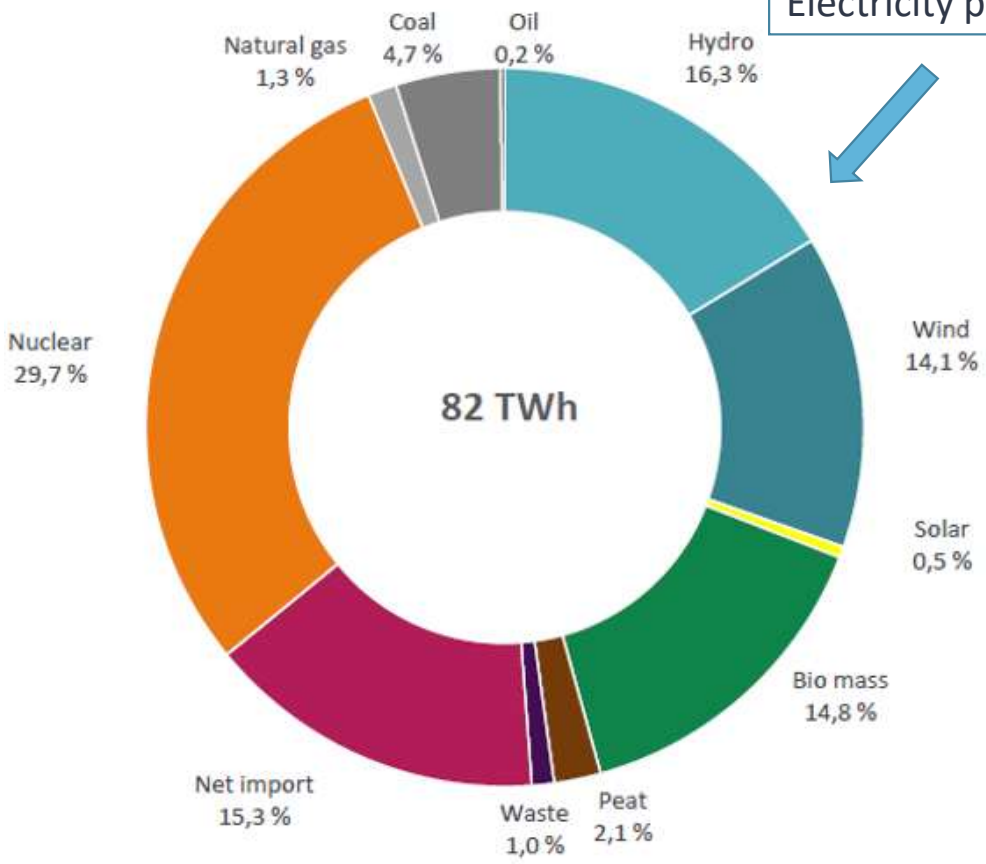
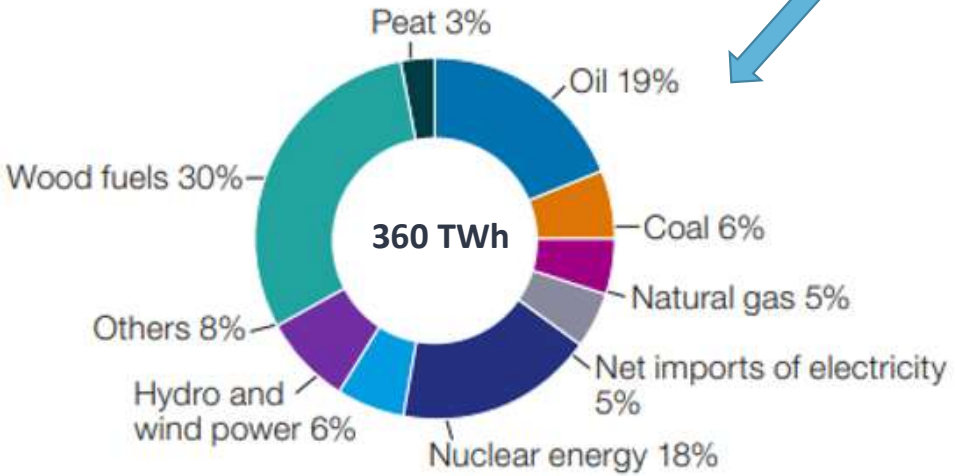
Electricity production + imports 2022



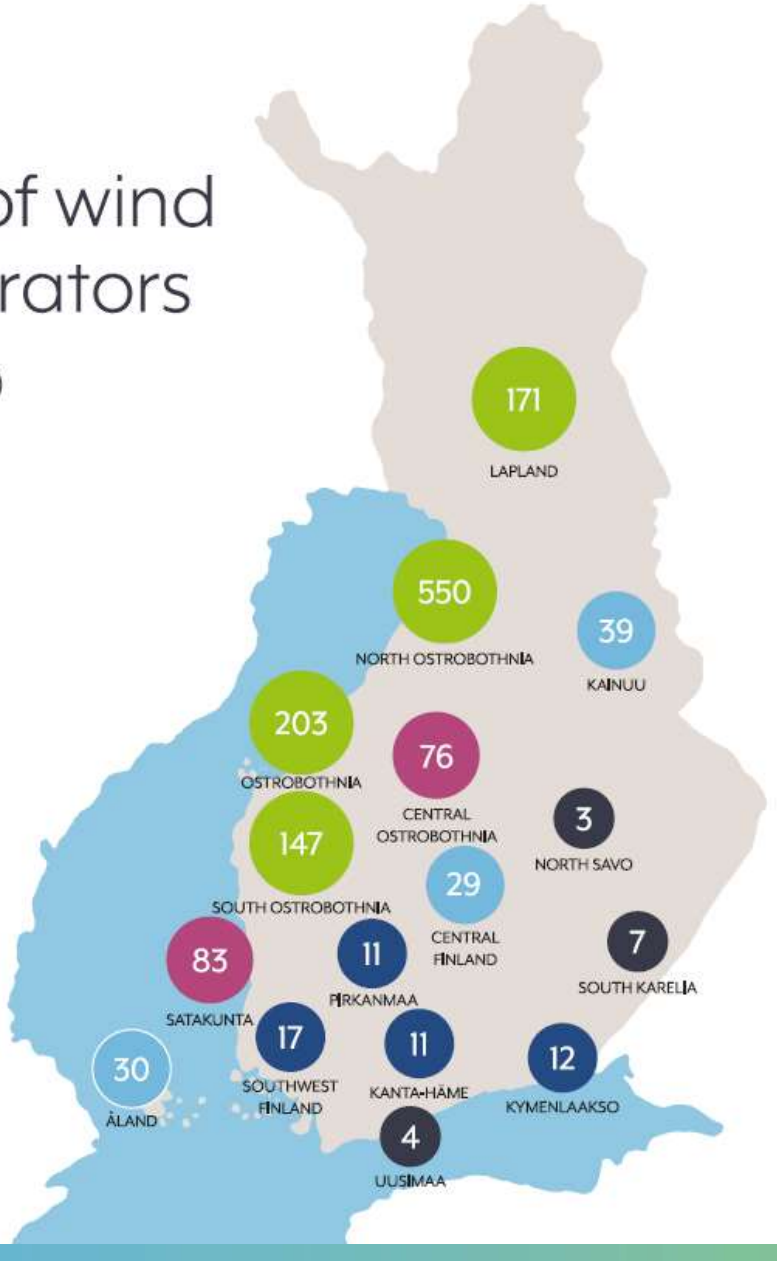
Total energy consumption 2021



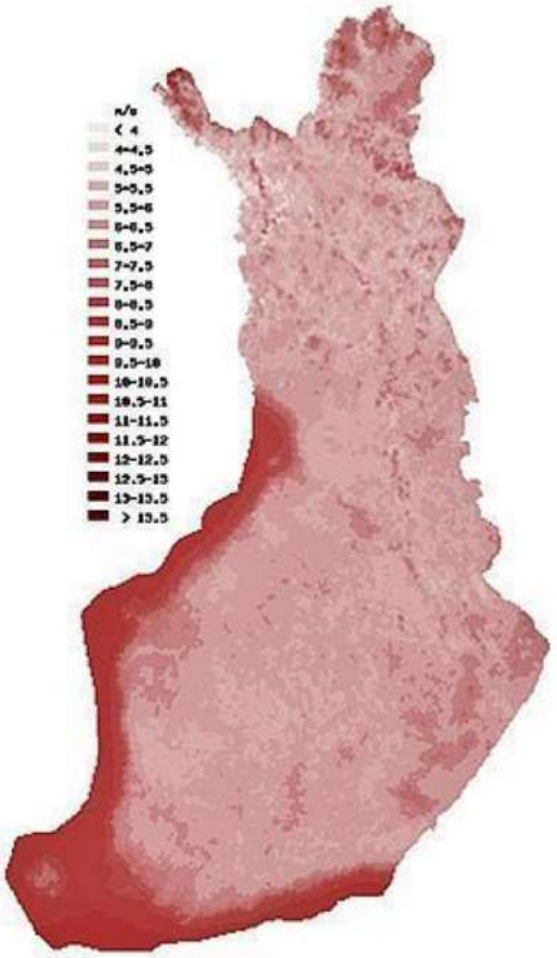
Total energy consumption in 2021* was 1 356 PJ.

Source: Finnish Energy & Statistics Finland

Distribution of wind turbine generators by region (2022)



Total
1393 WTG



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Wind power production in Finland is growing fast – wind power covered:

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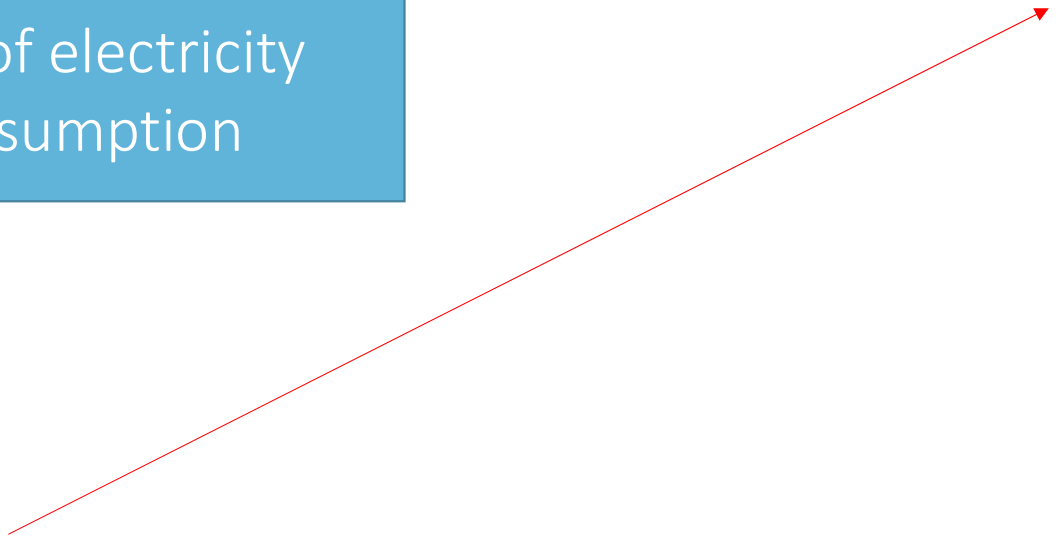
in 2012
under 1 % of electricity consumption

in 2022
14 % of electricity consumption

in 2026
over 33 % of electricity consumption



Fast growth of wind power

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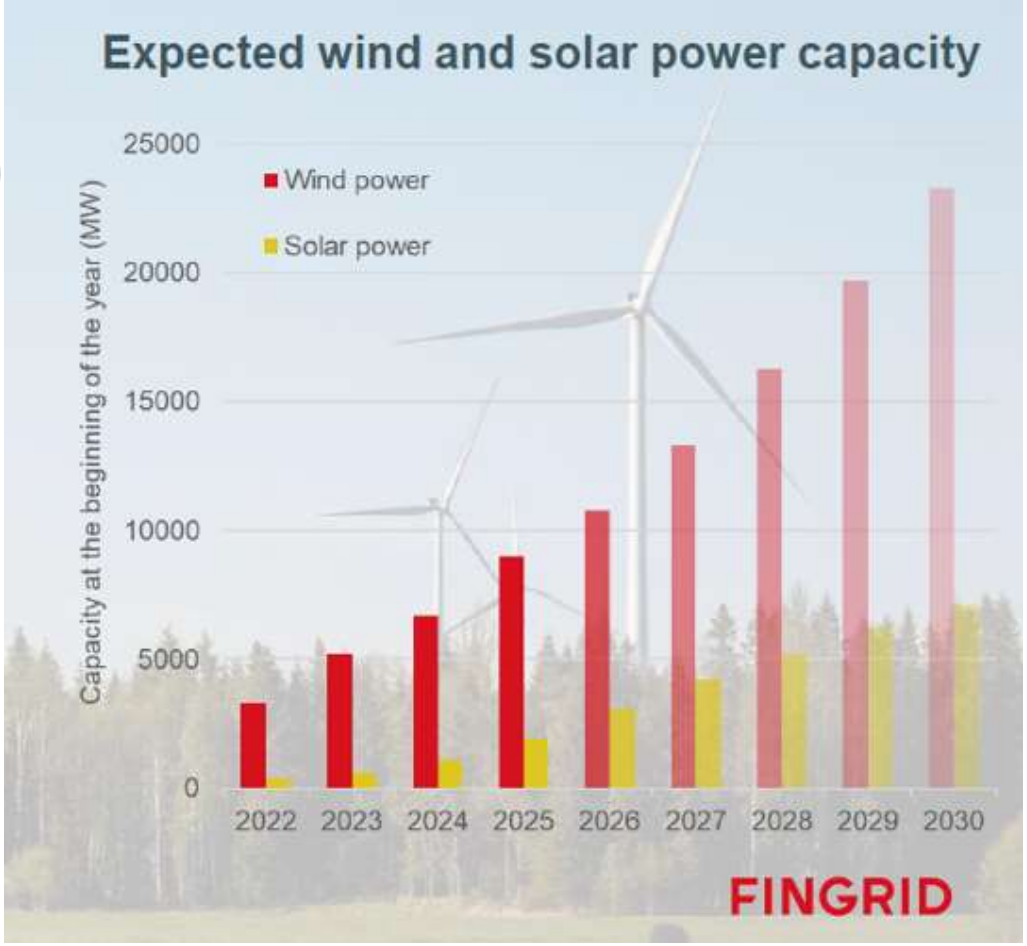
Fingrid estimate: 23GW 2030

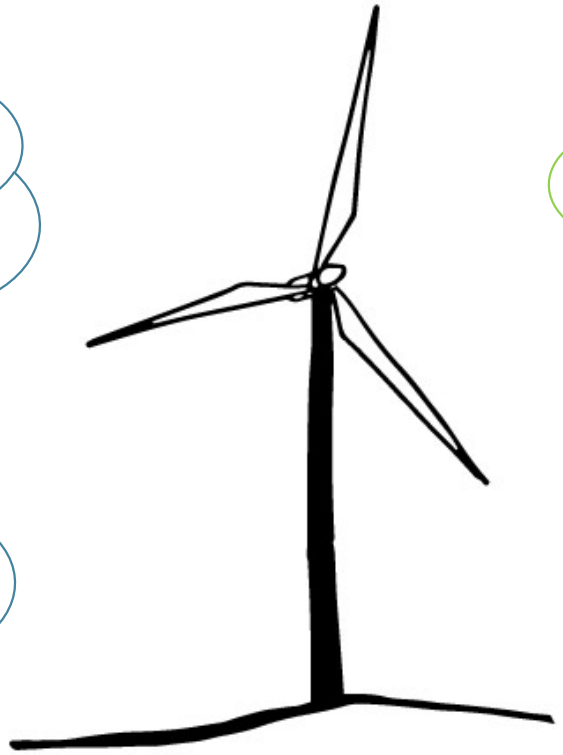
vs. 5,7 GW 2022



Fast growing capacity

Wind power now
5,7 GW
1393 WTG

Coming online
2023-2025*:
3,3 GW
500 WTG



Onshore project
pipeline:
~50 GW
300 projects

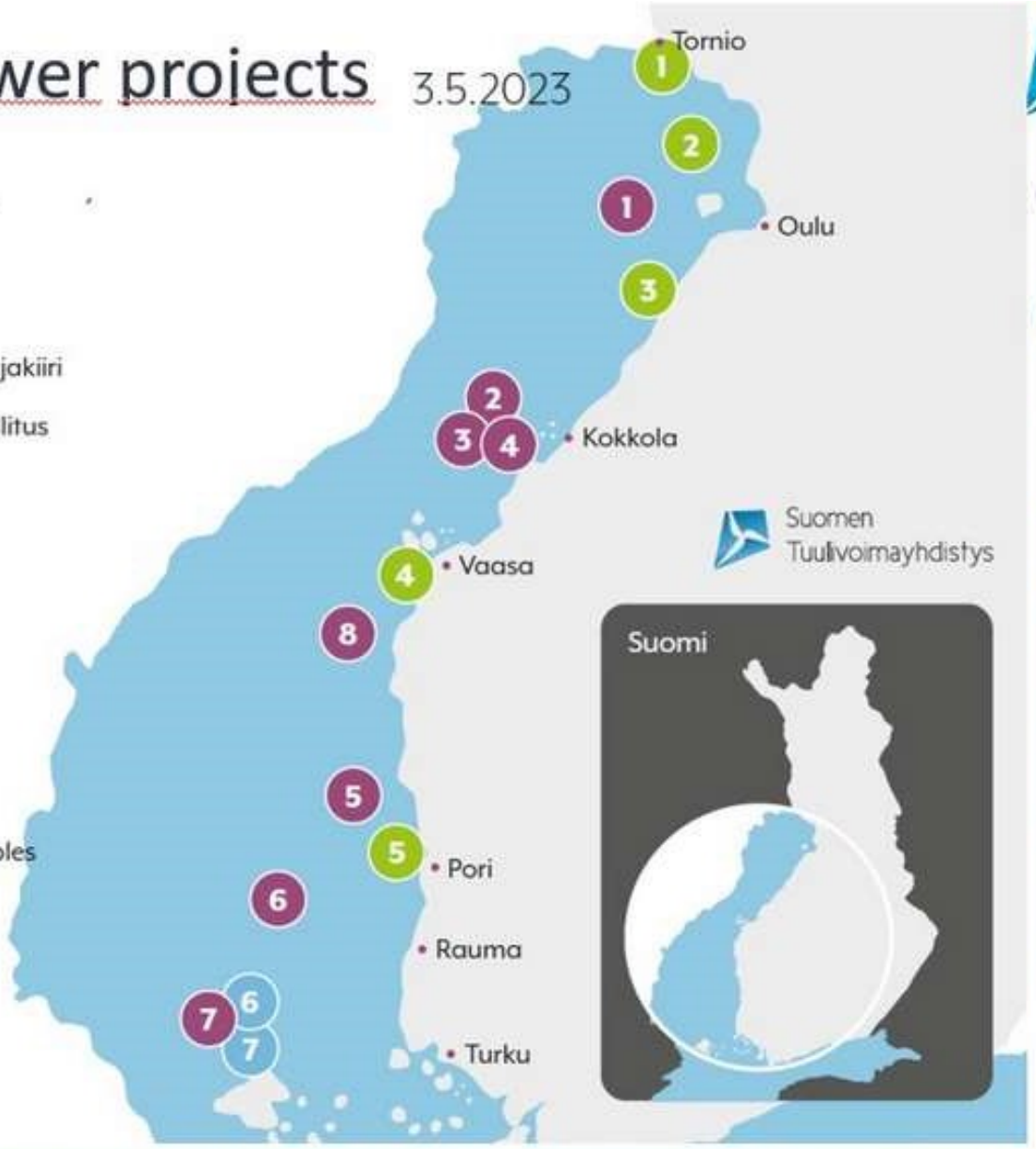
Offshore project
pipeline:
~33 GW
20 projects

* According to the investment decisions published before 30th of Jan 2023

Offshore wind power projects 3.5.2023

1. Röyttä, Tornio, Rajakiiri
2. Suurhiekka, Ii, Skyborn Renewables
3. Maanahkiainen, Raahe ja Pyhäjoki, Rajakiiri
4. Korsnäs, Vaasa, Vattenfall ja Metsähallitus
5. Tahkoluoto, Pori, Suomen Hyötytuuli
6. Stormskär, Ilmatar
7. Väderskär, Ilmatar

1. Oulu/Raahe, OX2
2. Kokkola, Voima, Ilmatar
3. Pietarsaari/Kokkola, OX2
4. Pietarsaari/Kokkola, Skyborn Renewables
5. Merikarvia/Pori, Eolus
6. Rauma/Eurajoki, Eolus
7. Ahvenanmaa, Vågskär, Ilmatar
8. Korsnäs, Norrskär, Ilmatar



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Territorial water

Åland

EEZ

Modernizing the energy system

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Finnish target: CO2-neutrality by 2035

→ Electrification of transport, heating, & industry

→ Electricity consumption will heavily grow

→ Wind power is the fastest way to increase new electricity production

Electricity production transforming

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- Wind power will be the biggest production method 2027 →
- Nuclear will be the second biggest method then
- Hydro production remains on current level
- Solar has a lot of potential
- CHP declining
- P2X and demand response growing
- Heat storages, industrial electric boilers, batteries, pumped-hydro plant…

2030 and beyond – how much wind power in Finland?

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- Essential points are:
  - How much and how fast will the electirity consumption grow?
  - P2X solution and hydrogen projects – when, where, how much?
  - Future of demand response and storage solutions?
  - Wind power construction in Eastern Finland?

→ Wind power will help the industry, transportation and heating to become carbon neutral – but it can not do it on its own

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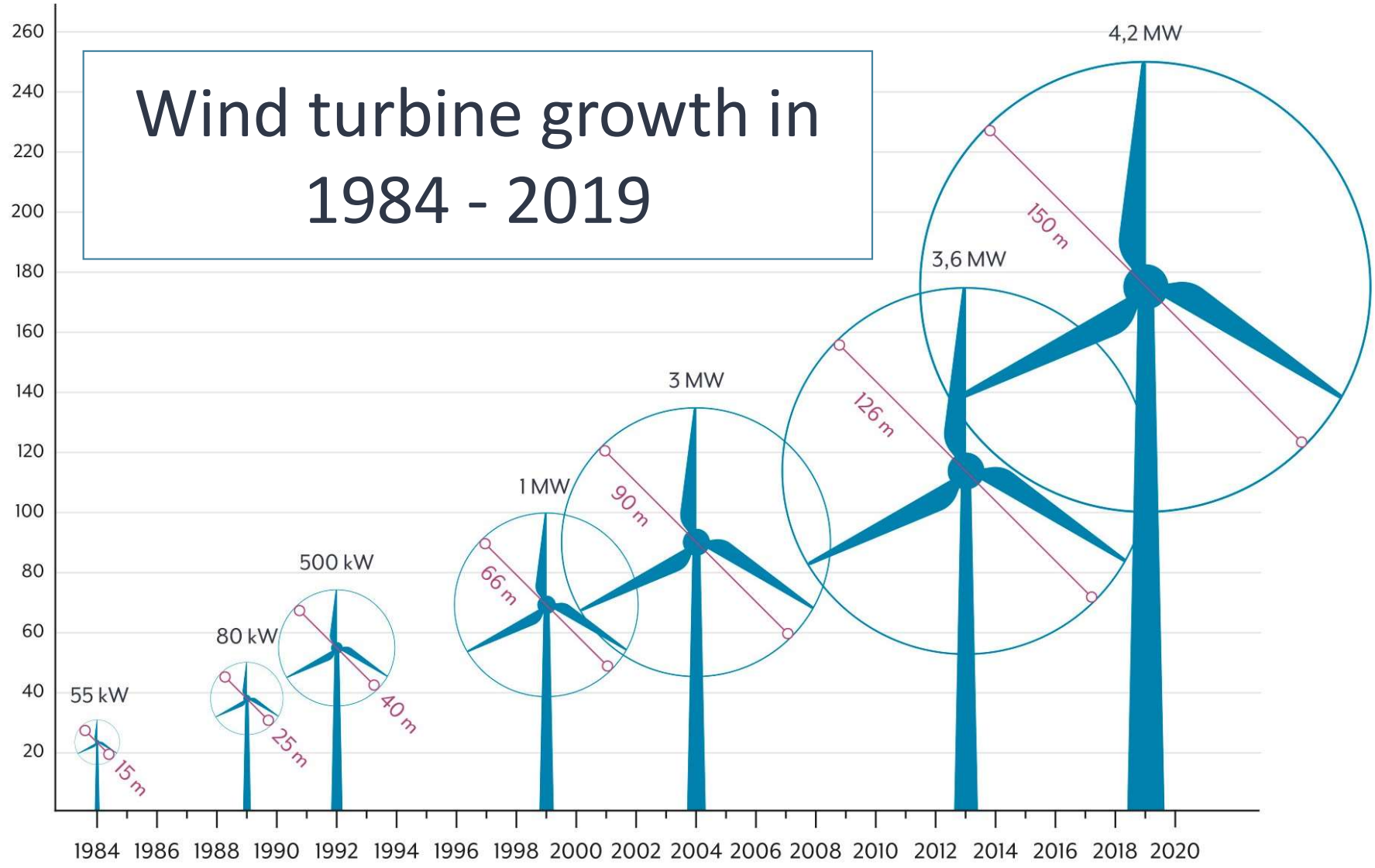
Wind power technology

Wind turbine growth in 1984 - 2019



Why higher and higher turbines?

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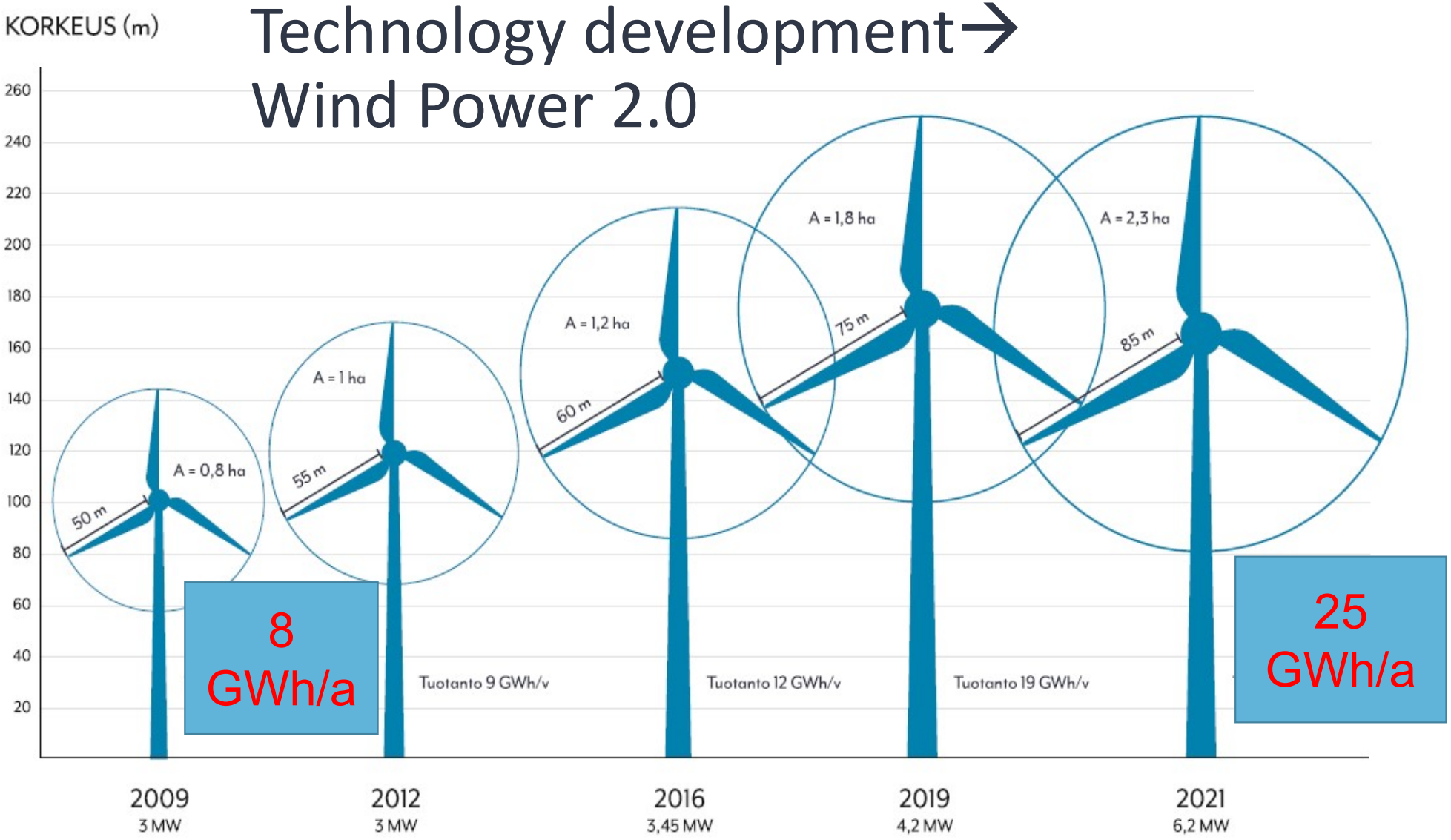
- THE WIND – higher up it blows more
- The wind speed (V) really matters for the production: **$P = r^2 * V^3$**

→Even just a bit more wind means a whole lot more production

→With high turbines, wind power has become subsidy-free in Finland

Technology development→ Wind Power 2.0



More MW's does not mean more dB's

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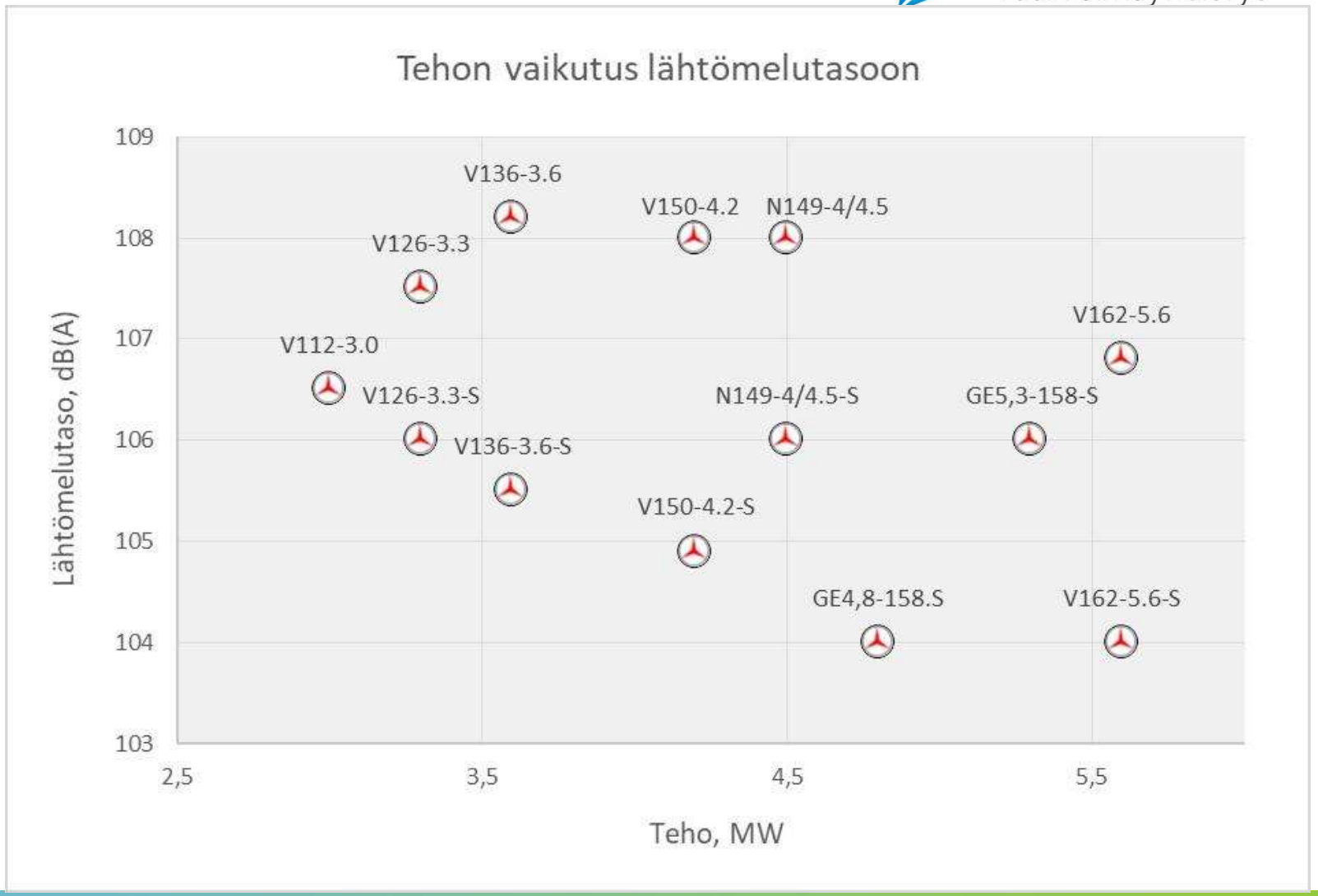
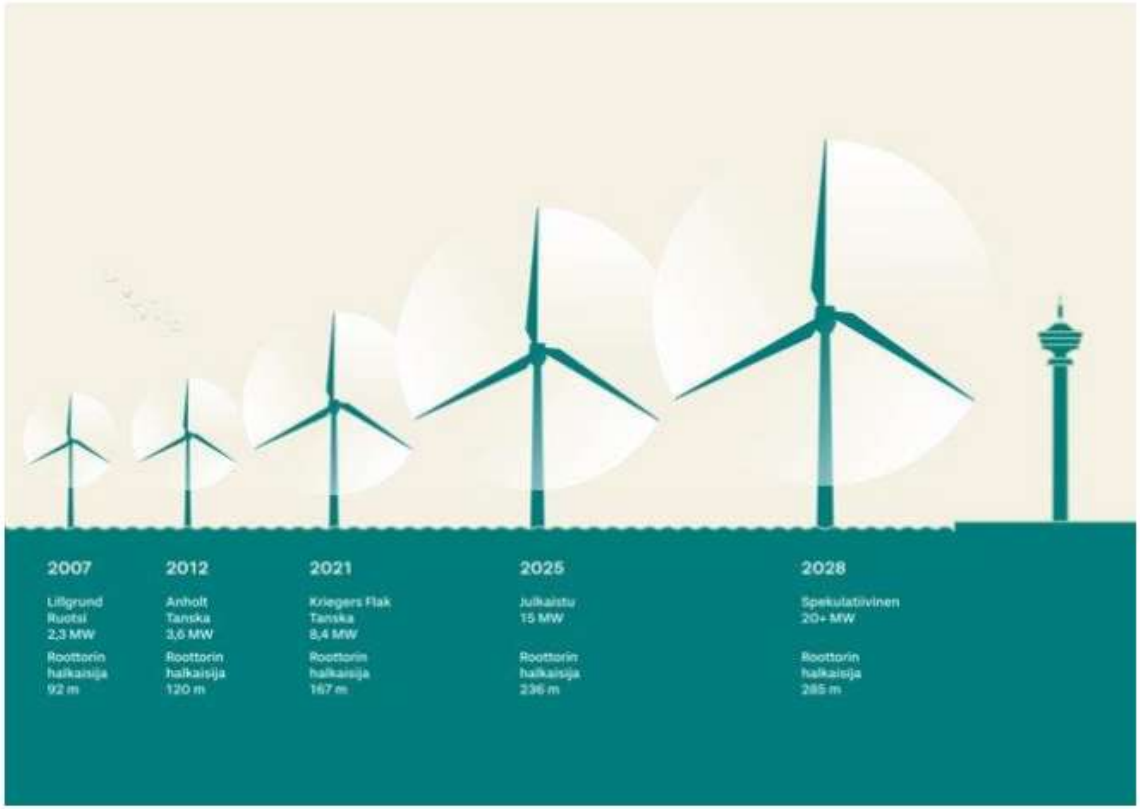


How large the turbines will become?

Onshore?

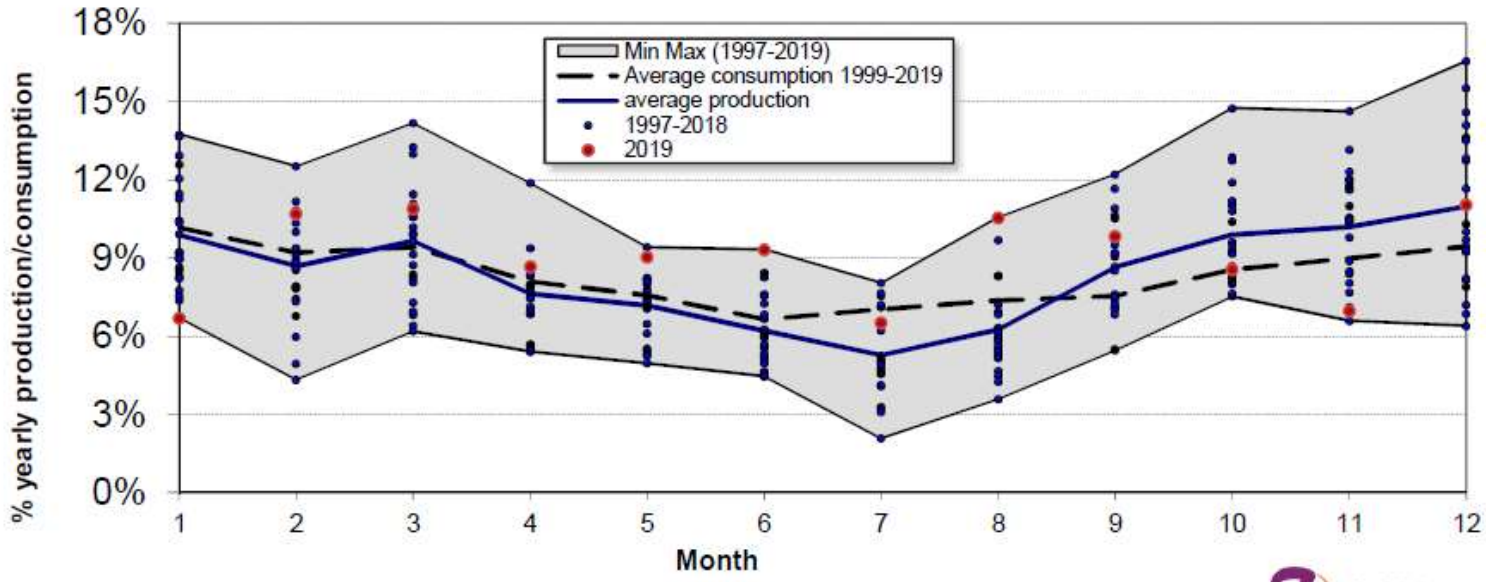
Offshore →



Wind turbines now:	→ in 2030:
• Rotor 236m	→ >300m
• Hub Height 145m	→ >180m
• Gross Capacity Factor ~62%	→ ~>70%
• Power 15 MW	→ 20+MW

Source: OX2

Wind power suits well the Finnish climate & consumption of electricity



Special features of Finnish wind power

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- High turbines, large rotors
- The market started late →
- Young and efficient fleet of turbines
  - Permitting allows to build the newest turbine models
- ”Pilot market” for new turbine models?
- Quiet turbines rule the market
- European/western turbine manufacturers

Photo: TuuliWatti Oy

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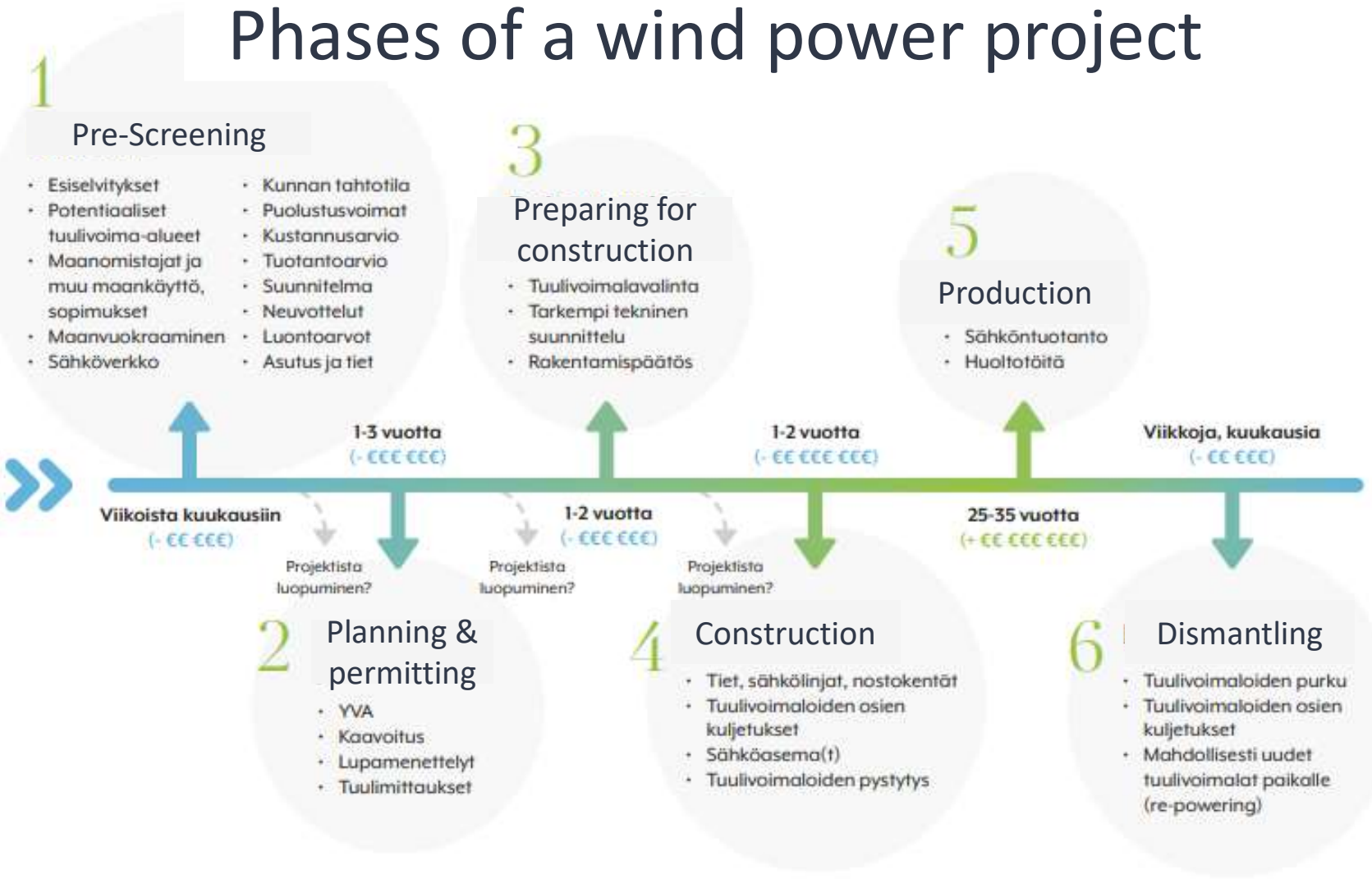
Wind power project & permitting

Phases of a wind power project



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Wind power provides for municipalities…

- Big property tax income: several municipalities collect over million €/a
- Income for land owners
- Work for companies in numerous fields of business
- Permanent vacancies
- Green image
- Supports CO2-neutrality targets
- Vitality and visibility to future

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Wind power also…

Changes the landscape

Is a new kind sound in the environment

Has impact on nature

Causes debates

Comprihensive & good quality planning is essential!

Permitting

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Regional plan
- Updated from every 5 to 10 years
- Duration of the planning: 2-3 years
- Authority: Regional council

Pre-planning BUT in some regions the area can be reserved for wind power in a regional plan only after the EIA is done.

Spatial plan
- Duration 2-3 years
- Authority: ELY-centre and municipality
- Maximum height of the turbines
- Authority: Municipality

EIA
- Duration 2-3 years
- Separately or as one process with spatial plan
- Same studies can be utilized and time can run overlapping
- Authority: ELY

Environmental studies (e.g. noise, birds, animals, fish, vegetation, archaeology).
Statements from the **military,** civil aviation authority and other stakeholders.

Building permits
- Duration 0,5-1 years
- Hub and tip heights
- Construction to be started in 3 years, time to finalize + 2 years
- Authority: Municipality

Water permit, if offshore
- Duration 1-2 years
- Locations of the turbines
- Construction has to be started in 5 years time
- Authority: AVI

Environmental permit
- Duration 2-3 months
- Only if the noise or flickering exceeds the planning limits
- Authority: Municipality

In which direction electricity production should be taken to?

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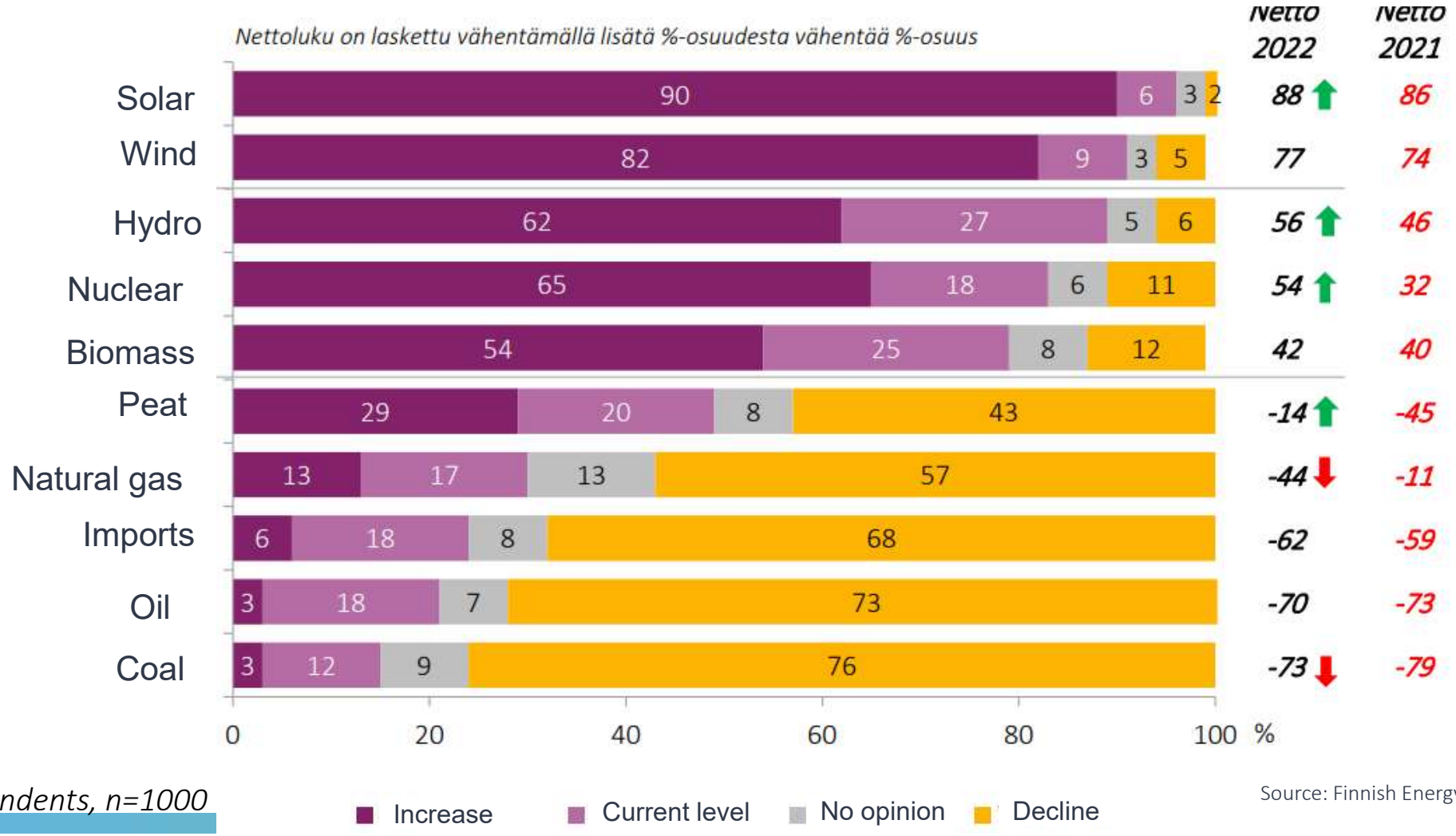

All respondents, n=1000

Source: Finnish Energy

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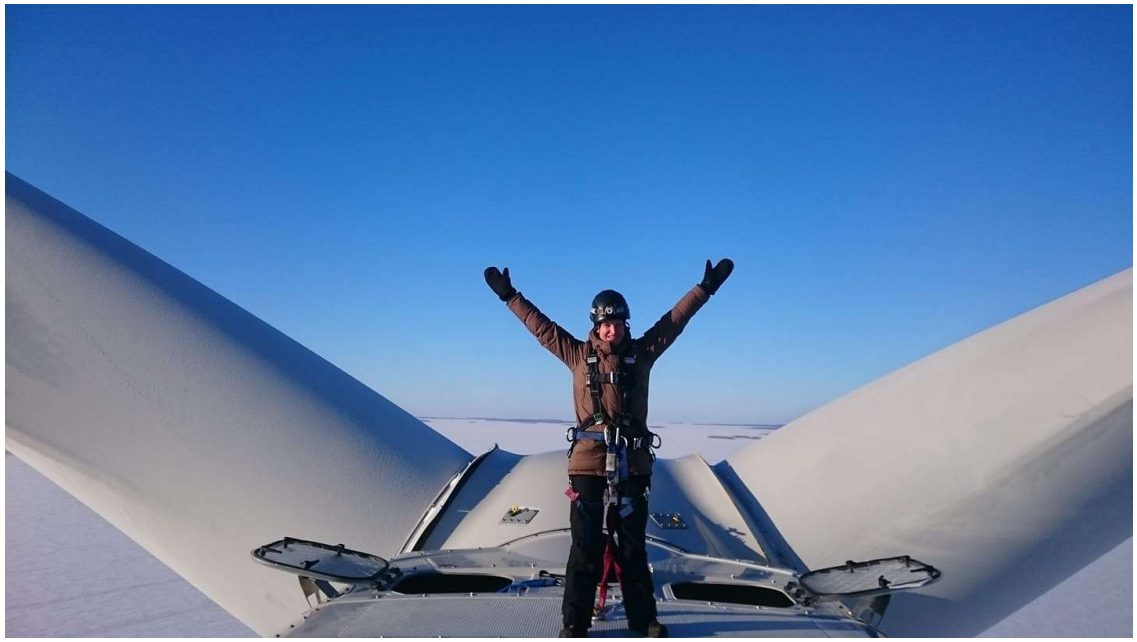
Thank you! Comments & questions?



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