

## TRiceR

A new way to  
apprehend wind  
turbine ice fall  
risk

Tractebel offers an innovative and integrated approach covering all aspects of your energy related projects.

Safety of wind turbine assets is a major point of concern for project developers, wind turbine operators and authorities. Wind turbine and safety experts at Tractebel have developed a cutting edge methodology to assess risks linked to ice falls from wind turbine blades in real time available 24/7.

### Responding to market needs

Ice accretion on wind turbine blades poses a risk for people passing by and any infrastructure nearby due to the ice fragments that form on the blades and fall when pushed by meteorological conditions.

TRiceR proposes real time information that maps out the risk probability, the area of exposure and the potential damage ice falls can cause based on meteorological conditions, enabling our clients to take appropriate mitigation measures.

Our methodology combines ice accretion and meteorological modelling; Monte Carlo simulations with fall equations and damage assessment algorithms offer an overall analysis of the risks.

### TRiceR makes sure your wind turbine projects are safe

- The effectiveness of mitigation measures are assessed from an objective point of view in full compliance with IEA Wind TCP Task 19 specialized in "Wind Energy in Cold Climates".

- The risk assessment considers long-term meteorological data over the assets' life time.
- Because TRiceR is a cloud-based digital application, it delivers results within a few seconds.
- An intuitive tool simple of use, with a straightforward interface that provides a user friendly experience allowing users to determine parameters specific to their wind turbines.

**For clients requiring specific support, Tractebel provides all the competences needed through a tailor-made approach through our classical consultancy services.**

### More about the methodology applied

TRiceR follows an objective way to assess ice fall risks by allowing several models to work together:

#### - An ice accretion model based on in-cloud icing and supercooled cloud microphysics

The calculation of ice accretion is based on the collection of liquid water that freezes upon contact with a cylindrical

object. Through this model, it is possible to define the ice distribution on wind turbine blades on an idle or operating turbine.

#### - A meteorological model

Monitoring of the conditions that cause the formation of different types of ice (glaze, hard rime, soft rime), and measuring the impacts of those conditions on falling ice fragments

#### - Fall equations module

The Monte Carlo simulations determine the impact probability of ice fragments around the turbine through fall equations.

#### - A damage model

The lethal effect of each fragment is studied in the damage model using a probit-function method following diverse criteria such as shard, energy, and skull base.

At Tractebel we provide you all the competences you need through a tailor-made approach and have state-of-the-art software at your disposal to make sure your projects are safe and your goals are met.

TRiceR is a web application. No need to install any software on your computer.

TRiceR uses an intuitive tree structure to navigate through your projects

Detailed background maps simplify the location of the assets

Thanks to the power of cloud, your results in a few seconds !

Draw your paths, areas and risk zones in a few clicks

## Role

As **Owner's Engineer**, we can support you with:

- Concession Files and Permit Elaboration
- Pre-Feasibility Studies
- Conceptual or Basic Design
- Procurement Support
- Project Certification Follow-up
- Construction & Commissioning Follow-up
- Operation & Maintenance Support
- Detailed Design for Electrical Systems including Testing and Commissioning

As **Lender's/Investor's Engineer**, we can help you with:

- Technical Due Diligence Services
- Project Monitoring Services

As **EPC Contractor** for Electrical System of Topside

## Some references

**Aische-en-Refail / ENECO** - Energy yield assessment of a 1x3.6 MW max. wind farm. Icefall study with TRiceR methodology.

**Hoogstraten / Electrabel** - Feasibility, permitting, tendering and contracting phase of a 6x4 MW greenfield wind farm. Icefall study with TRiceR methodology.

**Lummen Puratos / Electrabel** - Feasibility and permitting phase of a 3-4 MW wind turbine at industrial site. Icefall study with TRiceR methodology.

**Retie / Electrabel** - Feasibility, permitting, tendering and contracting phase of a 3x4 MW greenfield wind farm. Icefall study with TRiceR methodology.

**Rodenhuize / Electrabel** - Feasibility, permitting, tendering and contracting phase of a 3x4 MW wind farm at industrial site. Icefall study with TRiceR methodology.

**The Netherlands / ENGIE** - Owner's Engineer for feasibility, tendering and contracting phase of a 7 MW wind farm, 2 Turbines at industrial site.

**Zeebrugge / ENECO** - Use of TRiceR tool to assess the ice fall risk of 2 turbines in industrial environment.