



Functionality of the renewable support scheme – practical insights from a wind energy market actor's perspective

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Content of the presentation

Introduction of OX2

Wind power's complex operating environment

Experience from the feed-in tariff scheme in Finland

Planned auction system in Finland

Green Certificate system in Sweden and Norway

PPAs and Energy production on market based prices






- Regional Manager for Finland and the Baltics at OX2
- Leading the project development team in Finland
- Almost 10 years of experience from wind farm development
- Executed several wind farm transactions
- A board member at the Finnish Wind Power Association
- A member of OX2's management team

OX2 – Leading turnkey developer, realiser and operator

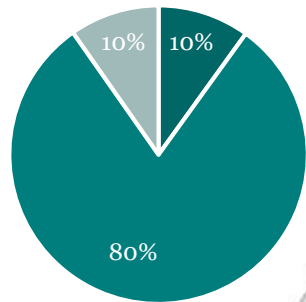
- Over 20 years of experience in the field of renewable energy
- More than €1,5 bn has been invested in wind farms developed and constructed by OX2
- Has developed and built 1 600 MW of onshore and offshore wind power
- The leader in technical and commercial wind power management in the Nordic region, with contracts for 1 112 MW, equivalent to production of about 3,5 TWh
- Project portfolio of over 50 wind power projects (2 000 MW) in Sweden, Finland and Norway
- Over 100 members of staff in Sweden, Finland, Lithuania, France and Germany. Headquarters in Stockholm.
- Supplier independent and privately held
- Revenue 2017: ca. € > 230 million



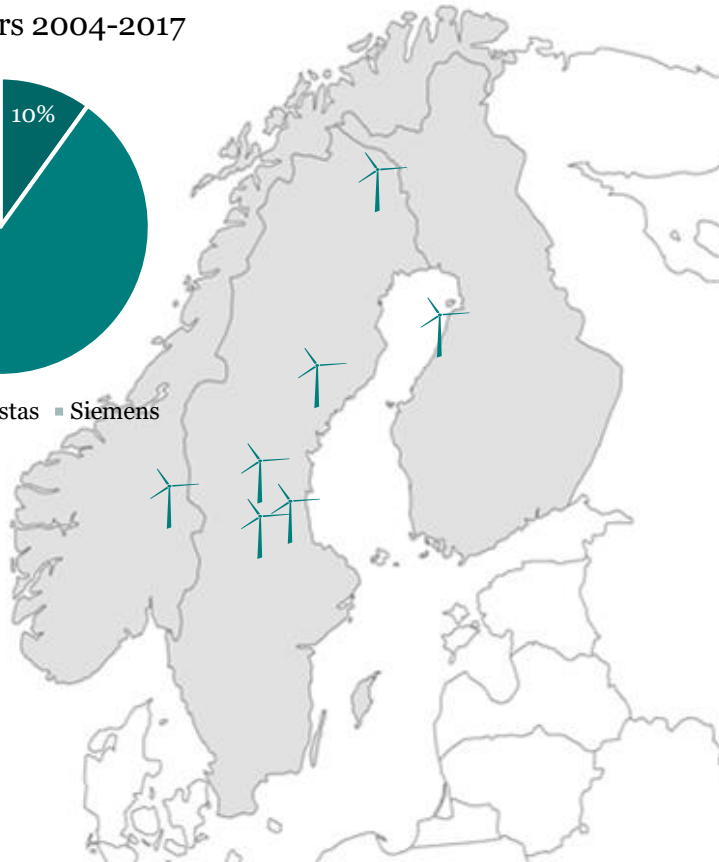
In total over 750 MW under construction

 *In construction*






Main suppliers 2004-2017



■ Nordex ■ Vestas ■ Siemens

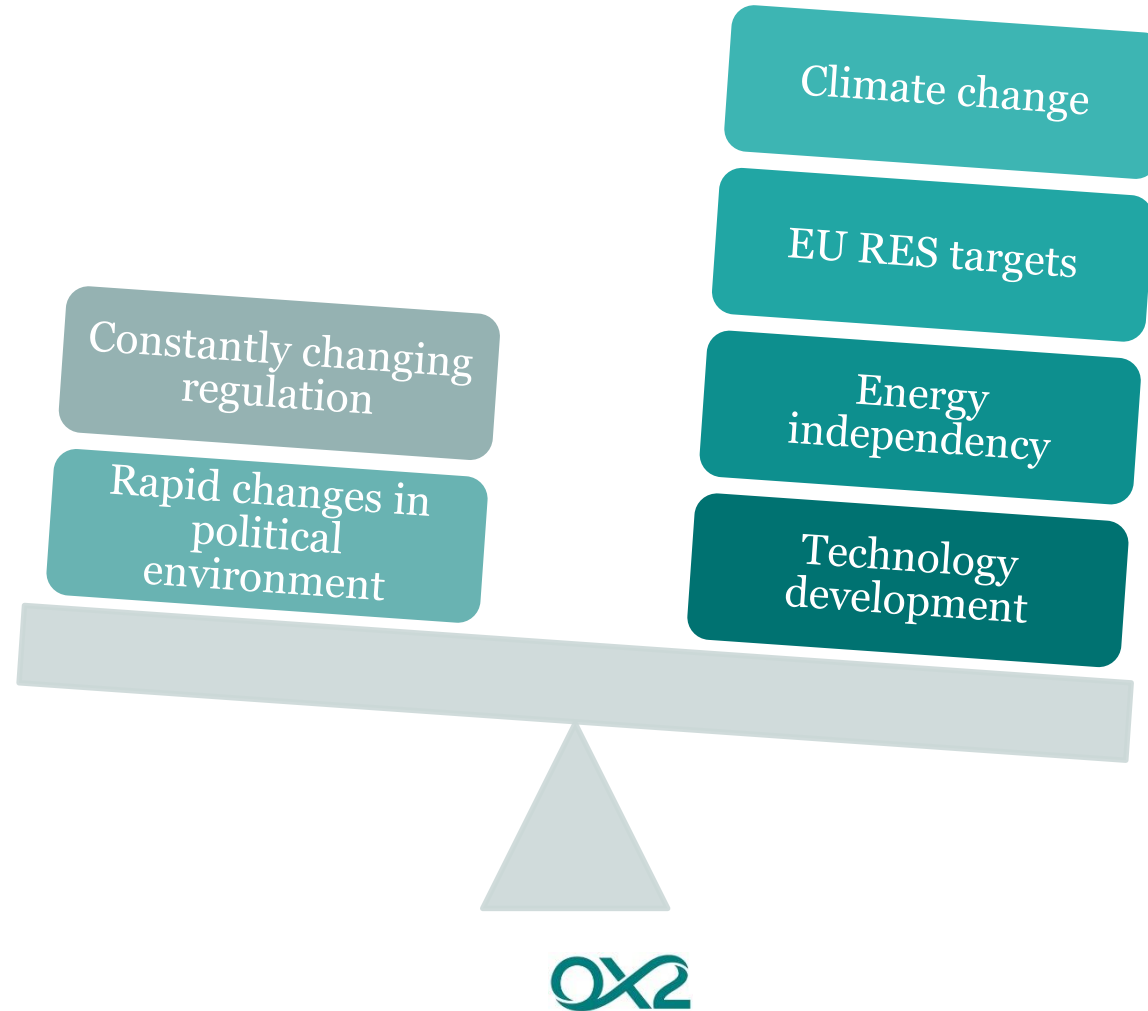


	Höglölen (SWE) 65 MW (2016) Aquila Capital
	Lehtirova (SWE) 148 MW (2016) Aquila Capital 
	Raskiftet (NOR) 112 MW (2016)   
	Valhalla 357 MW (2017) Aquila Capital

	Ykspihlaja (FIN) 14 MW (2017) Aquila Capital
	Stigshöjden (SWE) 22 MW (2017) 
	Orrberget (SWE) 33 MW (2017) 

Wind power's complex operating environment

Complex operating environment



Investment
for 20-30 →
years

TODAY, WE CAN BE MORE CONFIDENT THAT **THIS PLANET IS GOING TO BE IN BETTER SHAPE FOR THE NEXT GENERATION.**

PRESIDENT OBAMA
ON THE HISTORIC #PARISAGREEMENT
TO COMBAT CLIMATE CHANGE
GO.WH.GOV/CLIMATE



TRUMP ON WIND

Bloomberg
NEW ENERGY FINANCE

“

Wind farms are a disaster for the environment. They kill the birds. They are very expensive in terms of energy. They're made in China.

”

Donald Trump
Presidential Candidate



Picture: Michael Nagle/Bloomberg

Michael Liebreich

BNEF Summit, New York, 5 April 2016

@MLiebreich

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Experience from the feed-in tariff scheme in Finland

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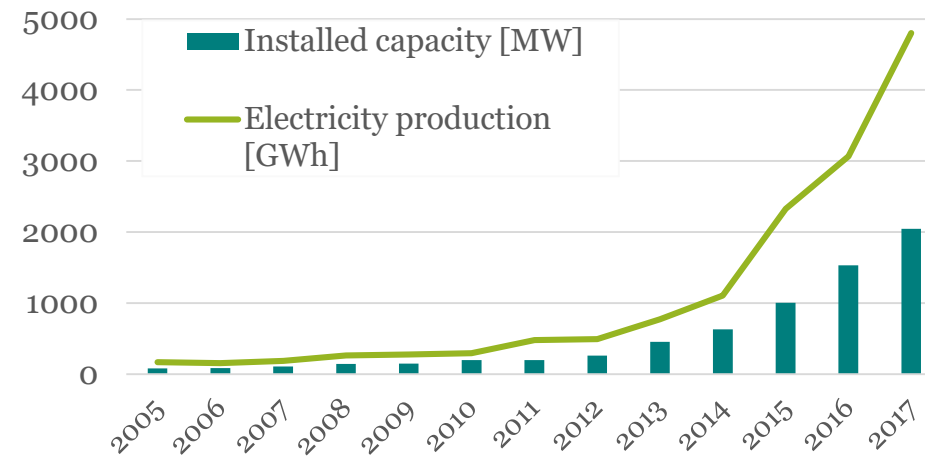
Goals of the feed-in tariff:

- Increase the use of renewable energy sources in electricity production within short time schedule
- Increase the competitiveness of renewable energy sources compared to fossil fuels
- Diversify the energy production scheme and increase the energy independency



A new industrial sector to Finnish market was formed:

- Wind power industry employs 4000-5000 people in Finland
- 10 000 MW wind power projects under development
- Installed wind power capacity of 2 000 MW
- Share of electricity produced by wind power:
0,6 % in 2011 → 5,6 % in 2017
- However, energy independence hasn't increased
 - 23,9 % of electricity was imported in 2017



Source: Energiategollisuus ry

Experience from the feed-in tariff scheme in Finland (2)

Tariff was planned in 2009 was based on the average electricity price level of 45-50 €/MWh

- Decrease of electricity price to level of 30€/MWh
- Increase in the gap between tariff fee and market price
- Decrease of interest rates
- Technical development increased production significantly

Other observations from developer's perspective

- Due to a tight time schedule, possibly the most cost-efficient projects were not included in the tariff scheme
- Construction permit in legal force was the most important thing
 - Only very few appealed projects received quota
 - Quality of the development wasn't the top priority
- Turbine suppliers' pricing. After FiT-systems have been replaced by auctions prices have dropped significantly.

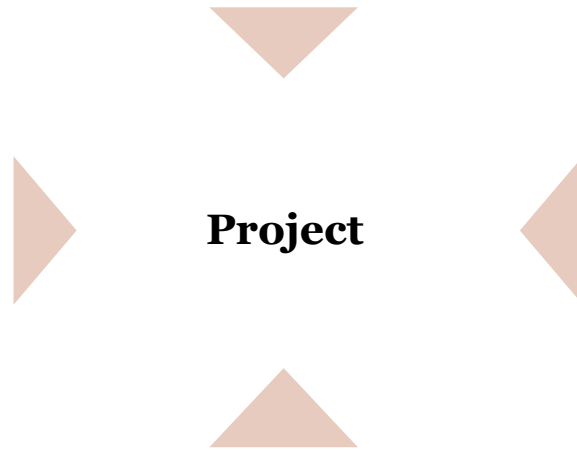
Planned auction system in Finland

Technology

Design, procurement and contracting

Funding

Equity, bank and
transaction management



Offtake

PPA contracts and hedging strategies

Project Rights

Permits and other local contract



Planned auction in Finland

- The subsidy will only be paid to the most cost-effective and competitive investments in renewable electricity production.
- Stable predictable cash flows decreases risks of investments.
 - Enables debt financing and lower return requirements.
- 2 TWh of annual production is a very low target.
 - Meaning maximum only 500 – 600 MW of new wind power capacity.
- Fierce competition can be expected
 - There are more than 4000 MW wind power capacity (12 TWh) fully permitted and could participate in the auctions.
- Higher more ambitious renewable electricity targets are needed.
- Two to three-year support scheme is only temporary.
 - What happens after auction?



Green Certificate system in Sweden and Norway

Sweden's and Norway's perspective

- A market based subsidy system for renewable energy production
 - Support is 1 certificate per produced MWh during 15 years of operation.
- Outcome of the co-joined system
 - Have secured a long term pipeline of Wind Power project in the countries. An example of last year result of **investment decision of 3000MW (2000MW in Sweden, 1000MW in Norway)**.
 - Investors have payed the price of development. This is due to an over belief of the system, low transparency of the system and inefficient correction mechanisms of the system.
 - Results is remarkable low subsidy of renewable energy production.
 - It has driven the LCOE down. Low income have put high pressure on optimizing the wind farm by finding the best projects, best suit of turbine suppliers, pushing a technical development of high towers, low wind speed power curves, de- and anti-icing system.
- Next Steps
 - In Sweden, target is 100% renewable electricity production in 2040. The certificate system will be prolonged to 2045 and the quotas will increase after 2022. Wind power could provide a large part of new capacity.
 - In Norway, decision to step out of the certificate system and construction of projects included in the system shall end latest in 2021. There is no plan to subsidize new wind power in Norway after 2021.

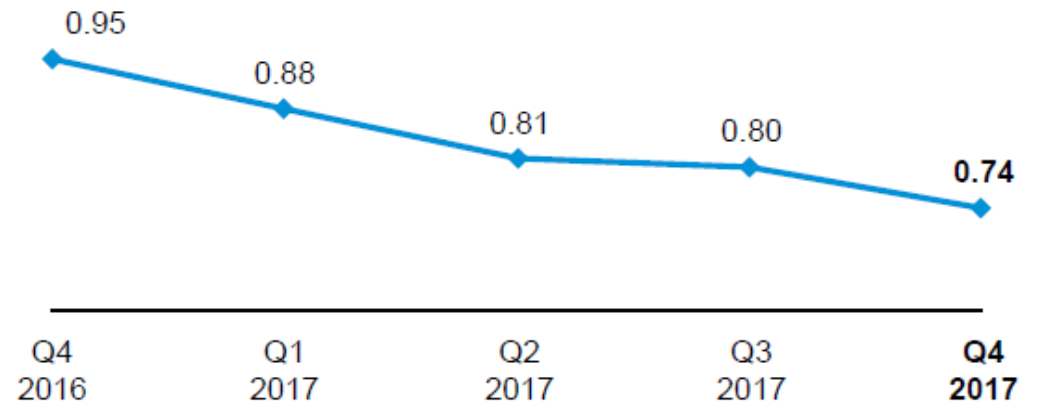


PPAs and Energy production on market based prices

Market parity in large scale renewables approaching fast

- Onshore wind the cheapest form of energy production in Finland (LUT comparison, Sept. 2017, excluding CO₂-cost and subsidies)
- Based on IRENA's report Onshore wind is one of the most competitive sources of new generation capacity. Recent auctions in Brazil, Canada, Germany, India, Mexico and Morocco have resulted in onshore wind power LCOEs as low as USD 0.03/kWh.
- Three main cost reduction drivers have emerged for renewable power:
 - 1) technology improvements
 - 2) competitive procurement
 - 3) a large base of experienced, internationally active project developers.

Average selling price of order intake
mEUR per MW



Source: Turbine manufacturer Vestas
https://www.vestas.com/~media/vestas/investor/investor%20pdf/financial%20reports/2017/q4/2017_fy_pres_uk.pdf

Power purchase agreement as a product

Product

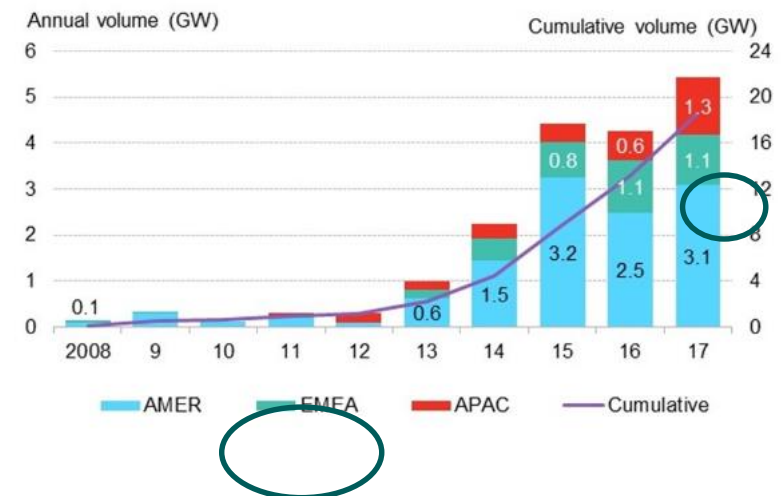
- Power purchase agreement, abbr. PPA, is an agreement where a renewable energy asset owner and an energy consumer (*corporate offtaker*) agree on the delivery of a certain amount of energy for an agreed fixed price and duration.
- The agreement is financial, thus allowing for asymmetrical production and consumption.

Market development

- Renewable energy PPA market is growing globally achieving a cumulative volume exceeding 22 GW in 2017, **with 1.100 MW signed in Europe during 2017.**

Recent corporate PPAs in Nordics

Offtaker	Project (size)	Signing	Validity	Start date
Google	Lehtirova (148 MW)	2016/10	10 yrs	2018/Q4
Norsk Hydro	Fosen (1.000 MW)	2016/2	20 yrs	2018-2020
Statkraft	Svartnäs (115 MW)	2017/6	unknown	2018/Q4
DNB Markets	Åskålen (288 MW)	2017/6	unknown	2019/Q4
Alcoa	Kvit- & Raudfjell (281 MW)	2017/10	unknown	2019
Norsk Hydro	Markbygden (650 MW)	2017/11	19 yrs	2019



Some of 129 RE100 companies have made a commitment to go '100% renewable'



Business case for corporate buyers

The business case for corporate buyers



Economics

- Allows corporate buyers to lock in a fixed electricity price, or fixed cap, with no upfront capital requirement
- Provides visibility over future electricity costs
- Hedges against fuel and electricity price volatility
- Reduces risks related to potential future changes to carbon pricing
- Removes requirement for operational and management costs, and operational risk sits with the developer



Sustainability

- Aligns with SDG 12 - Ensuring sustainable production patterns
- Helps with progress towards renewable energy or GHG emissions targets
- Some countries legislate or encourage private companies to improve their renewable footprint to receive regional development bank support



Brand and leadership

- Increases recognition for renewable electricity achievements



Leverage

- Allows for the development of partnerships with a small number of reliable and experienced counterparties
- In comparison to owning generation assets, PPAs allow a business to remove focus from non-core areas

Source: World Business Council for Sustainable Development, wbscd.org, Rescale project

<http://www.wbscd.org/Clusters/Climate-Energy/REscale>

