

Joint efforts towards a fossil free future



Winterwind

2019-02-05

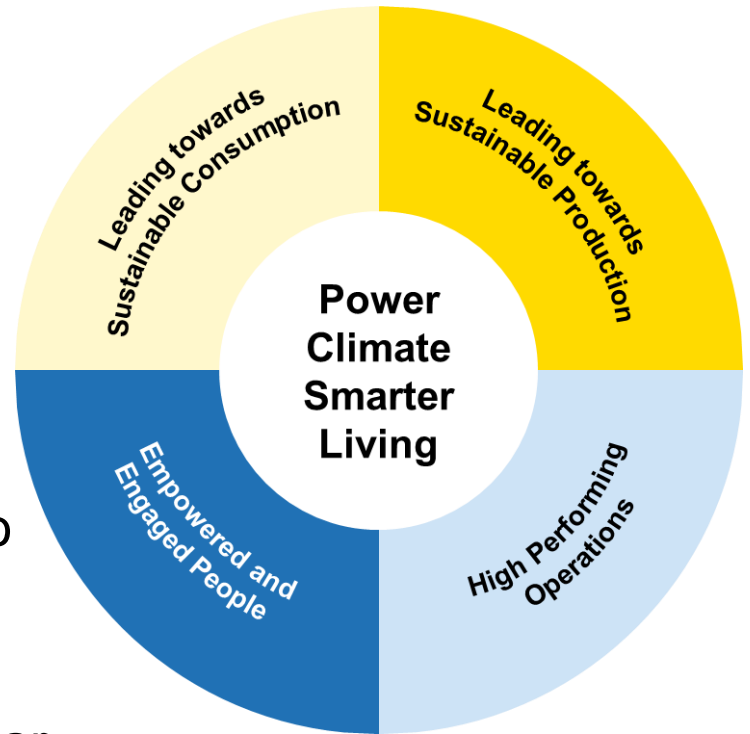
Vattenfall and our goals

100% owned by the Swedish state

Primary markets: Sweden, Denmark, Netherlands, Germany & UK

Ambition of sustainable production, while helping industry and consumers to become fossil free

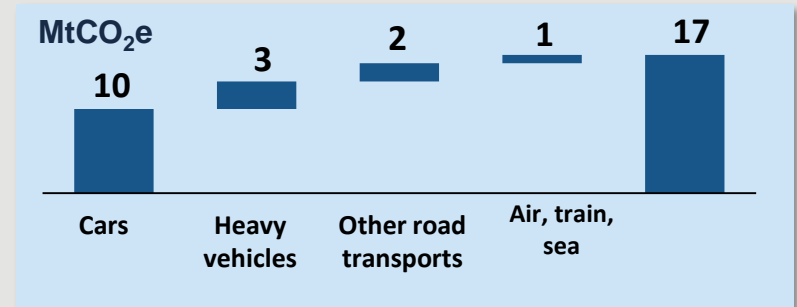
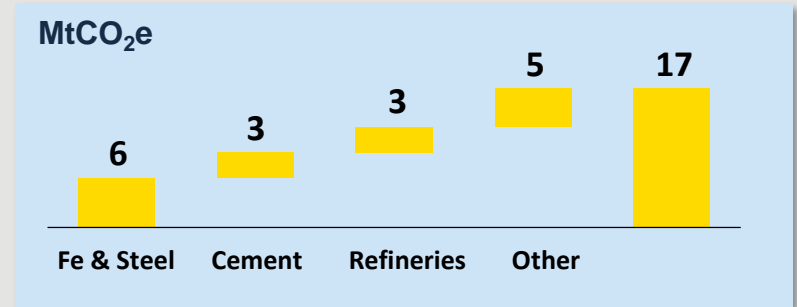
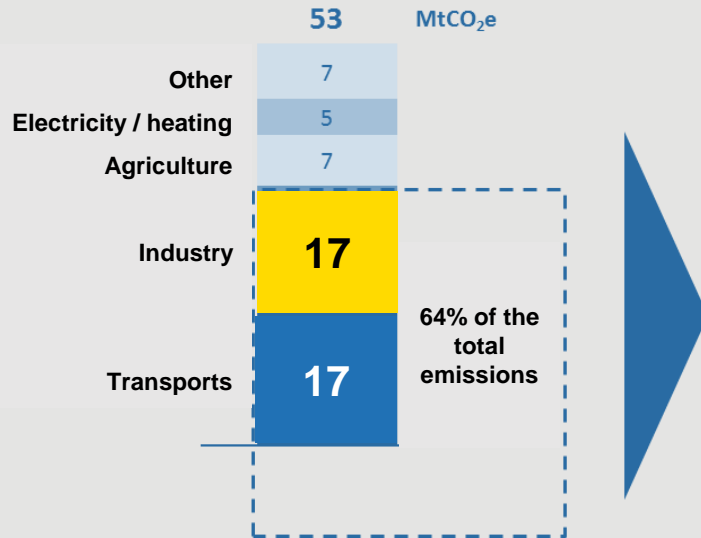
Renewable investments of 1 billion €/year



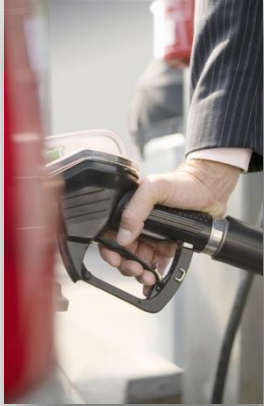
Partnerships with our customers

All parts of the society needs to be part of the transition

Greenhouse gas emissions in Sweden



We want to electrify...



TRANSPORTS

HEATING

INDUSTRY

Strategic partnerships

Research project for a carbon dioxide-free steel production



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Cooperation on large-scale biodiesel production



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Study on electrified cement production



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Energy storage projects around a number of wind farms



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Marketplace and community for energy sharing



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Commitment to a large company for battery manufacturing in Sweden



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Northern Europe's largest charging network for electric vehicles



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Attract electricity-intensive industries to come to Sweden



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Fossil free steel with SSAB/LKAB



Building of pilot plant started



Electricity need:
ca 15-20 TWh/year
(full conversion)



+



=



+



Iron ore pellets

Hydrogen

Sponge iron

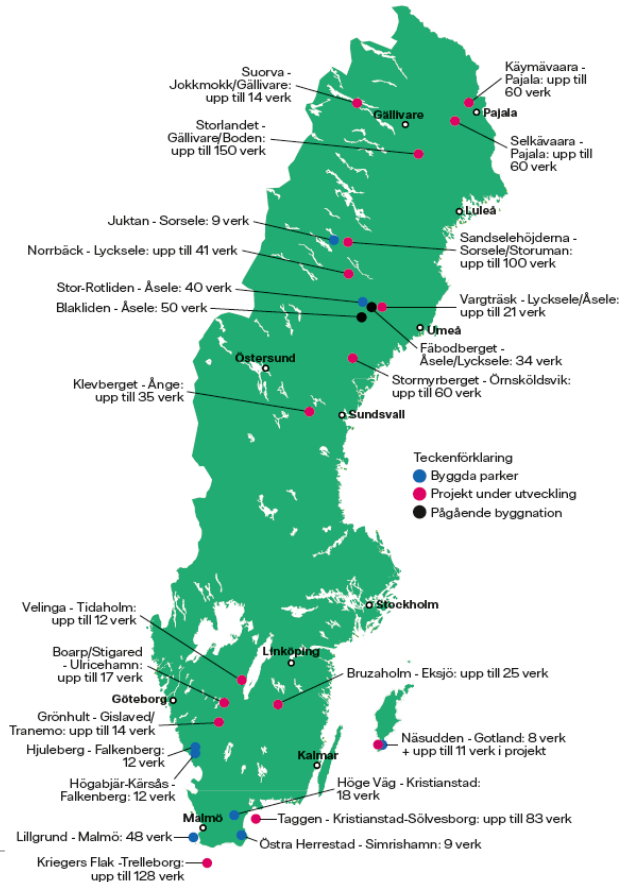
Water

Vattenfall's wind power portfolio and plans



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Wind power ambition Sweden



Eight existing wind farms in operation

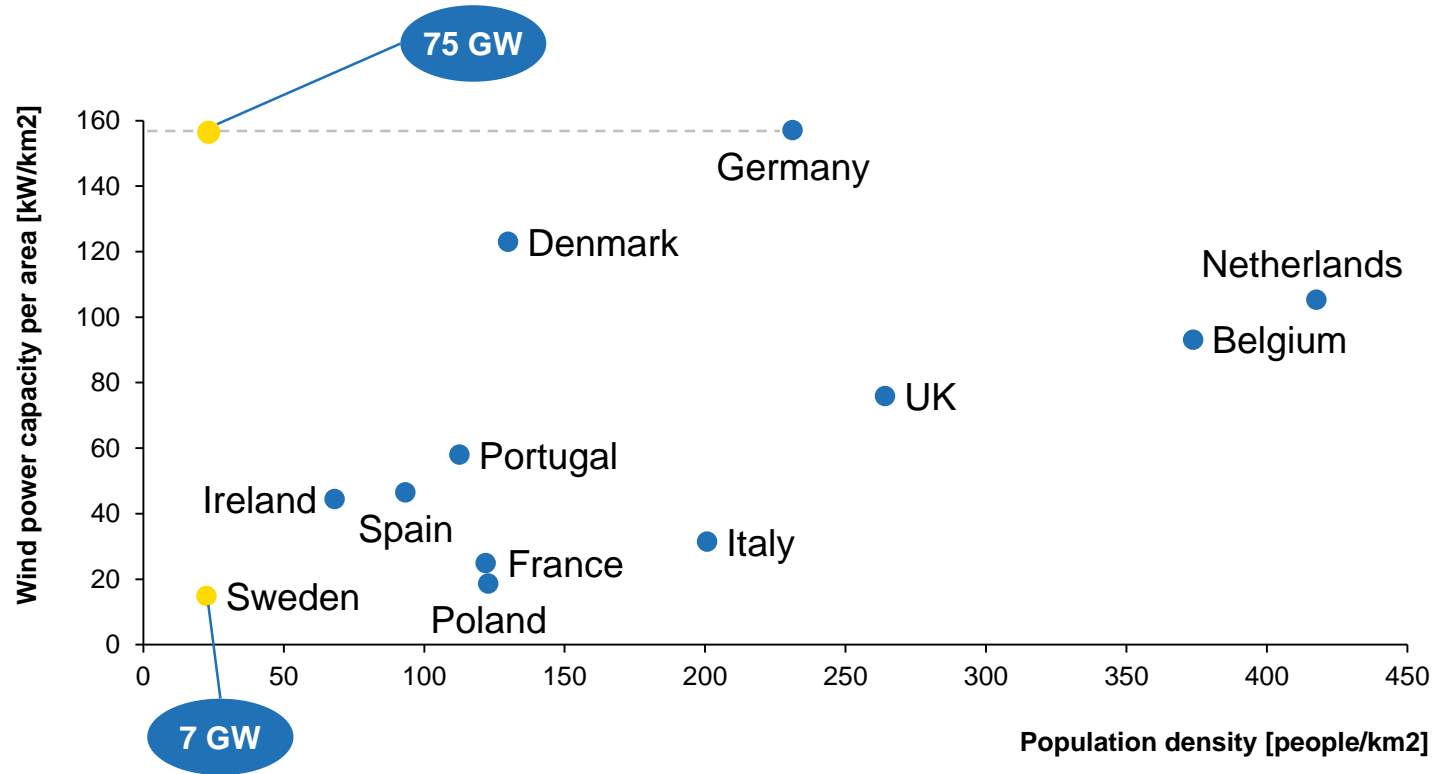
Construction of Blakliden & Fäbodberget, 353 MW, 2018-2021

Onshore development pipeline of ~ 15 projects and 2000 MW, plus cooperation with other companies

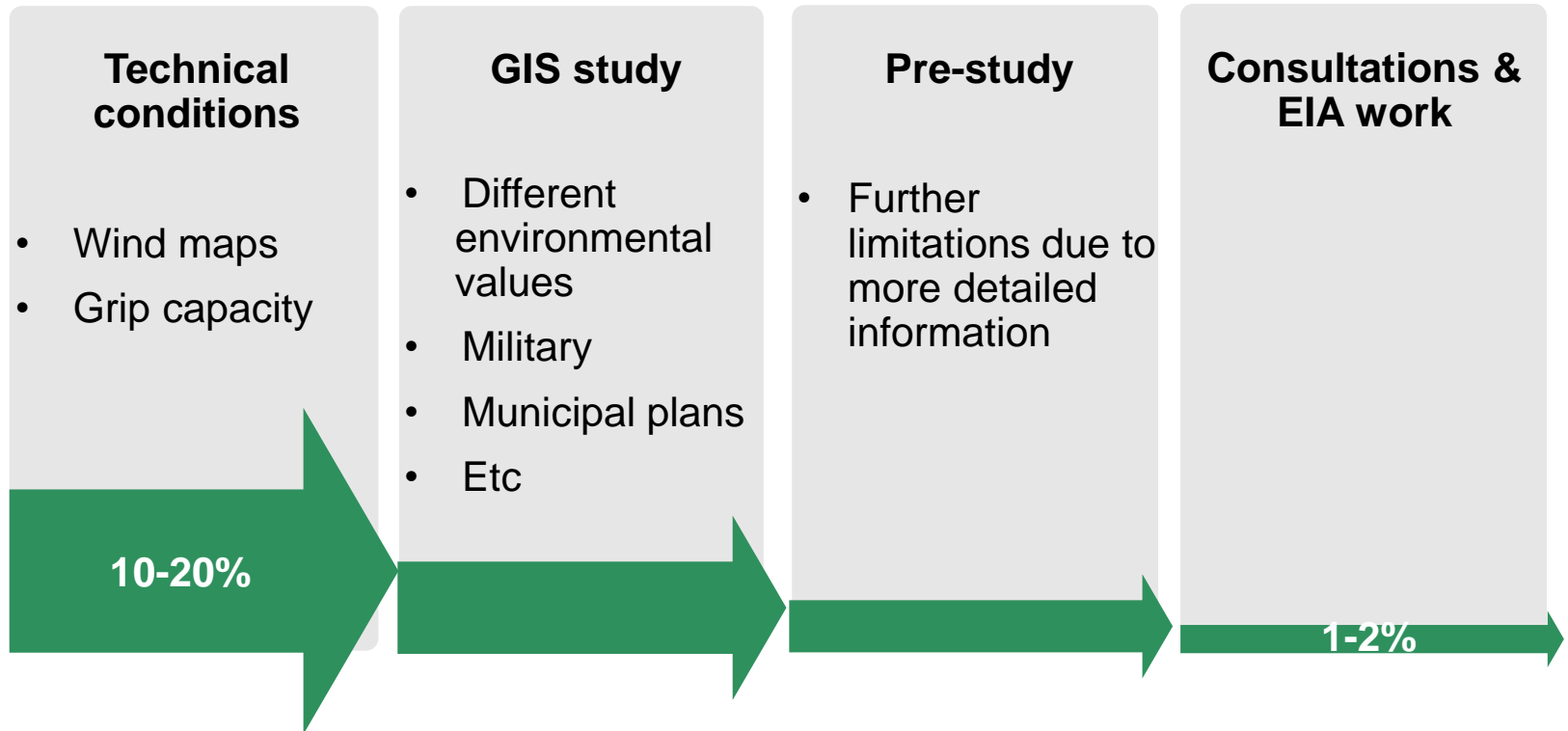
High ambitions for new investments and new projects and cooperations

100% renewable - the
challenge of getting permission
in good wind conditions

Population density and wind power



Difficult to find new projects

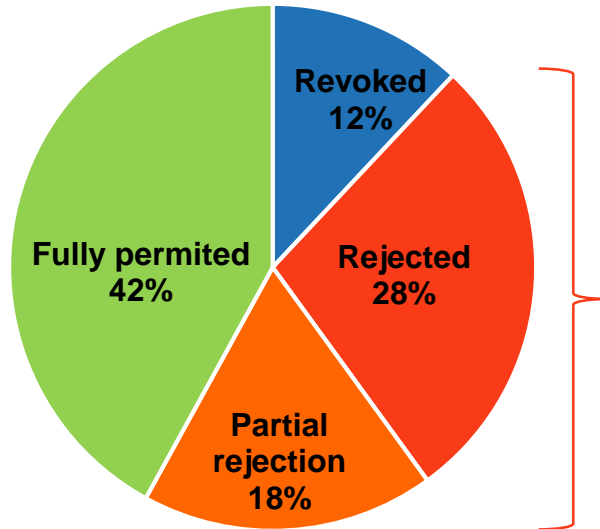


Projects rejected at the first permit level

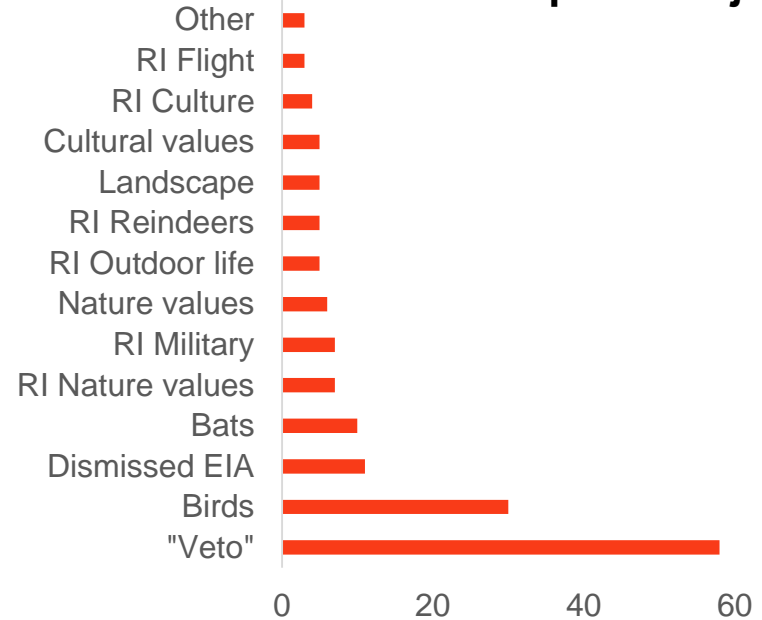
Source: WindXEnergy

County level decisions 2012 - 2017

291 decisions



133 full or partial rejections



The courts reduces approved projects further

MMD and MMÖD September 2015 - May 2018
Projects with 2,537 turbines was handled

Most decisions from county levels are appealed (except when municipal veto was used)



75%
rejections

25% permitted

Source: advokatbyrån Fröberg & Lundholm

100% renewable electricity – a permit and planning challenge

Challenges

- Difficulties in getting permits in areas with good wind resource
- Increasing requirements in the permit process
- Long and uncertain permit process
- Similar issues for increasing the national grid capacity

Solutions

- Assess the impact from a holistic perspective
 - The climate aspect of the trial
 - Assessment based on population instead of individual
- Enable latest technology
- Reform the municipal approval
- Strengthen the power grid
- Legislative changes needed

Technical and icing challenges

Icing challenges

Challenges

- Subsidy free
- Utilizing new technology
- Anti-icing with proven and warranted performance
- Safety assessments
- Icing climatological assessment
- Etc

Important with

- **Continued RnD**
- **Innovation and new ideas**
- **Test centers**, To be able to prove performance and test new technology
- **Continued and developed performance warranties**

**Thanks for your
attention
Questions?**