

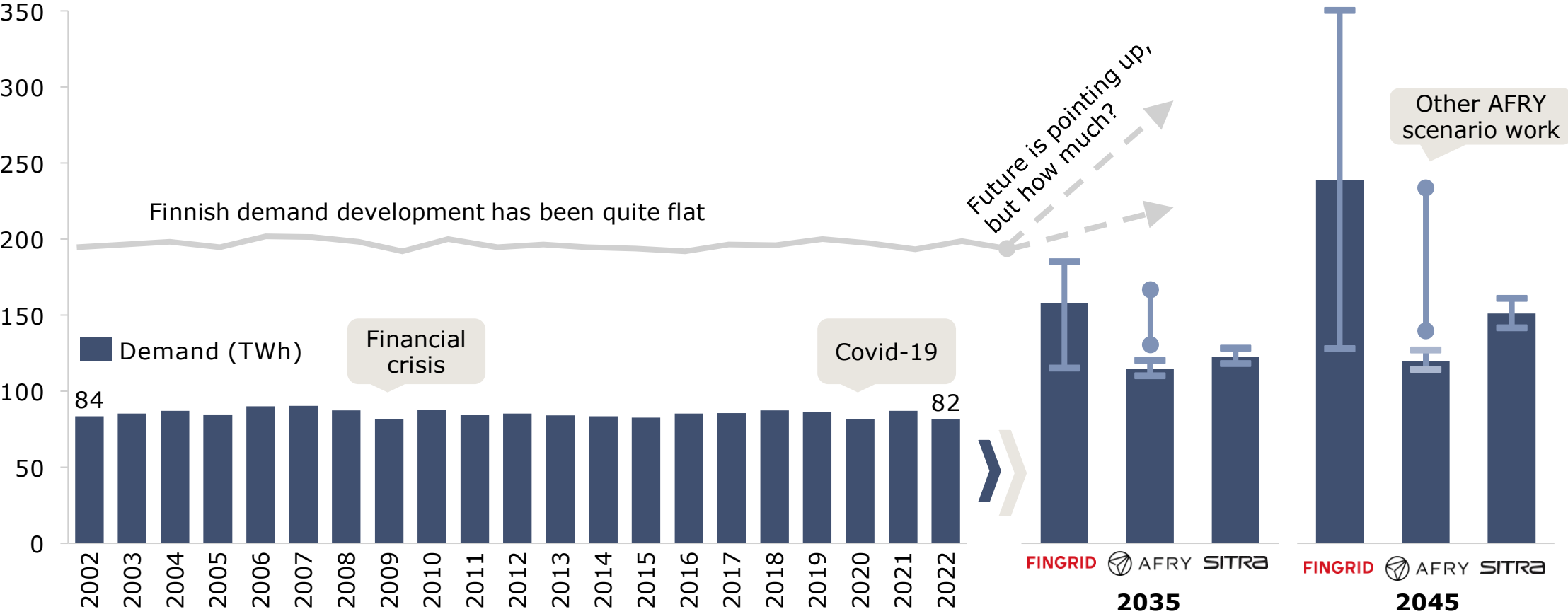
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# Energy Transition in Finland

Finnish Energy Day 2023

15.6.2023 NIKITA SEMKIN

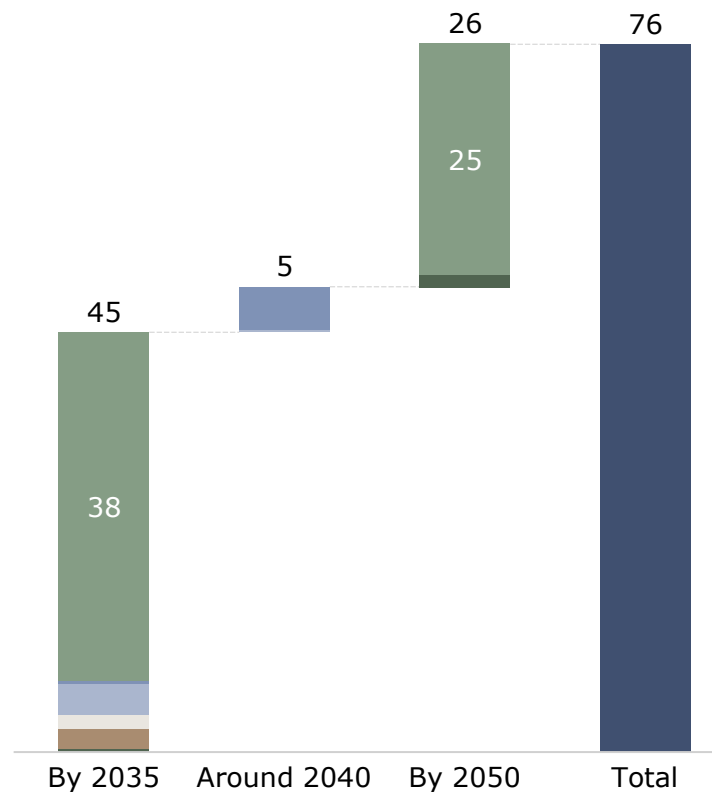
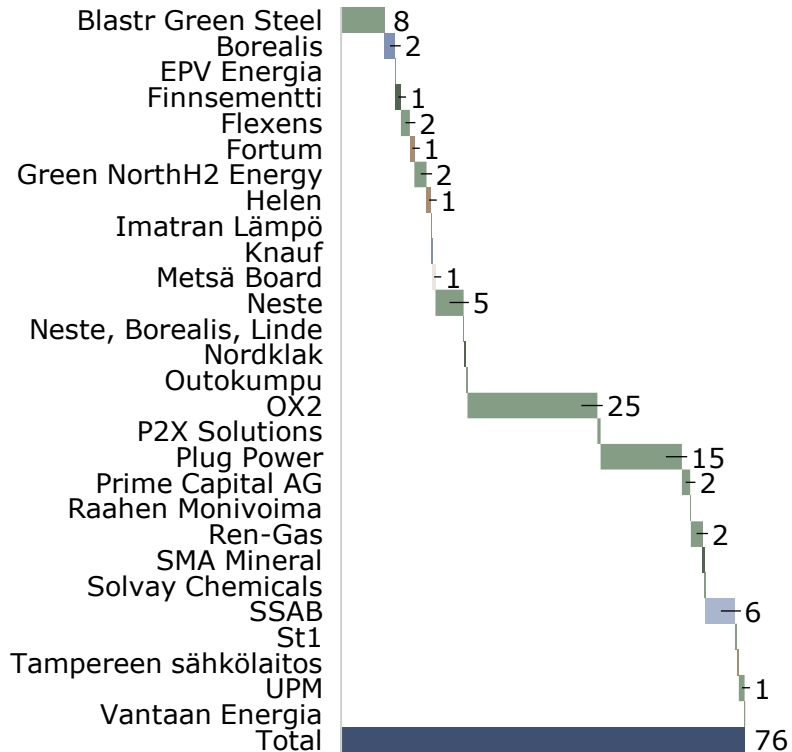
Everyone expects the demand to grow, but nobody knows by how much.  
 Change to the power system still likely to be drastic



# Hydrogen, together with wider industrial electrification represents huge and a very concrete demand potential

**ELECTRICITY DEMAND INCREASING PROJECTS\* (TWH)**

**POSSIBLE TIMELINE (TWH)**

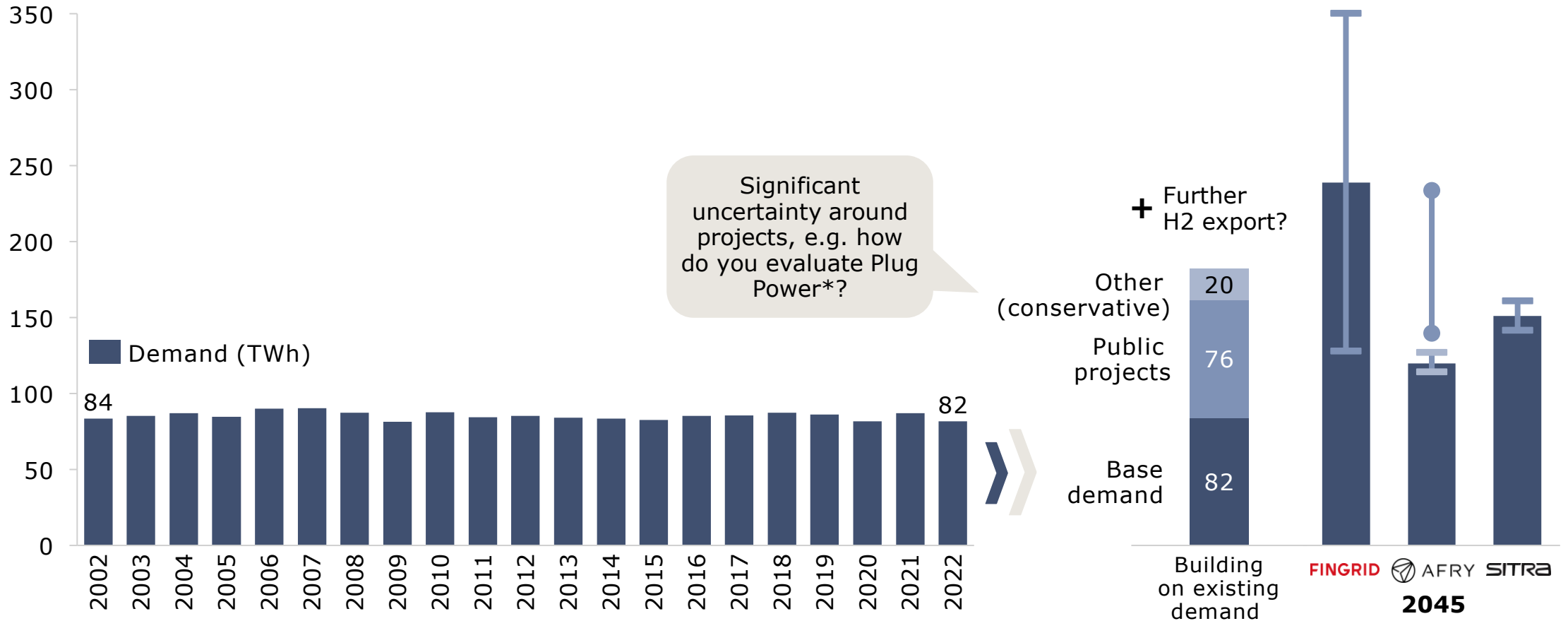


■ Hydrogen based 
 ■ Chemical industries 
 ■ Metal & mining 
 ■ Pulp & paper 
 ■ Heating 
 ■ Other

\*High level estimates

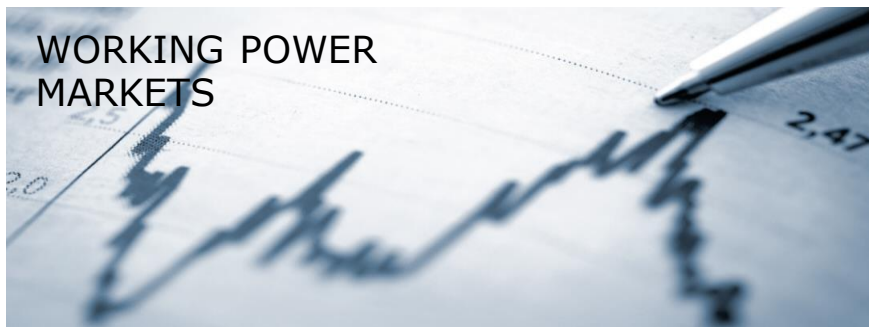
Finland has significant number of publicly announced projects

Putting it all together the demand projections don't seem unreasonable, though uncertainty remains



\*Plug Power has cumulative 3bn EUR loss since 1997.

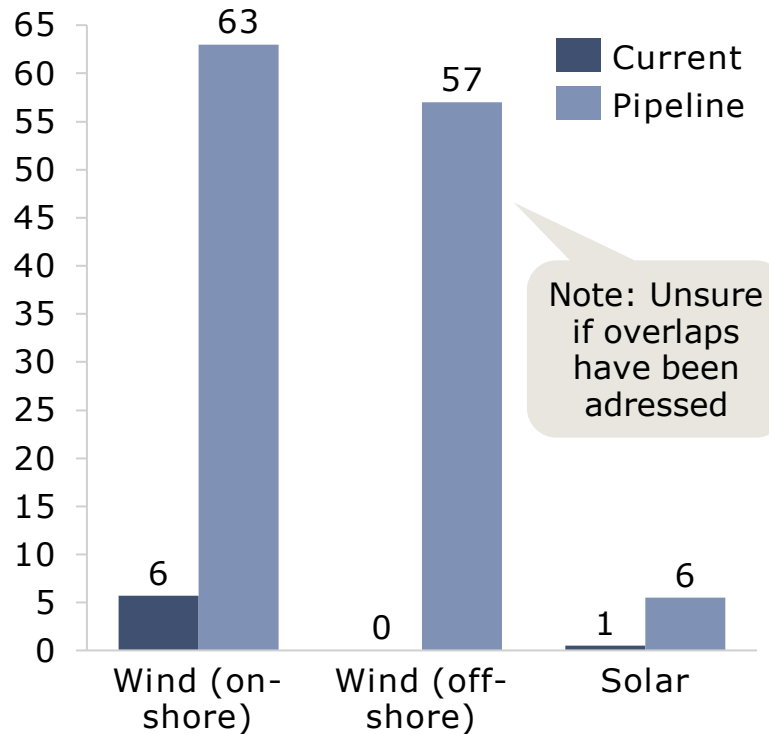
# Ability to scale (green) power sector will be key enabler of industrial transformation and new demand growth



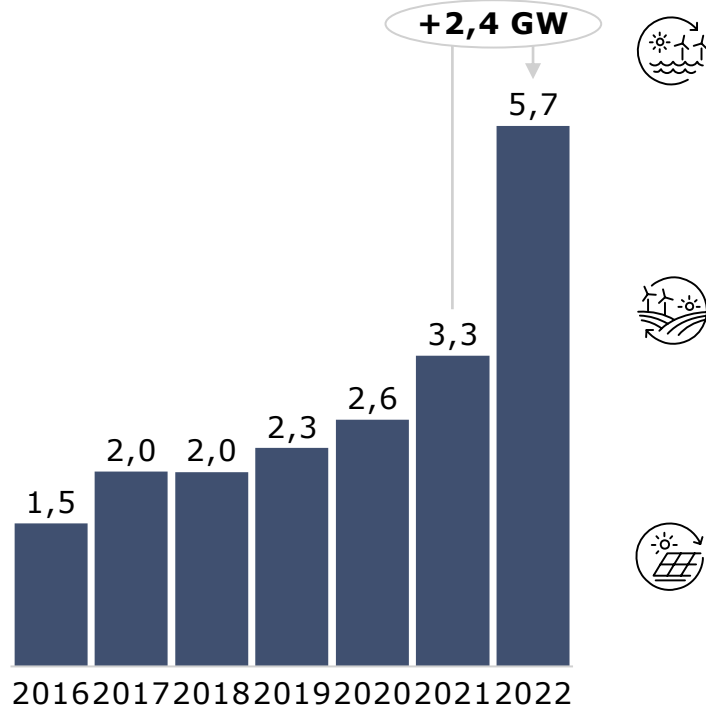
What is needed to scale the green power sector?

Finland has abundant supply potential of renewables – current pipelines alone can generate >450 TWh of green power

**DEVELOPMENT PIPELINE ALONE REPRESENTS >450TWH SUPPLY**



**FINLAND HAS DEMONSTRATED ABILITY TO BUILD RES AT SCALE**



Onshore wind likely still to be main supply source of new power

Offshore wind will be required especially should the demand grow

Solar production already profitable in Finland – big picture role still small

\* Estimated offshore capacity factor for future projects: 45%

Availability of financing unlikely to be a constraint – Finnish wind has attracted plenty of interest from international & domestic investors

BUYERS IN RECENT NORDIC WIND PROJECT TRANSACTIONS

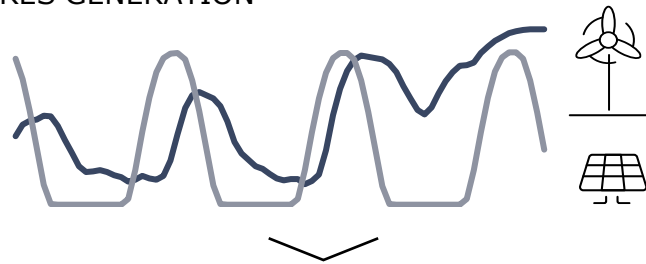


Note: List not exhaustive

# Critical questions remain around integration, grid development and social acceptance & permitting

**ABILITY TO INTEGRATE REMAINS KEY QUESTION. IN SHORT TERM TIMING BETWEEN PRODUCTION / DEMAND**

RES GENERATION



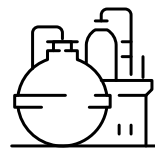
POWER SYSTEM & MARKETS



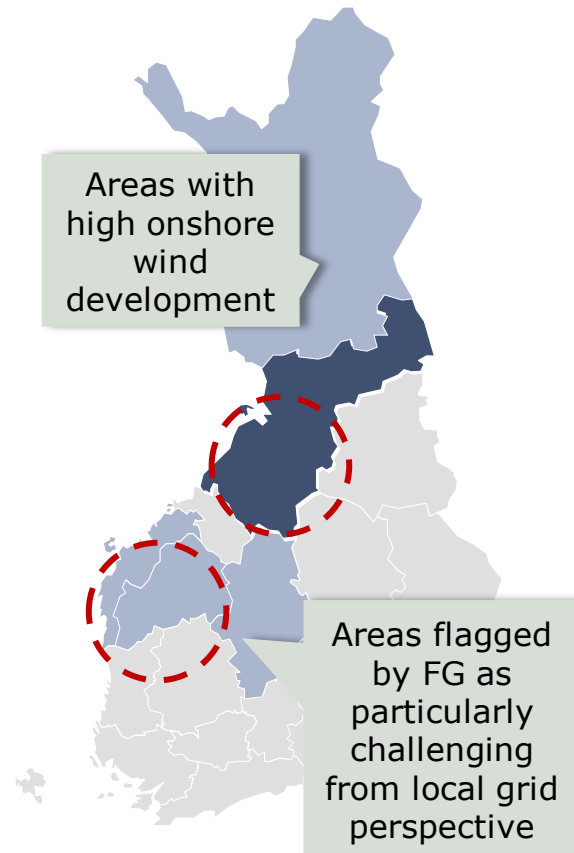
ELECTROLISYS



DEMAND



**CHALLENGES IN THE GRID?**



Areas with high onshore wind development

Areas flagged by FG as particularly challenging from local grid perspective

**SOCIAL ACCEPTANCE IMPORTANT AS EVER**



*"Norway wind turbines should be torn down, reindeer herders say"*

Discussion related to Storheia and Roan wind projects. Norway now resuming onshore wind power licensing after 3-year break



Municipalities stopped 78% of all onshore wind project in 2021, in 2022 the figure was 73%

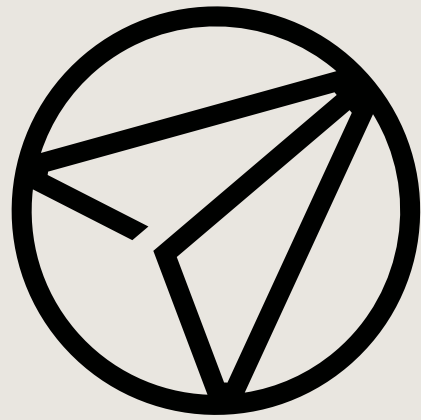
Proposal to adjust veto right was voted down in Riksdag



*"Municipality lives from tourism and views. General agreement has been that wind power is not wanted in Utsjoki"*

-Head of municipality, Finland





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ÅF PÖYRY