Proof of concept of a tower based blade ice detection system for low to moderate icing sites

Winterwind Conference – 05/02/2019

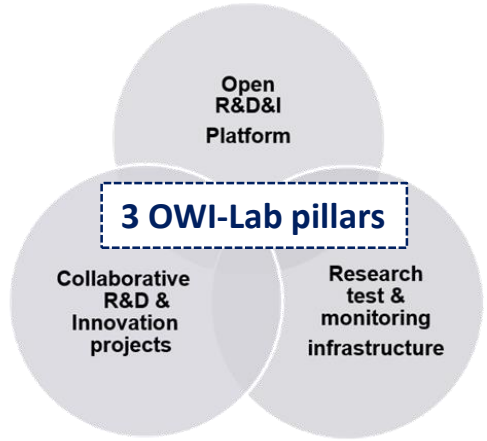
Pieter Jan Jordaens – Team leader OWI-Lab

www.owi-lab.be

Quick Introduction Sirris & OWI-Lab

Business intelligence
Industry driven approach

www.offshoreenergycluster.be



sirris
driving industry by technology

- Set-up in 1949
- Belgian Technology center - 160 VTE
- Mission: to support companies by implementing technology innovations
- Multidisciplinary R&D and innovation projects
- ± 1.500 innovation projects per year with 1.100 different companies (80% SME)
- 22,5 mil€ revenue
- Core topics: Advanced manufacturing ; ICT & data innovation ; Materials engineering and Mechatronics

www.sirris.be

Set-up in 2010

OWI lab

sirris
driving industry by technology

VUB VRIJE UNIVERSITEIT BRUSSEL

- RTO partnership focused on onshore and offshore wind energy topics with the aim to set-up and execute national and international RD&I projects
- Focus on challenges in harsh environments: offshore wind, cold climate wind energy
- Core topics: climatic testing facility & reliability in harsh environments ; SHM ; CMS ; O&M-optimization

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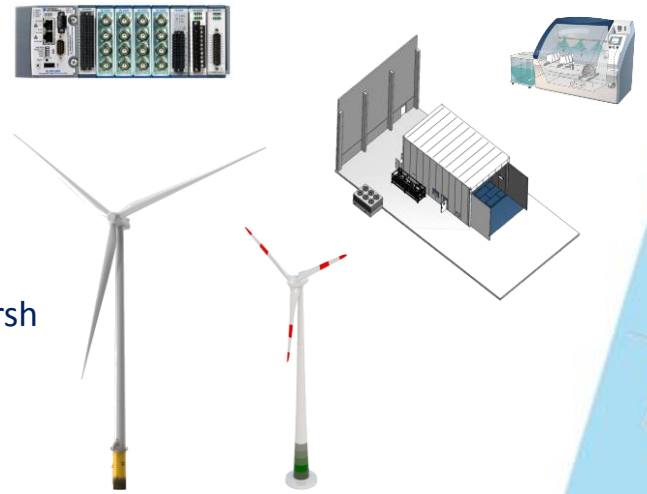
R&D and Technology Expertise

Test & Demo
- **Lab testing/demo**
- **In-field test/demo**



OWI lab

Lab & In-field test & validation infrastructure linked to cold climate → low temperature testing & (no)- ice detection

Winterwind
INTERNATIONAL WIND ENERGY CONFERENCE

Laboratory and full-scale testing, small wind turbines

Chairs: Carla Ribeiro and Martin de Maré

Siemens Gamesa test case: extreme cold start-up validation of a wind turbine gearbox by the use of a large climatic test chamber

Pieter Jan Jordaens, OWI-Lab (51)

EFAFLU test case: cold start-up validation of transformer pumps by the use of a large climatic test chamber

Daniele Brandolisio, OWI-Lab, BE (50)

To heat or not to heat?

Xavier VANWIJCK, XANT, Belgium (46)

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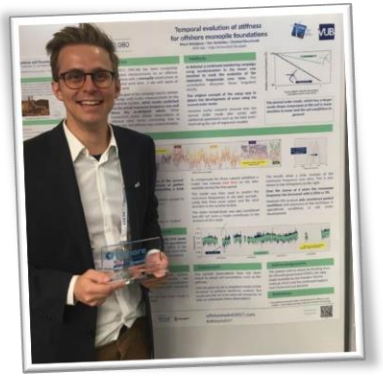
Pieter Jan Jordaens, OWI-Lab (17)



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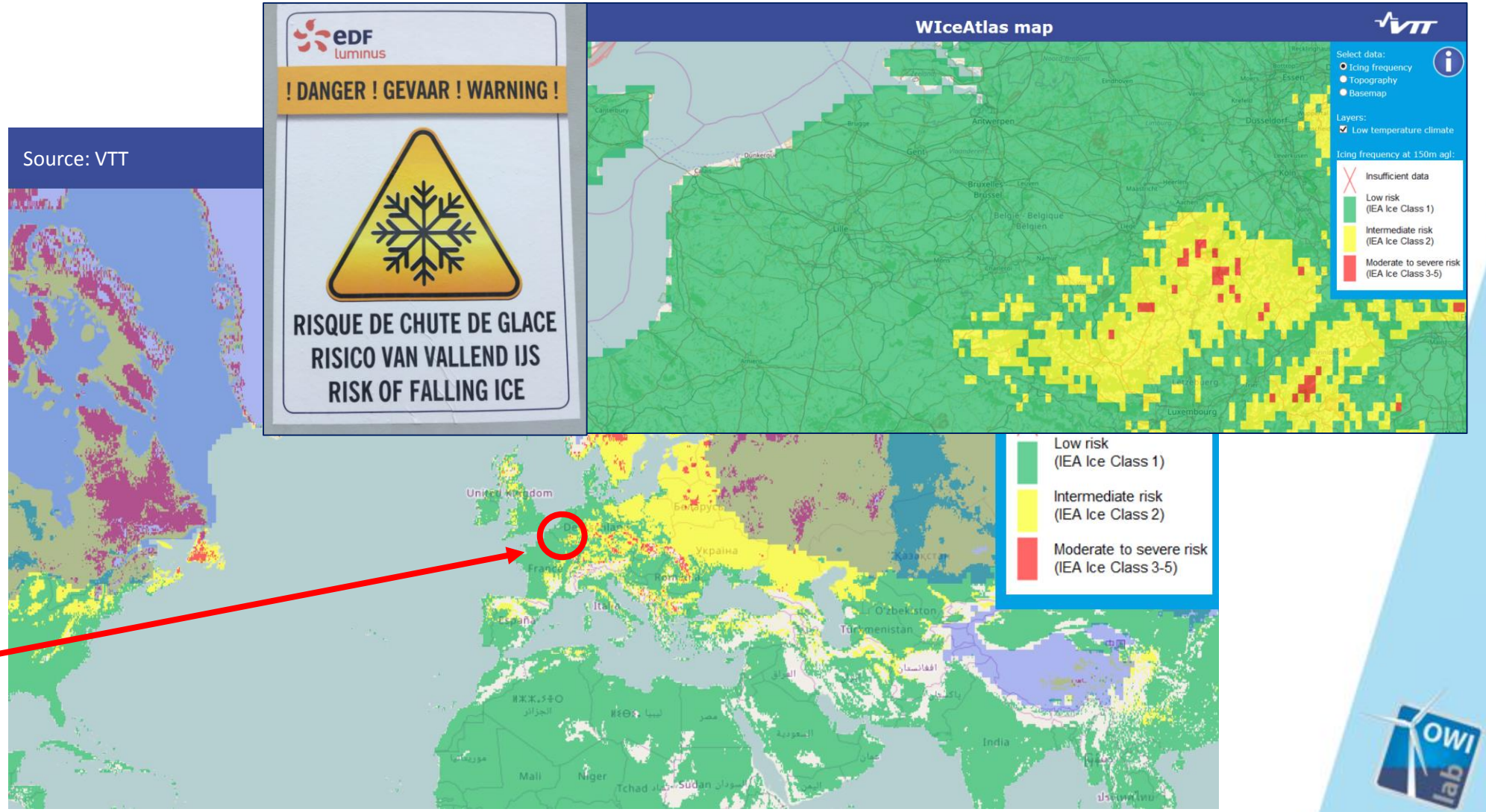
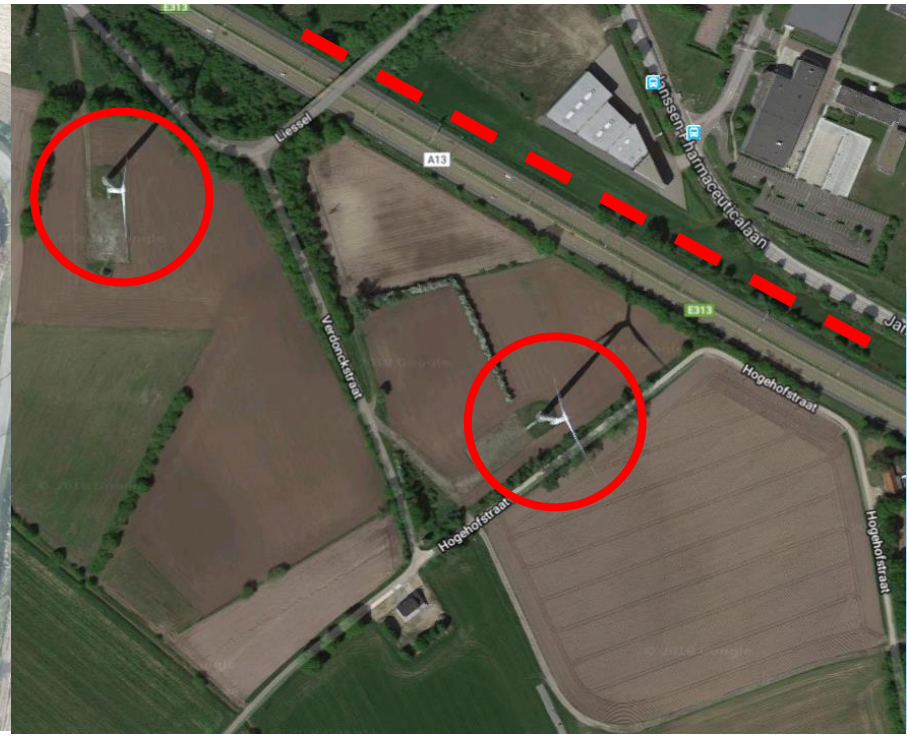
Motivation of this R&D-project



Motivation of this R&D-project

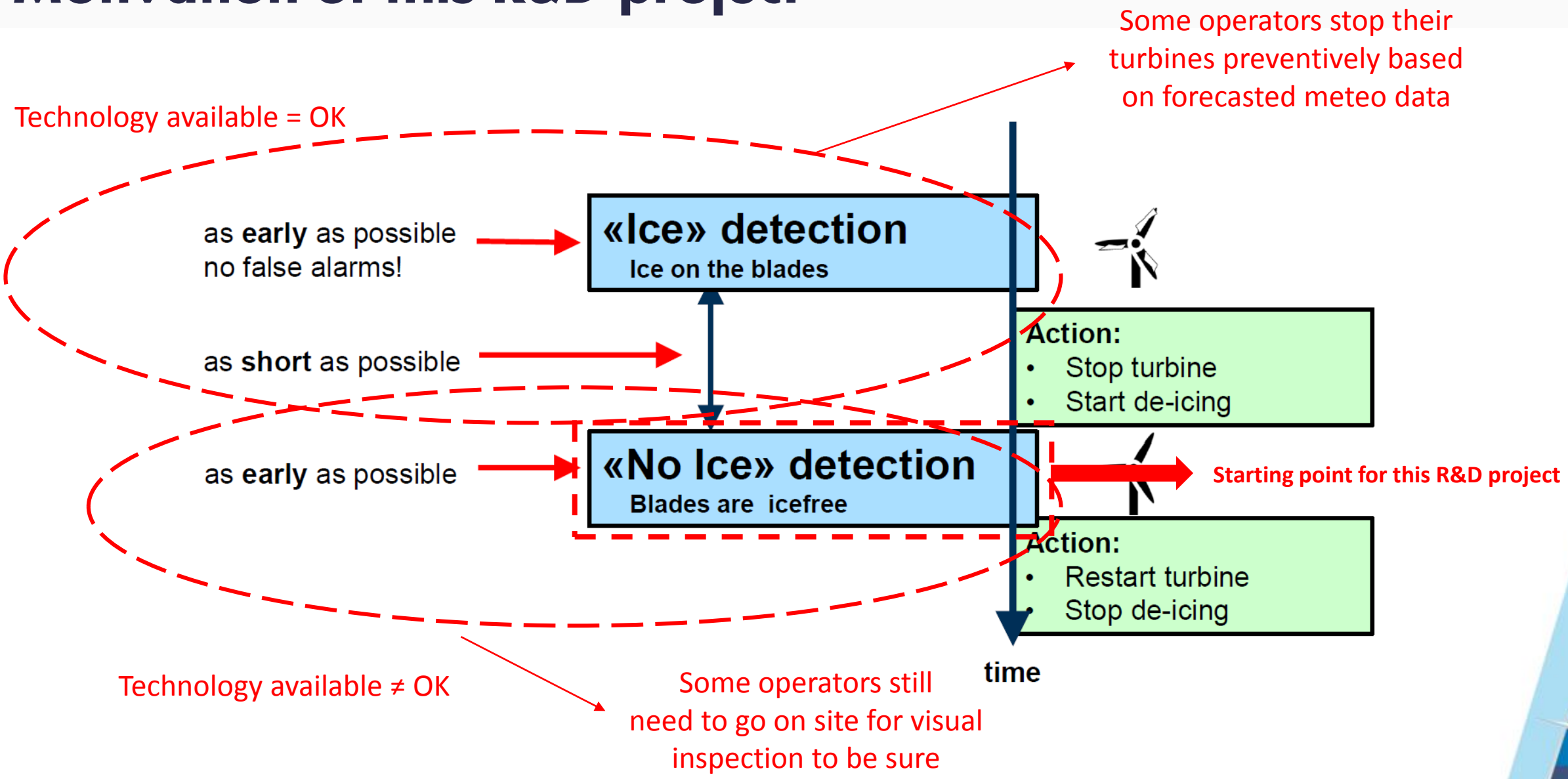
- Port Area: 55 wind turbines so far (+ increasing)
- Soon biggest onshore wind farm of Belgium
- Humid environment with fine wind speeds
- All turbines have blade heating & ice-detection

Motivation of this R&D-project



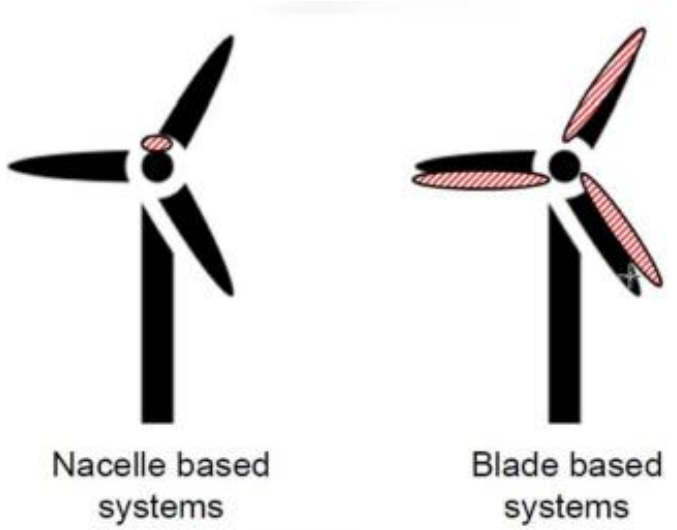
- Government strive to reach 2020 goals → more wind energy
- Permitting issues in communities
- Trend: installation of wind turbines near highway roads and industry parks

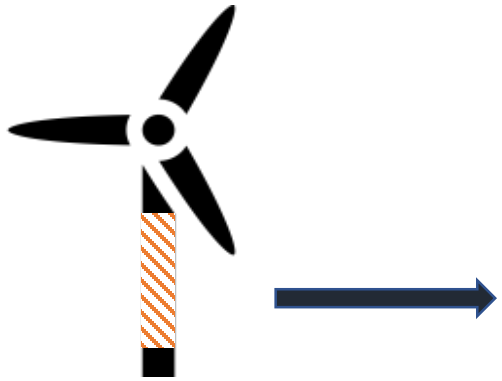
Motivation of this R&D-project



Source: VGB Research project by Meteotest - Evaluation of ice detection systems for wind turbines (16/02/2016)

State of the industry





Tower-based system

- **General consensus**: direct detection is preferred at the moment
- **Challenge:** But installation of sensors on the blades is complex and results in increased costs (ROI in Belgian case = ?)
- **Desire** : reliable ice / no-ice detection with a reduced sensor set-up

Cost-effective vibration based detection of wind turbine blade icing from sensors mounted on the tower

Source: VGB Research project by Meteotest - Evaluation of ice detection systems for wind turbines (16/02/2016)

Conclusions:

- There is an opportunity to use a single accelerometer in the tower to detect (no)-ice events, this concept is proven in parked conditions
- Potential to use this method for no-ice analysis after de-icing
- Concept to be validated in rotating conditions for ice detection (future R&D)
  → Accurate RPM value from SCADA would be needed

Contact person for more information

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