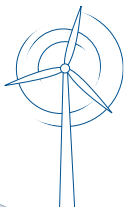




ANTI-ICING HIGHER YIELDS IN ICY CLIMATES



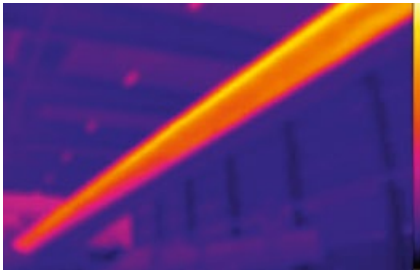
*Proven technology for
maximum availability*



NORDEX ANTI-ICING SYSTEM

Higher yields in icy climates

With the anti-icing system, Nordex customers can rely on secure yields from their wind turbines and maximum availability, even in cold temperature conditions. It is available for the turbines N117/3600, N131/3600, N131/3900 and N149/4.0-4.5.



➤ *Thermal images show the anti-icing system in the Nordex rotor blade testing facility (left) and fitted to a turbine in the field (right).*

The system consists of an ice sensor, mounted on the nacelle, and heating elements contained within the rotor blades at the aerodynamically relevant area of the blades. The sensor continuously monitors ambient conditions and reports the status to the wind turbine's control system. If data indicates the presence of conditions likely to cause icing, the heating elements are automatically activated. Energy-efficient heating prevents ice from accumulating on the rotor blades. There is no requirement to stop or reduce the operation of the turbine while the anti-icing system is working. Whilst active, the system will automatically switch between off, low power and full power to match the climatic conditions.

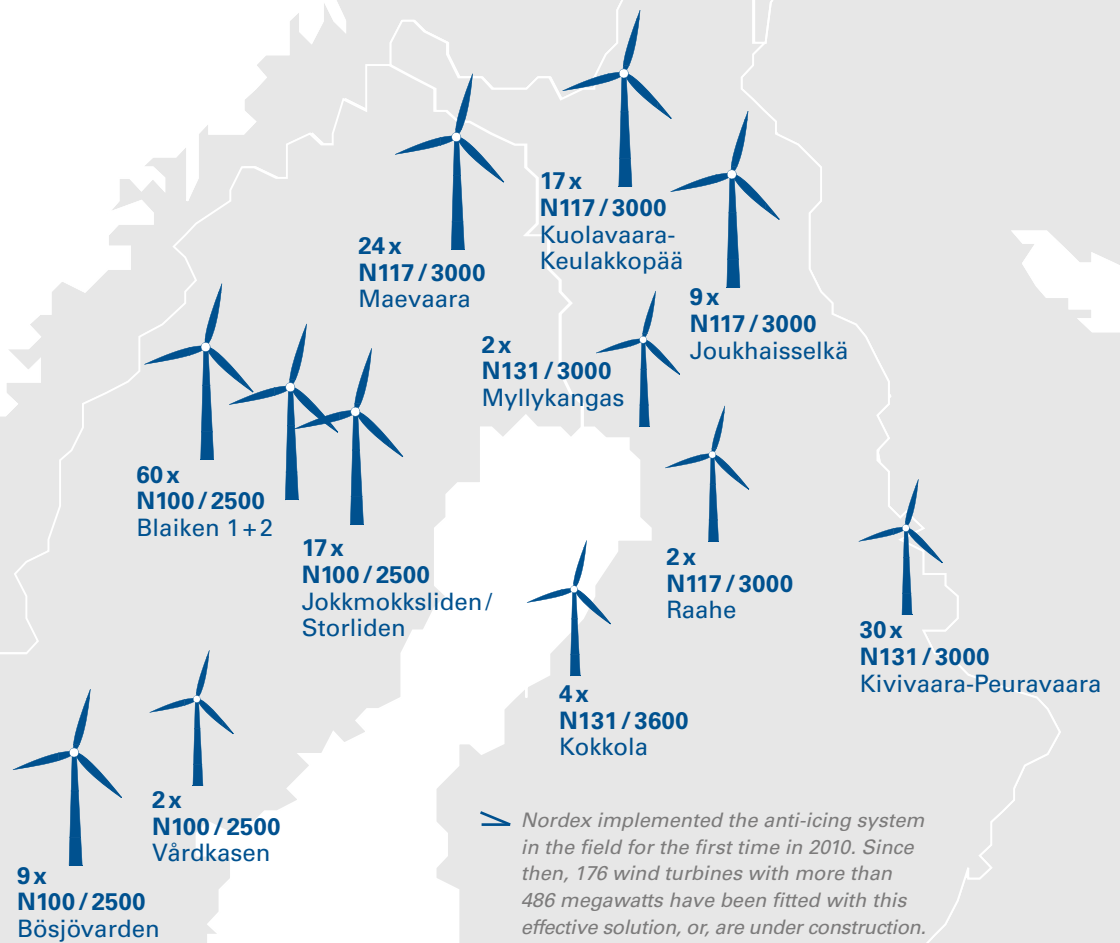


➤ *Effective anti-icing: system off, rotor blade covered in ice (left), ice free system with active system (right).*

If ice were to form during operation, the wind turbine would not need to be shut down. The anti-icing system automatically removes ice that has accumulated along the relevant surfaces of the rotor blade, thereby reducing yield losses and shutdowns resulting from icing. After downtime, e.g. due to grid outages, the system detects icing-driven performance reductions, triggering the de-icing process, before resuming full operation. The anti-icing system can also be controlled manually for an individual wind turbine as well as for the entire wind farm.

Your advantages at a glance

- Maximum yield even at sites prone to severe icing
- Avoiding ice formation on the blades during operation ensures high availability levels
- Low power consumption of the system equates to even higher power output for the turbine
- Resilient solution integrated into the blade structure



Nordex Anti-icing System – Track Record

	2010	2011	2012	2013	2014	2015	2016	2017	Sum
N100/2500-CCV-AIS	3	16	30	30	9				88 WEA/220 MW
N117/3000-CCV-AIS				1	34	17			52 WEA/156 MW
N131/3000-CCV-AIS						2	13	17*	32 WEA/96 MW
N131/3600-CCV-AIS								4*	4 WEA/14,4 MW
Sum									176 WEA / 486,4 MW

*under construction

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As of: 09/2017



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