



Summary of Winterwind 2023

Lars Tallhaug

# Akershus Energi

- Publically owned Utility
- 19 Hydro power stations. 2.4 TWh
- 1 Wind farm 0.5 TWh



# Odal Wind Farm



34 x 5.0-145 SiemensGamesa



# Åre





# Winterwind 2023



## Winterwind - #16



Cecilia Dalman Eek

Per Olofson

Mari-Loise Wernerson


Göran Ronsten

## Partisipants



- At least 17 different countries
- 47 % from Sweden

## Presentations - categories



**ICING PHYSICS**  
TESTING ICE THROW OFFSHORE GRID  
**TURBINE TECHNOLOGY**  
OPERATION SEA ICE IPS **MEASUREMENTS**  
**METEOROLOGY**

- 39 different presentations including poster presentations

## Presentations - category



Meteorology  
5

Ice  
modelling  
3

Measurements  
7

Grid  
1

Offshore  
4

Turbine  
technology  
14



Operation  
4

Ice throw  
1



## Presenters - nationality

**UNITED STATES**  
**GERMANY CANADA**  
**AUSTRIA** CZECH REPUBLIC **FINLAND**  
SWITZERLAND  
**NORWAY** **SWEDEN**  
**DENMARK** HUNGARY SPAIN  
**UNITED KINGDOM** **BELGIUM**

- From 14 different countries

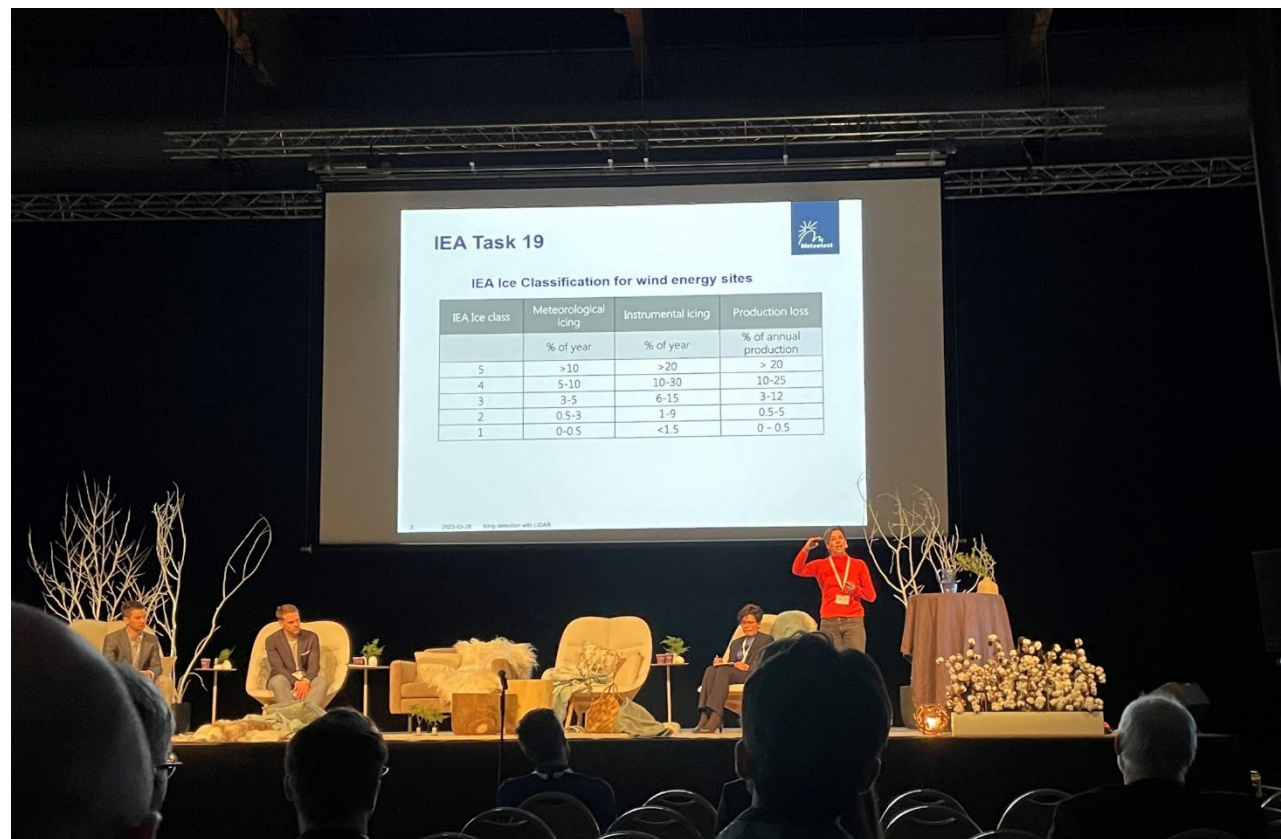




## Exhibitors

**ENERGY PRODUCER**  
**CONTROL SYSTEMS** RED ORGANIZATION **CONSULTANT** **IPS** AUTOMATION  
**MEASUREMENTS** ENERGY TRADER  
**SUB SUPPLIER**

# Highlight 1: IEA Ice Classification (warning: brag)



Modifications proposed by Université Laval

## IEA Task 19

### IEA Ice Classification for wind energy sites

IEA Ice class	Meteorological icing % of year	Instrumental icing % of year	Production loss % of annual production
5	>10	>20	> 20
4	5-10	10-30	10-25
3	3-5	6-15	3-12
2	0.5-3	1-9	0.5-5
1	0-0.5	<1.5	0 - 0.5

## Highlight 2: Turbine manufacturers



**Vestas Anti-Icing System™**  
Where and when it's needed

- **Automatic anti-icing mode** adaptive to climatic conditions for maximum **efficiency** to match the icing event
- **Targeted aerodynamic area**
- **Embedded heating system** in the laminate, close to the surface provides a **fast response time** with **no AEP impact**.
- **Optional control features** to match system performance to individual site conditions through SCADA
- **Compatible with Vestas Ice Detection™**

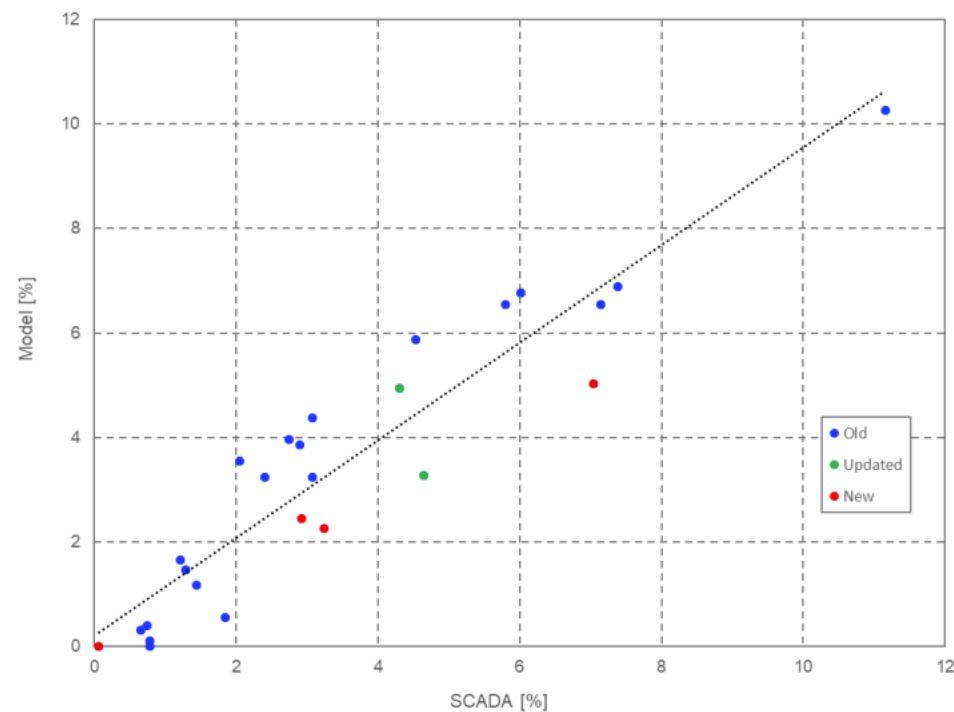
3 Vestas Cold Climate Solutions



## Highlight 3: Operational experience

### IceLoss 2.2 calibration/validation

- ▶ 4 sites added
- ▶ Updated SCADA analysis in 2 sites



## Highlight 4: Sub-suppliers

- A lot of important innovation starts with the sub-suppliers
- Lightning protection
- Coating with good results
- Indirect icing sensors





# Winterwind 2024

- I hope it will take place
- Continue the strong focus on technical issues
- Focus on sharing operational experience as far as possible
- A separate session for the risk for ice throw
- Continue to attract participants outside the Nordics
- Make sure the sky is blue

