

IEA Wind Task 19 – Key results from 2016-2018 Future plans 2019-2021



Winterwind

INTERNATIONAL WIND ENERGY CONFERENCE

Ville Lehtomäki, Operating Agent on behalf of Task 19

René Cattin, Meteotest/CH

Umeå, Sweden- February 5-6, 2019



3 questions about IEA Wind Task 19



What is it?

What are the latest key deliverables?

What are the future plans?

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What is it?

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The birth of IEA Wind Task 19



**1st meeting in Risoe
2001**



Göran Ronsten, Lars Tallhaug, Per Lundsager
Markus Geissmann, Hannele Holttinen

IEA Task 19 having fun



«Prison Meeting» Umeå 2011

René Cattin, Timo Laakso

Göran Ronsten, Lars Tallhaug

Andi Krenn, Michael Durstewitz, Tomas Wallenius

Miro Hulkkonen, Ian Baring Gould

Tang Jian Hui, Adriána Hudecz, Antoine Lacroix

The secret meaning of IEA



International Eating Association



Rolv Bredeesen
Tse Kim
Matt Gagnon
PJ Jordaens
Jenny Longworth
Carla Ribeiro

Øyvind Byrkjedal
Göran Ronsten
Andreas Krenn
René Cattin
Dag Haaheim
Ville Lehtomäki

What is IEA Wind Task 19?



- Task 19 – Wind Energy in Cold Climates – international expert group
- Mission: *Boost safe and cost efficient wind power deployment in cold climates*
- Activities included:
 - Exchange information on international research collaborations and projects
 - Create recommendations, guidelines & best practices
 - Collect overview of available technologies and market potential
 - Disseminate reports, tools and findings
 - No research projects!
- Task active since 2001
- New term 2019-2021 has just started!
- Funded through participating countries



3 questions about IEA Wind Task 19



What is it?

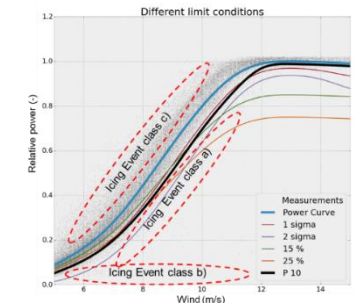
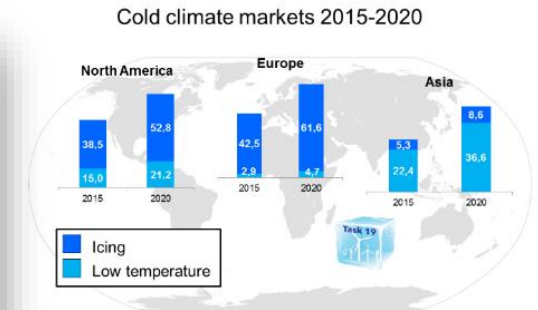
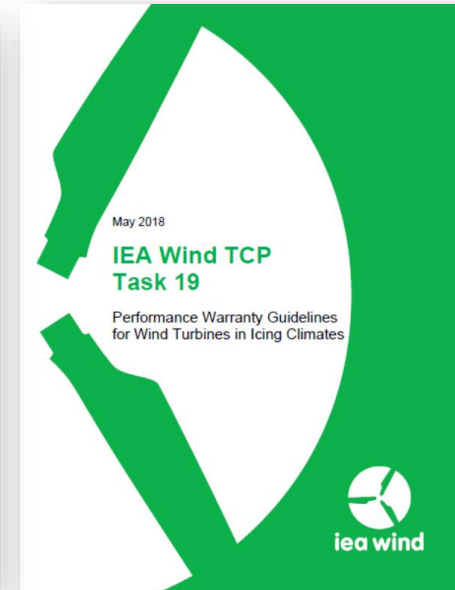
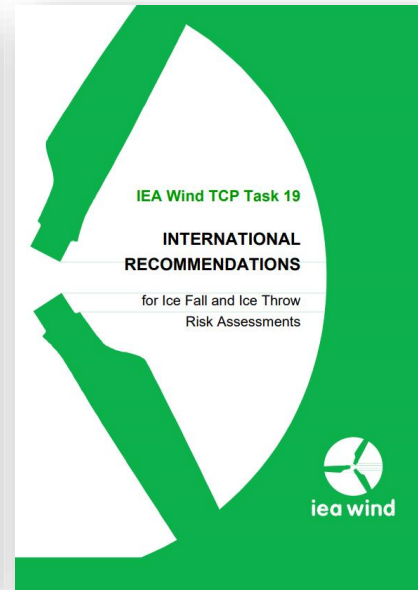
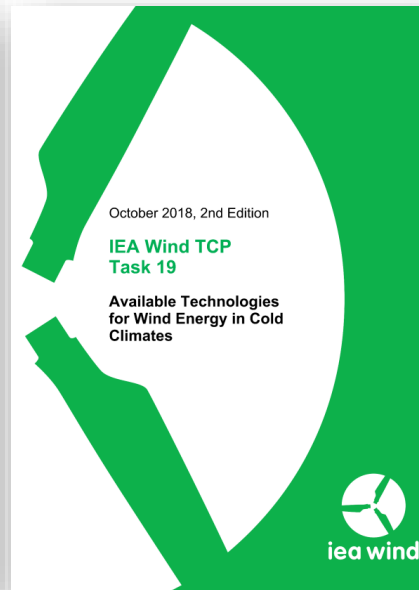
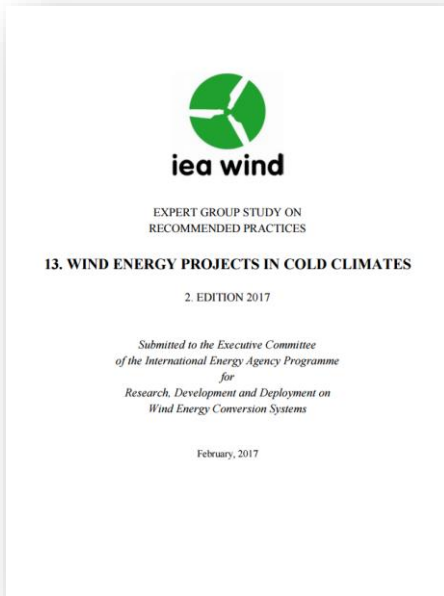
What are the latest key deliverables?

What are the future plans?

Current portfolio 2016-2018



1. [Recommended Practices](#) – report (Feb2017)
2. [Available Technologies](#) – report (2nd ed, Oct2018)
3. [Recommendations for Ice Throw Risk Assessment](#) – report (Oct2018)
4. [Performance Warranty Guidelines for wind turbines in icing climates](#) – report (May2018)
5. Global Cold Climate Market study [2015-2020 here](#) (Jul2016)
6. T19IceLossMethod v2.0 free software (download [here](#))



1. Recommended Practices report

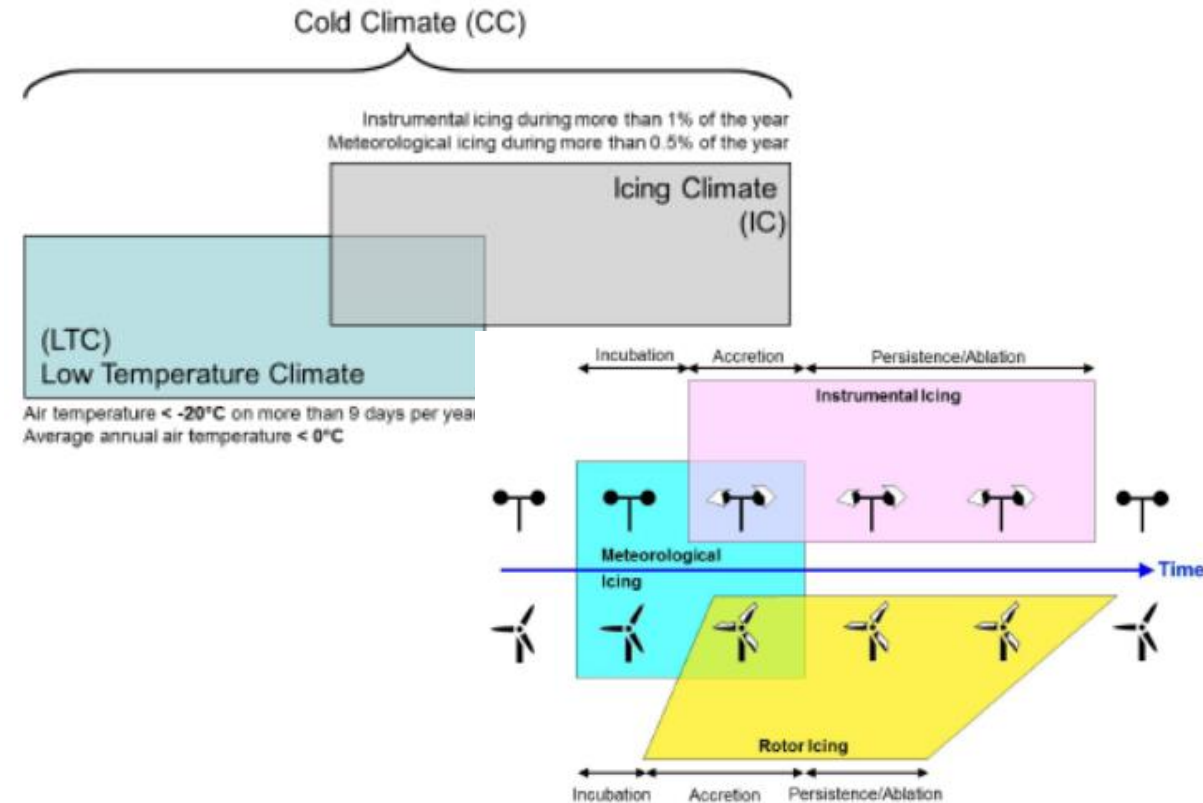


Target Audience

- Developers, owners, operators, banks

Key points

- ***“The Golden Standard for planning, executing and operating cold climate wind power projects.”***
- Minimize risks, more bankable projects, same language for all
- Short, easy to read!



IEA Ice class	Meteorological icing	Instrumental icing	Icing loss
	% of year	% of year	% of gross 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

2. Available Technologies report



Target Audience

- Engineers, scientists, analysts

Key points

- **“Find your solution in 3min from summary tables!”**
- List of most cold climate solutions in one document
- Over 400 references divided into
 - **Scientific papers:** trusted info
 - **Performance:** how good is it?
 - **Other:** basic info, specs

Table 7 – Ice detector technologies for mast or nacelle application

Detector manufacturer	Technical description	Applications	References	
HoloOptics T40 series	Uses the reflection of an infrared signal to detect ice on a vertical cylinder probe. Probe is heated when ice is detected until signal is back to normal.	Meteorological icing:	x	Paper: [58] [59] [60] [61] [62] [63] [64] [65] Other: [66]
		Instrumental icing:		
		Icing rate:	x	
		Icing severity:		
		Turbine control:		
Combitech IceMonitor (ISO Cylinder)	Measures the weight of ice load on a freely rotating vertical cylinder according to ISO 12494 (30 mm in diameter and 0.5 in length).	Meteorological icing:	x	Paper: [58] [59] [60] [61] [62] [67] [68] [69] [70] [64] [71] Other: [72] [73]
		Instrumental icing:	x	
		Icing rate:	x	
		Icing severity:	x	
		Turbine control:		
PMS Icemeter	Measures the weight of ice load on a fixed vertical cylinder downwards (30 mm in diameter and 0.5 in length). Also provides air temperature humidity, wind speed and direction.	Meteorological icing:	x	Paper: [58] [60] [74] [75] [76] [77] [78] [79] [80] [81] Other: [82] [83]
		Instrumental icing:	x	
		Icing rate:	x	
		Icing severity:	x	
		Turbine control:		
Heated versus unheated anemometer or wind vanes	Ice detection through comparison of readings of a heated and unheated anemometer or wind vanes.	Meteorological icing:		Paper: [84] Perf.: [58] [61] [62] [68] [85] Other:
		Instrumental icing:	x	
		Icing rate:		
		Icing severity:		
Atmospheric	Ice detection through	Meteorological icing:	x	Paper:
		Turbine control:	x	

3. Ice throw recommendations

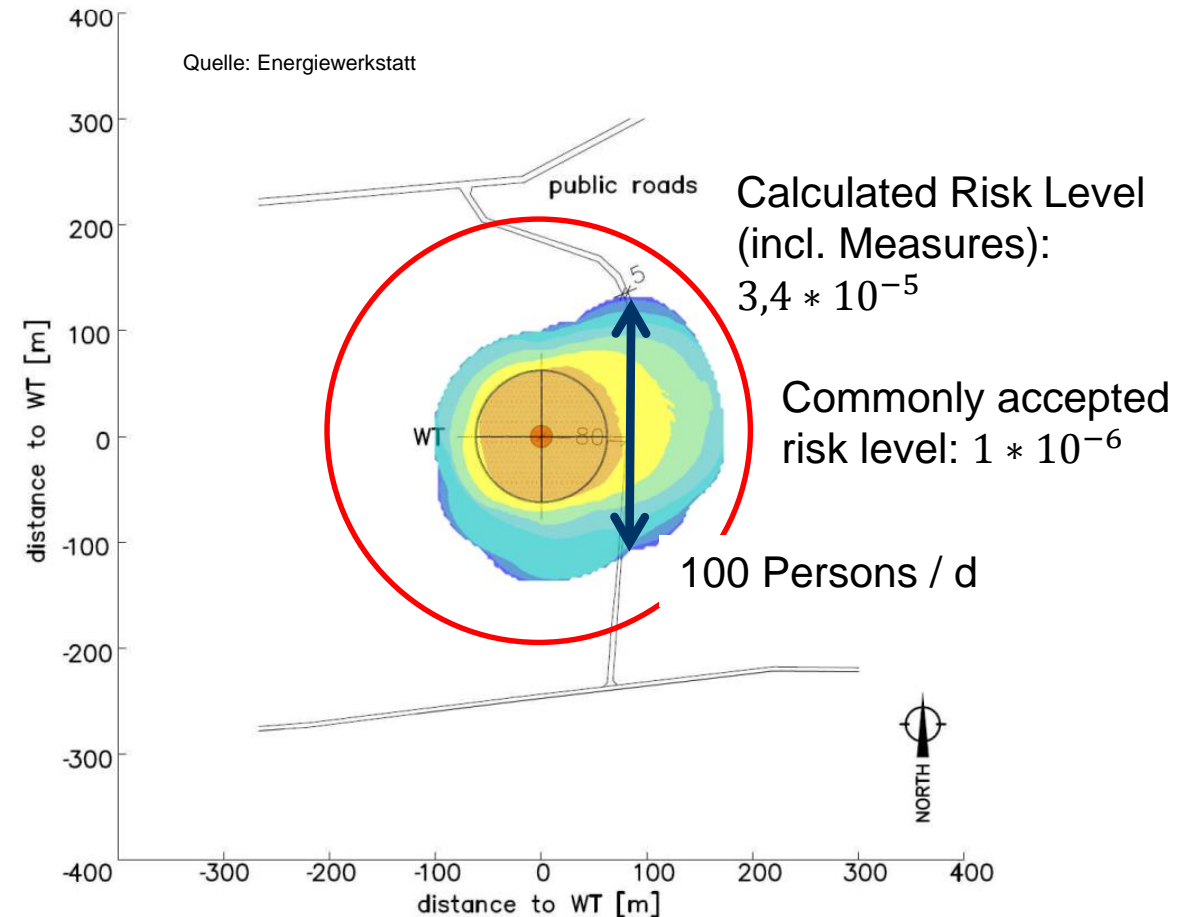


Target Audience

- Developers, consultants

Key points

- “**Standardized ice throw risk modelling approach for planned wind farms!**”
- ‘Must haves’ for
 - Mathematical Model
 - Relevant data set
 - Risk assessment
 - Uncertainties
- **Co-creation of guideline** with consultants, OEMs, certification bodies



4. Performance Warranty Guidelines



Target Audience

- Developers, operators, banks, turbine OEMs, technology companies

Key points

- Turbine **Ice Protection System (IPS)** (anti/de-icing) performance warranty options and testing
- **Warranty tests as key enabler** for even better and more reliable solutions in future!
- **Co-creation of guideline** with OEMs, developers, consultants

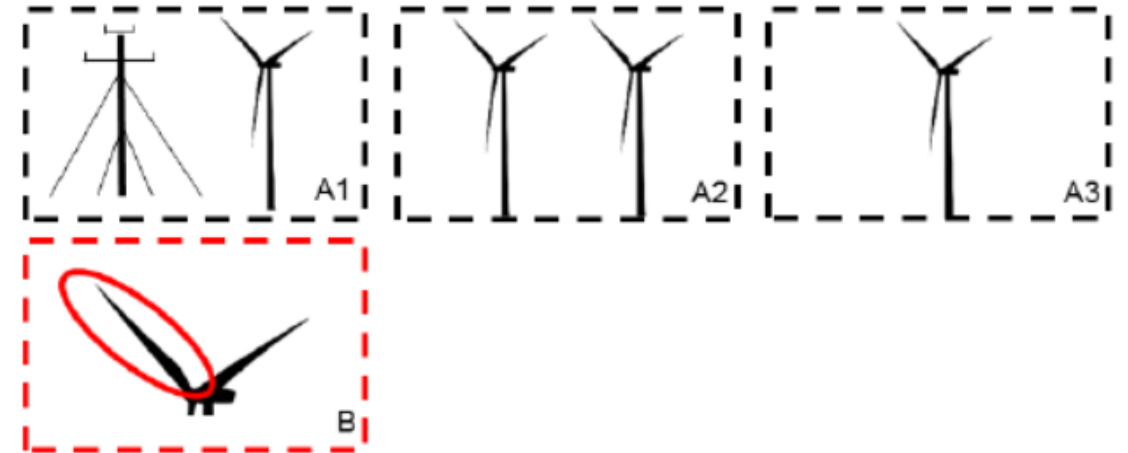
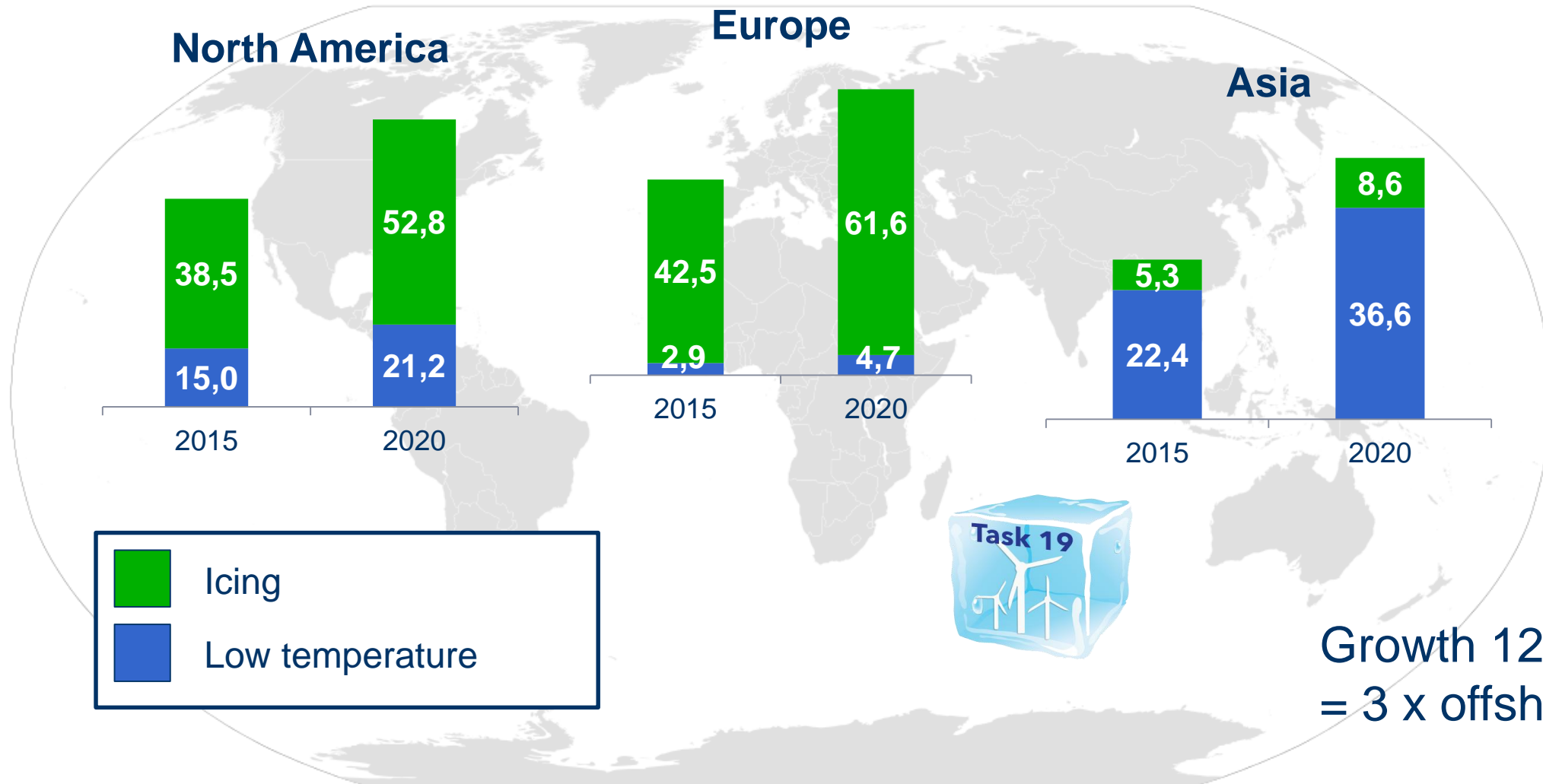


Figure 1. Overview of different full-scale turbine performance tests options (top row) and sub-component test option (bottom row)

5. Global Cold Climate Market study 2015-2020 [GW]



Growth 12GW/a
= 3 x offshore!

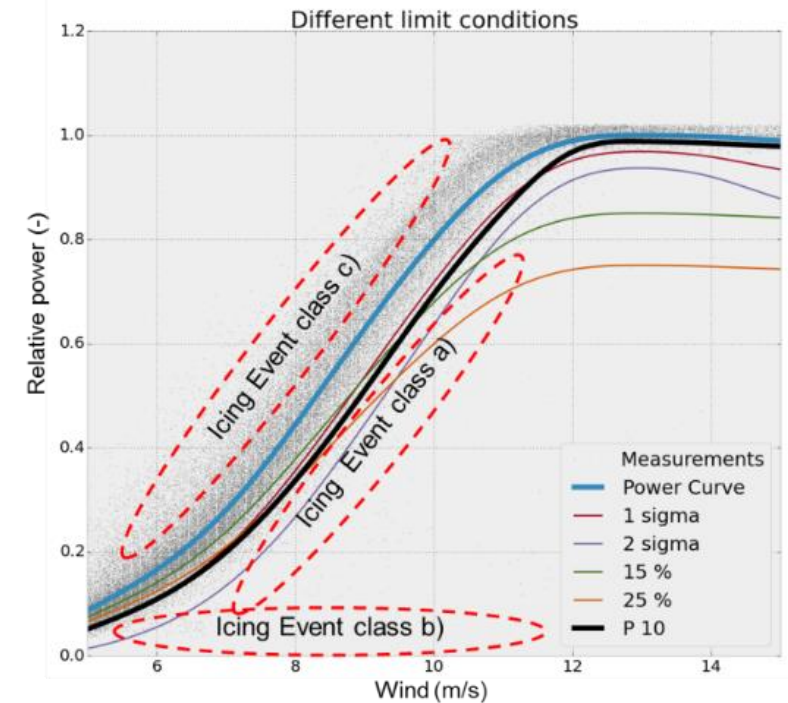
6. T19IceLossMethod v2.0 free software



1. Free public software code (Python) for calculating icing losses on any SCADA dataset
2. Uses the rotor as an “ice detector”
3. Method robustness achieved by using 10th percentile of non-iced power curve
4. False alarms minimized by including the “memory effect” of icing: more than one 10-min datapoint needed to trigger positive rotor ice detection

➤ **TOWARDS STANDARDIZED PRACTICES!**

[Download here](#)

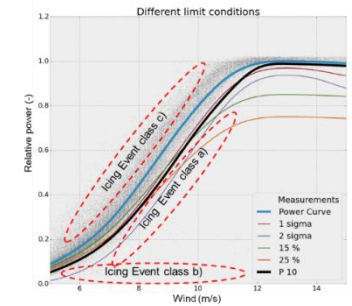
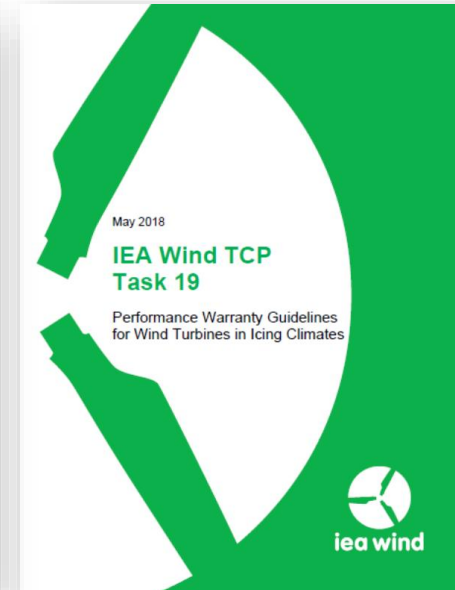
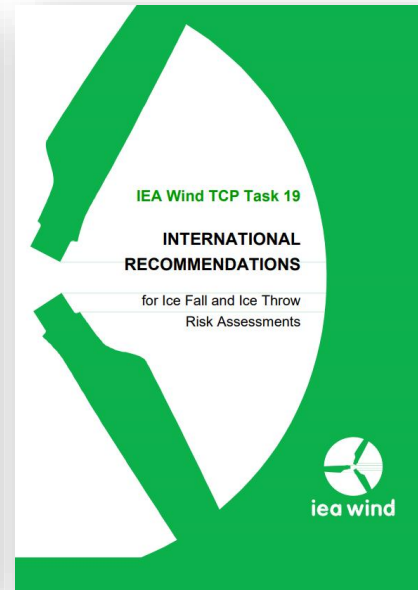
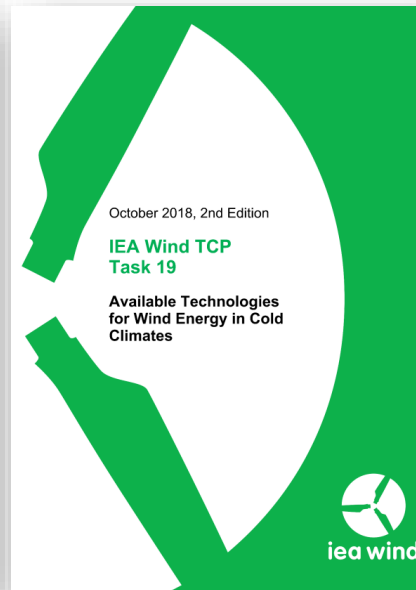
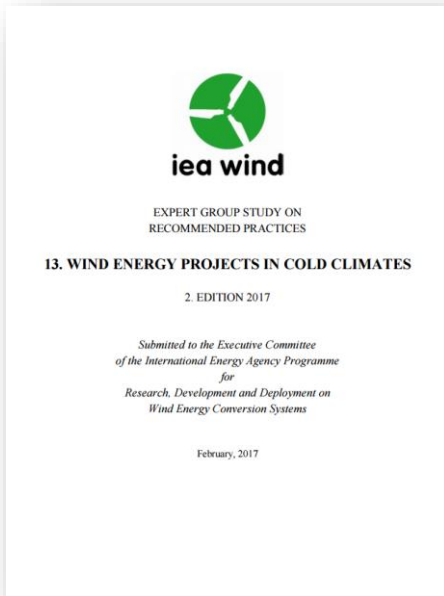


Current portfolio 2016-2018

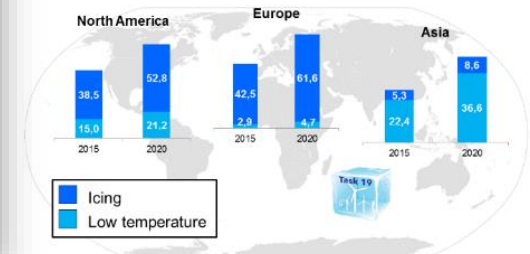


A lot of freely available information!

<https://community.ieawind.org/task19/home>



Cold climate markets 2015-2020



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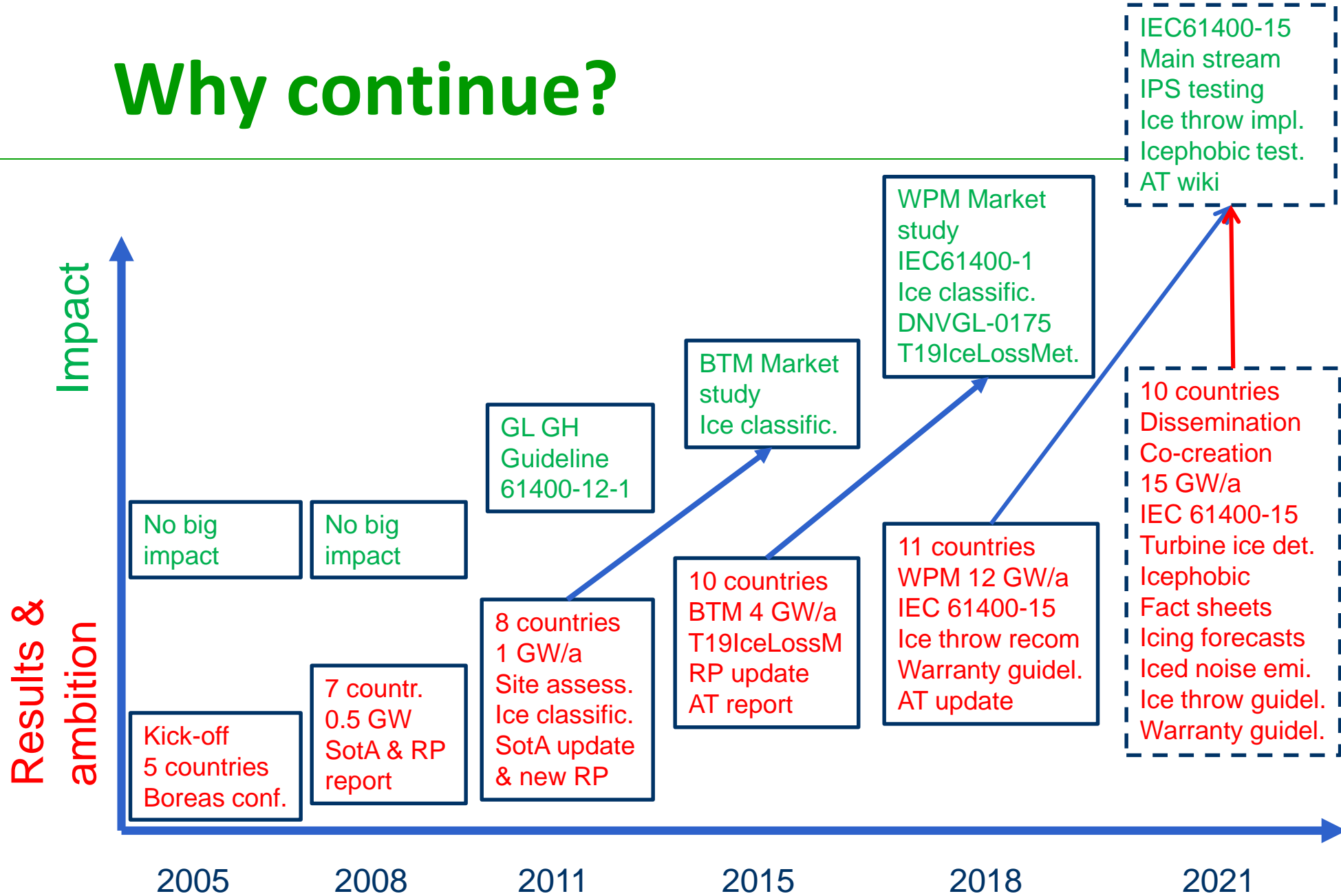


What is it?

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What are the future plans?

Why continue?



Task 19 plans for 2019-2021



Same mission: Boost safe and cost efficient wind power deployment in cold climates

Co-creation with wind industry towards standardization to new areas (turbine ice detection, icephobic coatings, icing forecasts) and strengthening of existing areas (icing losses in IEC, ice throw guidelines, warranty guidelines)

More dissemination: more impact also to non-CC experts via a) website (blogs) b) social media (Twitter, LinkedIn) c) email newsletters d) non-cc and cc conferences/events

Task 19 topics	Deployment of wind energy in cold climate	Towards standardized practices for cold climate solutions	Safety and acceptance
Motivation	Increase industrial awareness and interest	Bringing cold climate issues in guidelines and standards	Improving safety and removing cold climate specific barriers
Deliverables <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>New Update IPS</p> </div>	Market study update 2020-2025 Fact sheet: icing forecast benefits IPS & retrofit summary presentation Available Technologies wiki	Finalize work with IEC 61400-15 “Site assessment” T19IceLossMethod: for IPS Performance warranty guidelines for IPS: testing details development Performance evaluation guidelines for wind turbine ice detection systems Best practices for testing icephobic coatings Recommended Practices report & fact sheet	Ice throw guidelines: uncertainty and turbine control Iced turbine sound emissions summary presentation
Dissemination	Web site, blogs Email newsletter LinkedIn, Twitter Workshops Free software Presentations at conferences		
Countries	ALL	ALL	AU, CH, CA, NO, SE

Timeline



	2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Task 19 meetings	█		█		█		█		█		█	
E-dissemination (blog, newsletter, LinkedIn, Twitter)	1112		1112	1011	1111	1012	2124		1112	1024	1124	
T19IceLossMethod: IPS update		█	█	█								
IPS & retrofits: perf. and experiences (conf pres)			█	█	█							
Market study update 2020-2025				█	█	█						
Perf. eval. guideline for wind turbine ice detect.				█	█	█						
2 fact sheets: icing forecast & cold climate					█	█	█	█	█	█		
IEC 61400-15 cold climate inputs			█	█								
Warranty guideline update					█	█	█					
Available Technologies wikisite								█	█	█		
Recommend Pratices report update							█	█	█	█		
Ice throw guidelines update									█	█	█	█
Annual progress & final report			█	█			█					
Icephobic coating testing best practices report										█	█	█
Iced turbine sound emission summary										█	█	█
Milestones	█			█		█		█				
Deliverable	█											
Work in Progress	█											

N=13 deliverables!

2020 to 2021

Takeaways



Task 19 Mission: *Boost safe and cost efficient wind power deployment in cold climates*

Already a lot of excellent publications and tools for free!

We will have even more ambitious and interesting publications upcoming during 2019-2021, stay tuned!

<https://community.ieawind.org/task19/home>



About Task 19

The international expert group IEA Wind TCP Task 19 Wind Energy in Cold Climates gathers and provides information about wind energy in cold climates. Cold Climate areas are regions where icing events or periods with temperatures below the operational limits of standard wind turbines occur, which may impact project implementation, economics and safety. The group studies a variety of topics, including: project development; operation and maintenance (O&M); health, safety and environment (HSE); operational experiences; and recent research.

The current Task 19 working period runs between 2016-2018 and covers the following themes:



© VTT 2013 (Photo by M. Tihonen)

- Cold climate wind power market study update for 2015-2020 (published in *WindPower Monthly* magazine

Upcoming Events

Task 19 kick-off meeting 2019-2021

Feb 6, 5:00 PM - 7:00 PM (SE)
Umeå, Sweden

REGISTER

MORE

Task 19 Publications

Sign up for Task 19 newsletter today!!



1) via Task 19 website or

2) <https://mailchi.mp/eaff039754eb/task19>

Task 19
Wind Energy in Cold Climates

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Soon!

Thank You!!



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