

**OX2**

**CHALLENGES WITH FINANCING WIND POWER IN COLD  
CLIMATE**

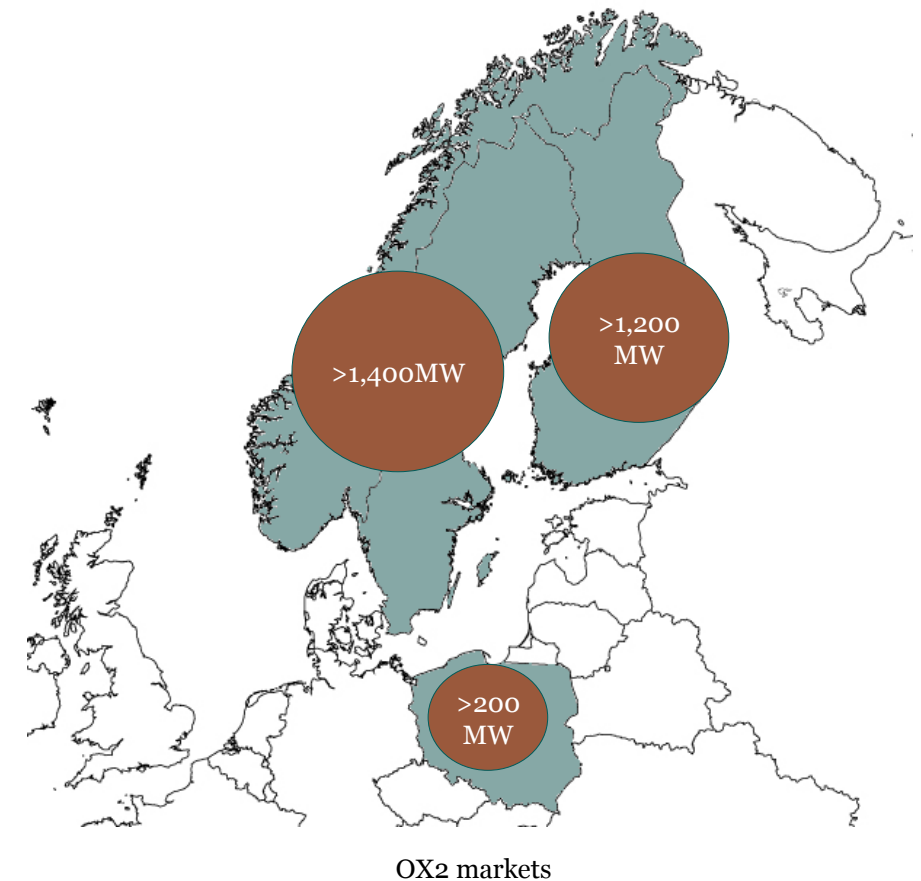
**ULF TOLLAKSEN, HEAD OF ENGINEERING**  
**[ulf.tollaksen@ox2.com](mailto:ulf.tollaksen@ox2.com)**

# Agenda

- Introduction to OX2
- Challenges with financing wind power in cold climate
  - Ice-loss calculations
  - Procurement limitations
  - Timing
- Case studies:
  - Glötesvålen
  - Maevaara
- Brief info about upcoming OX2 projects
  - Stigshöjden, Lehtirova, Orrberget

## A leading turnkey developer in the Nordic region

- Founded in 2004
- Built and developed ca 1000 MW
- Technical and commercial management for >200 WTGs (500 MW)
- Turnkey supplier of 250 MW during 2014
- Revenue 2014E: 200 MEUR
- >80 employees in in Sweden (HQ), Finland and Poland
- Ownership structure: Supplier independent and privately held
- Project pipeline of >2,500 MW in late stage development



## OX2 has extensive experience from cold climate

- Built 4 projects ca 80 WTGs (190 MW) north of the Polar Circle
- During 2014 OX2 had 6 projects (250MW) under construction, all north of Dalälven
- All 2014 turbines constructed with cold climate package
- 80% of turbines ordered with active de-icing systems
- Operations portfolio covers >400MW north of Dalälven



OX2 2014 construction projects

# Business model with value proposition towards both local developers and investors

## **OX2 offer to Local developers**

- Technical design and optimization capacity
- Access to international institutional capital
- Expertise and resources to manage a large project from start to finish



## **OX2 offer to Investors**

- Access to high quality projects
- Proven track record of development and construction
- Technical and commercial management
- Optimizing risk/return profile

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# Challenges with financing wind power in cold climate

- Expect that investors and their consultants are not necessarily familiar with the challenges of cold climate development and construction and that this topic should be covered early in the process
- If treated right the cold climate challenges in relations to financing are fairly straight forward and comparable to financing of normal climate sites
- Due to technology improvements and experiences in the market, the scene might change over the course of a financing process



# Ice-loss calculations

- Agreeing on a net-P50 for the wind farm is essential to the valuation and financing process
- Consultancies and investors have different view and experience on how to treat ice-losses
- High uncertainties in all methods used today
- Ice-loss to be included in net-p50 is dependent on the level of warranties the de-icing system comes with





# Procurement limitations

- CAPEX is generally higher on cold climate sites, especially turbines, due to more works included and more risks during erection/commissioning
- In general there is less turbine models available for cold climate which gives the developers less negotiation power
- Selecting the right turbine is the #1 critical process in a wind project
- Most turbine suppliers have cold climate packages but few have good and proven de-icing systems on all models, however almost all suppliers have at least one model with de-icing systems
- Limited production capacity and less automation in manufacturing of de-icing blades, i.e. risk for delay and longer lead time on construction



# Timing

- Construction period is in general somewhat longer than for warm-climate projects
- Certain activities may only be done during certain periods of the year at cold climate sites, and a wrongly estimated financing period can have severe impact on the construction phase
  - I.e. if financial close is planned for a date that is critical to start construction directly, any delay may lead to not 1:1 delay of the project but a 6-12 month delay due to seasonal effects.
- A delay could have severe impact on Interest during construction / Cost of capital



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# Case study Glötesvålen

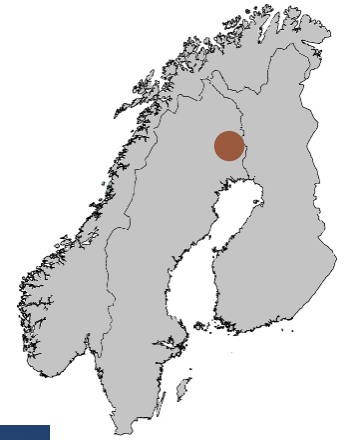


- Construction was started late summer 2012 with roads up to the site
- Summer 2013 all foundations and electrical work completed
- Summer 2014 was used for turbine erection, V90 3,0 MW
- The project is a prototype project for the Vestas de-icing system supported by the Swedish Energy Agency

## Key Facts

Number of WTGs	30
Maximum Rated Power	90MW
Hub height	80m
Wind speed at hub height	> 8.1 m/s
Net energy output (P50)	>220 GWh
Owner	IKEA





# Case study Maevaara

- Construction was started late summer 2013
- Summer 2013 all foundations and electrical work completed
- Summer and autumn of 2014 was used for turbine erection
- Winter 2014/2015 is used for commissioning
- Selected turbine supplier is Nordex with the N117 3.0 MW including anti-icing system

## Key Facts

Number of WTGs	24
Maximum Rated Power	72MW
Hub height	119m
Wind speed at hub height	> 7.6 m/s
Owner	Allianz

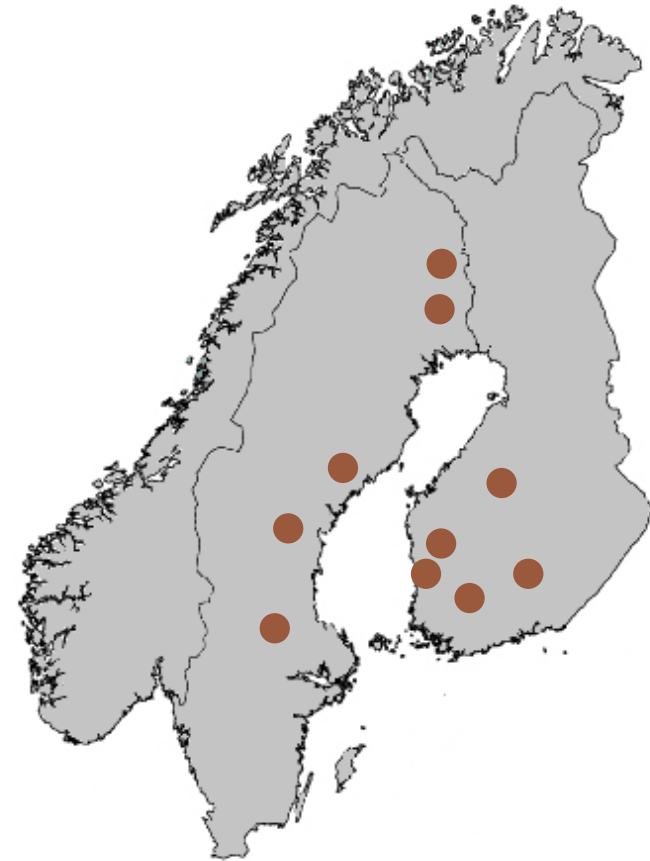


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# OX2 has a strong portfolio of 2015 projects

- Portfolio in Finland starting to mature in 2015
  - 100-200 MW of projects ready for construction by 2015
- Several large projects in Sweden
  - Lehtirova 130 MW
  - Högkölen 90 MW
- In addition to some smaller:
  - Stigshöjden 20 MW
  - Orrberget 30 MW



# www.ox2.com

## Contact details

For information about investment opportunities and OX2 projects, please contact

Henrik Tholander, Head of transactions

[Henrik.tholander@ox2.com](mailto:Henrik.tholander@ox2.com), ++46 70148 3100

For general questions about OX2 please contact

Paul Stormoen, Managing director

[Paul.stormoen@ox2.com](mailto:Paul.stormoen@ox2.com), +46 7067 11818

