

# ULJABUOUDA – AN ARCTIC CHALLENGE

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## Uljabuouda – a pioneer project

The first wind farm built by Skellefteå Kraft

The beginning of a long term investment

Technique for windpower in cold climate is developed

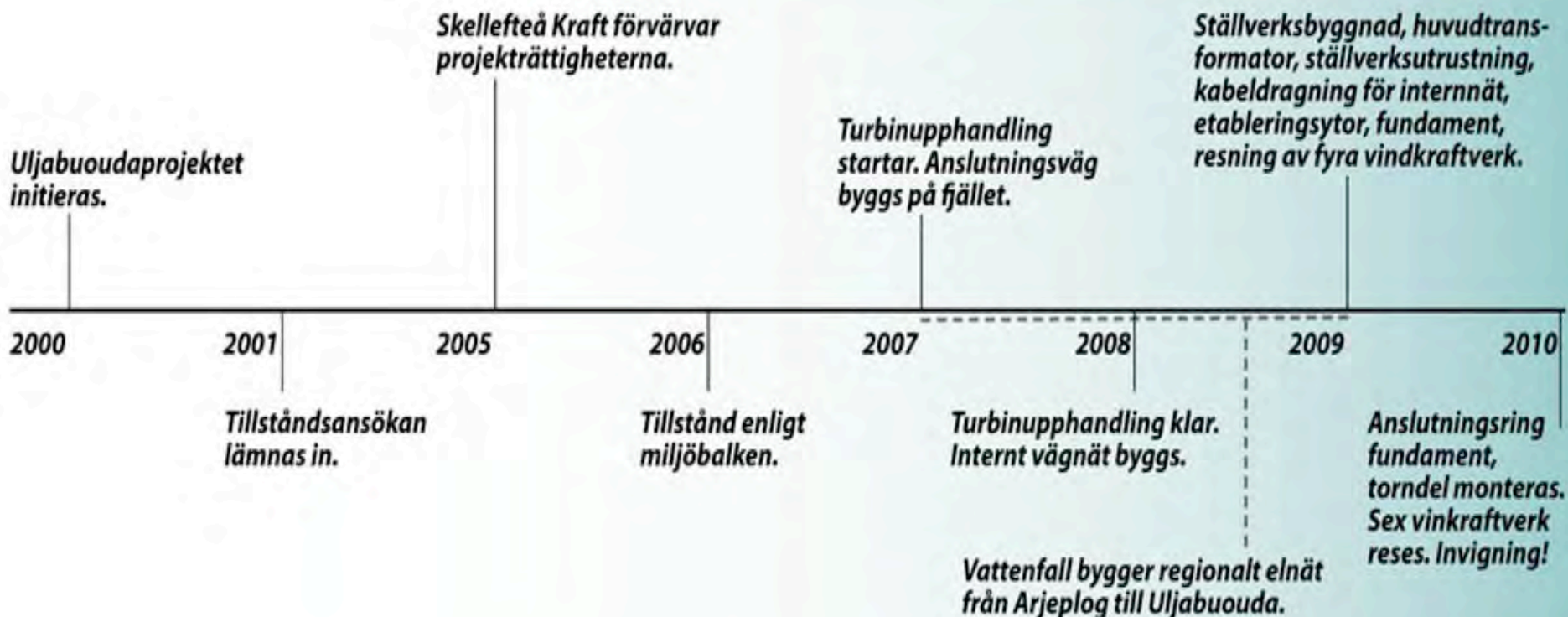
In collaboration with Energimyndigheten

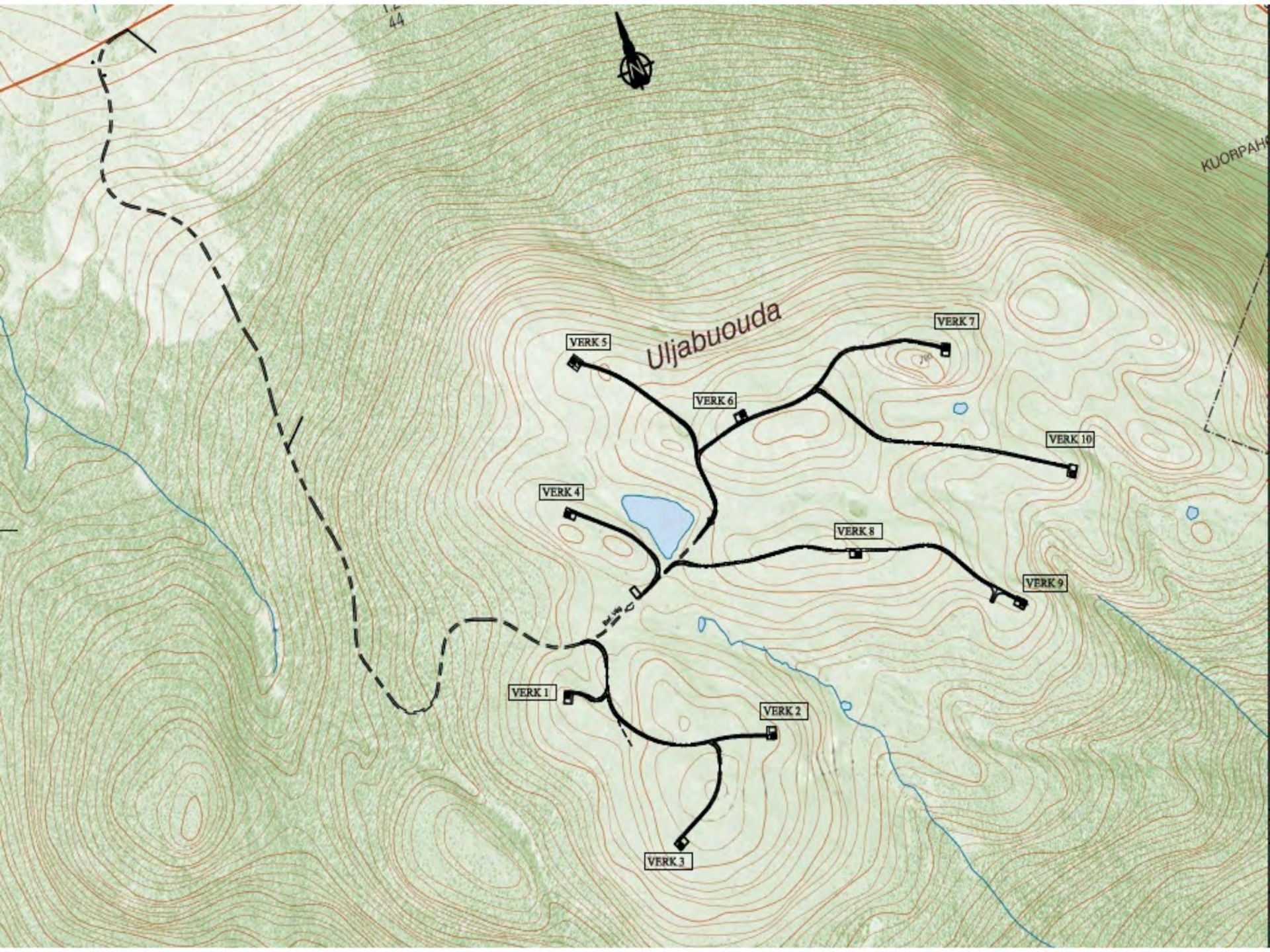


## Uljabuouda wind power farm

The Municipality of Arjeplog







KUORPAH

Ujabuouda

VERK 5

VERK 7

VERK 6

VERK 10

VERK 4

VERK 8

VERK 9

VERK 1

VERK 2

VERK 3

44

## Uljabuouda wind power farm

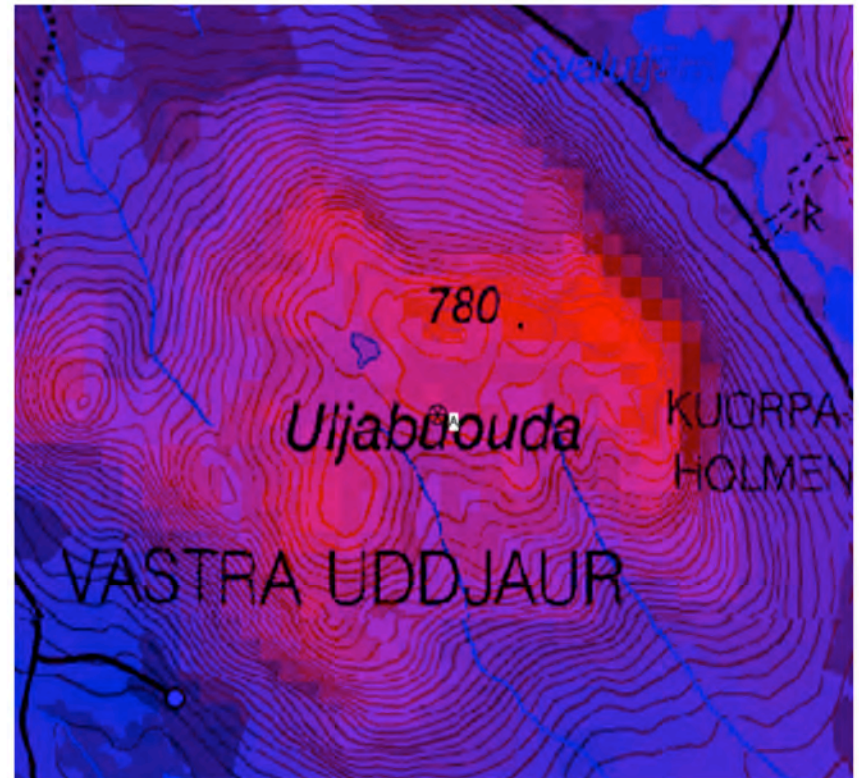
Excellent wind conditions

Mean wind speed 8 m/s

10 vind turbines

Power: 30 MW

Annual production 80 GWh



## Certain considerations



## Reinforced overhead line





**Indoor main  
transformer  
and switchgear**



## Roads that don't alter the water flow



**Road "on top of"  
original ground**



## **WinWinD, WWD 3 MW**

10 turbines, 3 MW

80 m tower,

90 m rotor diameter



## Adaptions to cold climate

Additional heating in nacelle and for some machine components

Heated anemometers

An ice prevention system in turbine blades decreases the power losses and increases availability and safety



## Ice prevention system

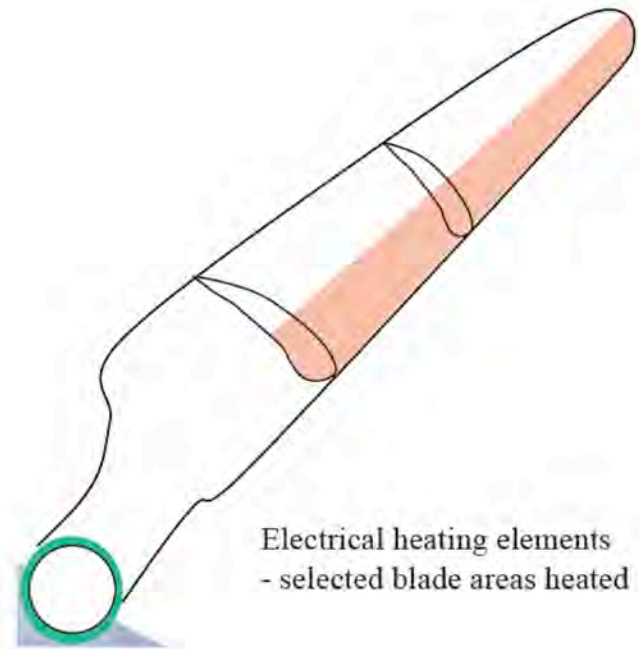
Developed by VTT and WinWinD

Electrothermal system

Integrated carbon fiber below coating on the leading edge of the blade.

The electrical heating elements are divided into sections

The system is working during operation



## Experiences





**Icing**





**Short building season**



**Snow clearance**

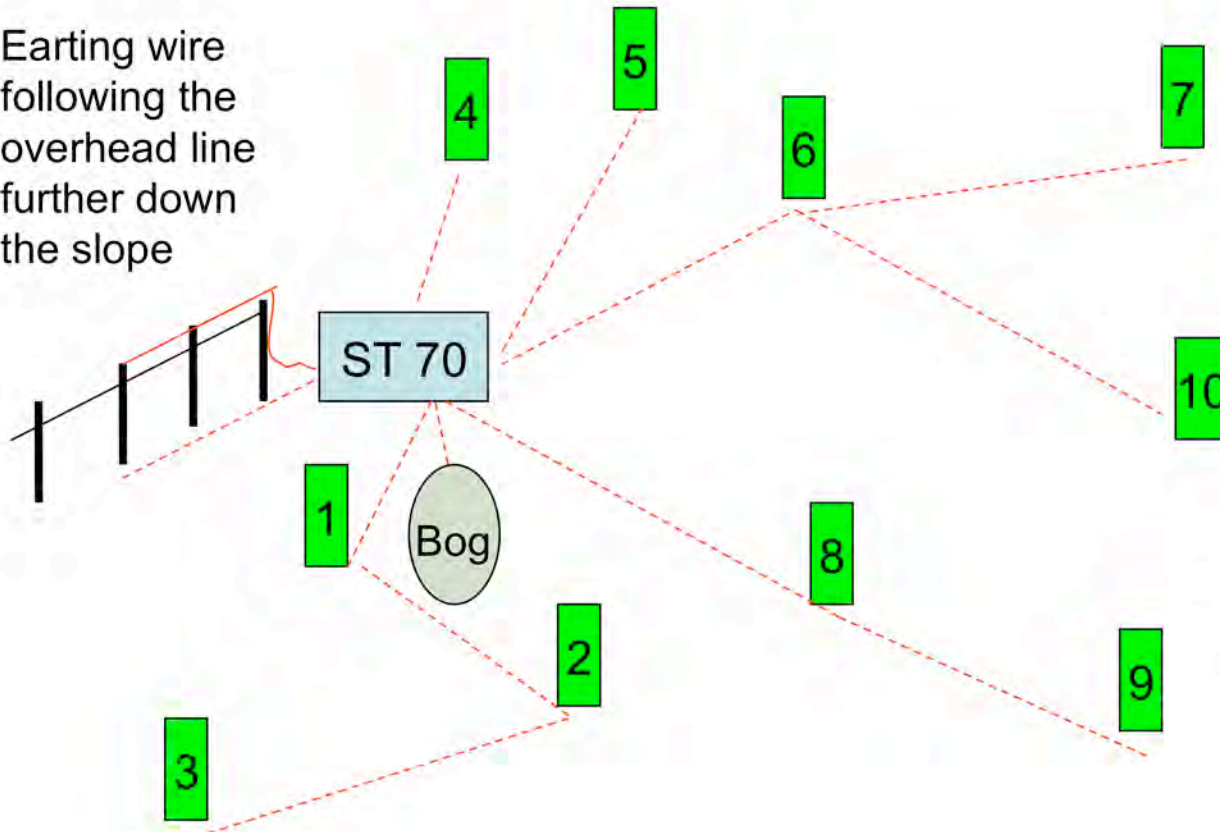
## Erosion



## Uljabuouda Earthing System

Germanisher Lloyd:  
earthing resistance <10 ohm  
-Difficult in arctic mountain  
environment

Earting wire  
following the  
overhead line  
further down  
the slope



**Tower**

Earthing ring  
Ground rods

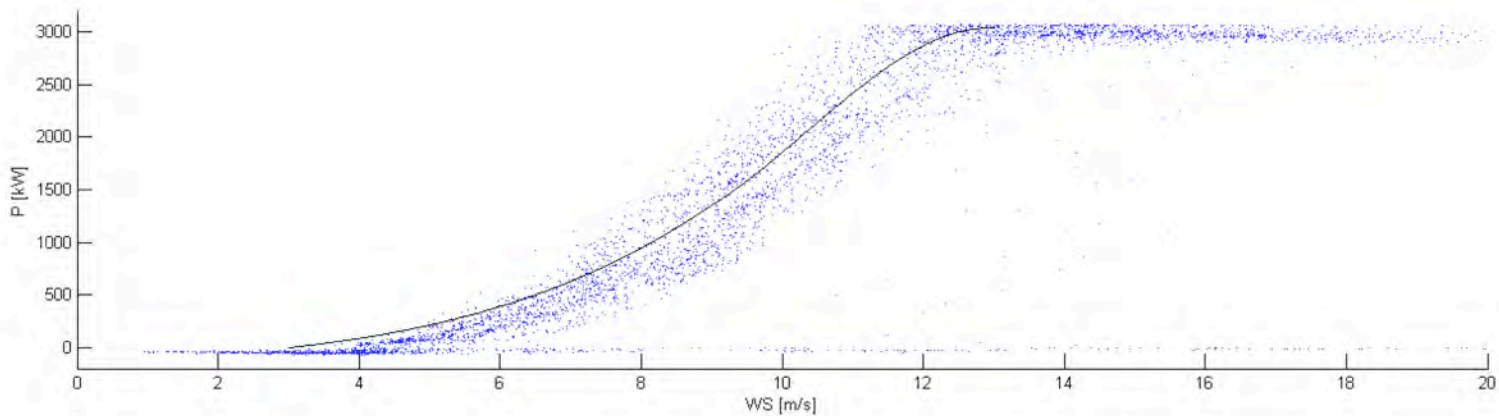
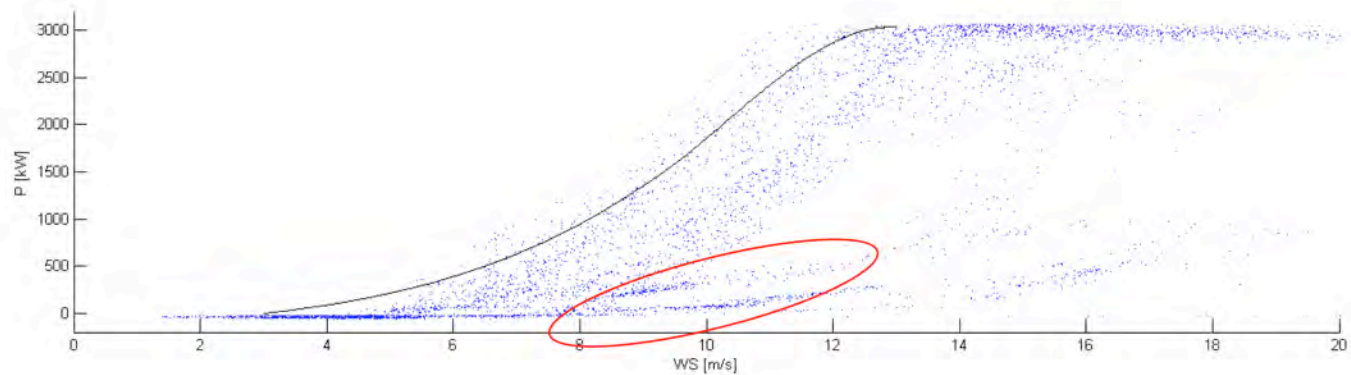
The whole system  
interconnected -  
uniform potential



**Lightning damage on blades**



**Difference, disabled and enabled  
de-icing system at Uljabuouda Dec 22**



**Production VT6 and VT7 December 2011**

**8 Dec – 9 Jan 2012**

**VT 7, with deicing, compared  
to VT 6 without deicing**

40% higher production

430 MWh

24 000 EUR

**Gainings ~240 000 EUR for  
Uljabuouda wind farm during  
one month with heavy icing**





Questions?

