Prevention better than cure during icing season

As our winters get colder and turbines get bigger, icing presents a host of potential pitfalls for wind farmers. Wicetec looks to overcome these challenges with its Ice Prevention System, helping to avoid a repeat of the Texas big freeze power outage earlier this year. PES caught up with Petteri Antikainen, the company's Co-Founder and CEO, to discuss the possibility of wind turbine winterization.

PES: Welcome to PES Wind Petteri. First of all, could you introduce our readers to Wicetec, for those who may not be familiar with your work?

Petteri Antikainen: Wicetec is the world wide leader in wind turbine blade heating solutions. Currently Wicetec has two business segments. Firstly, we work with wind turbine manufacturers to provide heating solutions for new installations.

Secondly, our technology can be retrofitted to existing wind turbines that are weather damaged. This summer we will continue retrofit installations in Canada on two wind farms, this area of the business is gaining a lot of interest right now. We are making plans for 2022 and beyond, so business is good.

PES: Last winter was a particularly cold one across Europe and in North America. Did this make things busier for you as a result?

PA: The winter just gone was definitely colder than the two or three milder ones previously and we had a record number of calls from potential customers. Wind farm owners tend to be more aware of icing issues nowadays and as turbines are getting bigger, they are more prone to suffer from the effects of ice, which is why enquiries are increasing.

It is always preferable to work at long notice on projects where possible and we're talking to customers now who are aiming for installation for 2022 giving a good lead time, whereas previously calls only really started as winter began. Of course, enquiries also came in when the Texas disaster hit with record-low temperatures last February. The state's grid was not able to supply power for millions of people.

PES: After that incident wind turbine winterization was quite widely talked about in the media, wasn't it?

PA: The power outages were a very sad situation for those affected. We know that the main issue in Texas was to do with fossil fuel and nuclear power plants, but the wind power was also down due to the ice. It is not totally unique that it gets cold in Texas and in fact, a Washington Post article claimed that it had actually been as cold as this year in 1983, 1985, 1989 and 2011. As the global climate is changing and even if temperatures are rising, extreme weather phenomena are increasing, which means cold weather is likely to occur more often in the future.

What has changed from before is that the capacity of wind power has increased on the grid and is expected to continue increasing. With the record high energy price of US $9000 MW the payback time of blade heating investment for a modern wind turbine would be just a few hours.

As a result of what happened in Texas our webpage traffic increased by 1000% and we

Petteri Antikainen

had a large number of new enquiries within a week of the cold weather hitting the state. Head of our business development Lasse Hietikko, was interviewed for a University of Houston Energy Fellows blog post that is published on forbes.com and represented the company on a podcast that can be found on Youtube by searching for Wicetec.

PES: As you mentioned, there will be more and more wind power built in the future. How should this be considered in terms of icing?

PA: The security of energy supply becomes a more and more important question, even in warmer climates, not just areas where winter lasts many months. If the grid cannot handle a large amount of wind power disappearing within a short time period, winterization of the turbine should be considered as an insurance for power supply.

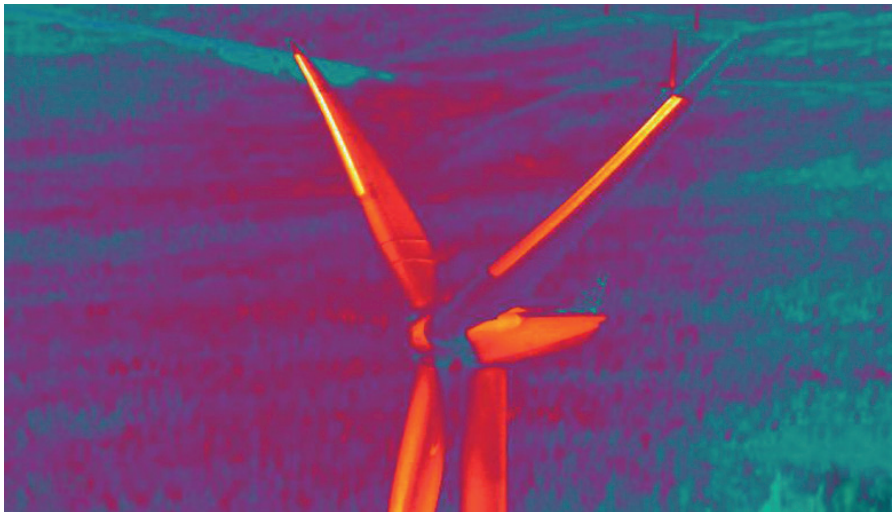
We have heard stories where 2GW of wind power goes down due to icing in less than 15 minutes, which is too short a time for coal power plants to start up, or significantly increase power output. In areas that have a lot of nuclear power available the situation might not be any easier, as nuclear power doesn't really work as a balancing power.

Together with increasing availability and an increased offering of wind turbines with blade heating solutions, the future development looks significantly better than before.

PES: Why has there been wind power built in icing areas where turbines have not been able to operate in those conditions?

PA: We see this as a normal learning curve. Mistakes have been made and planning processes for new projects have improved and thanks to our retrofittable technology, we can help the customers in this difficult situation.

PES: The international media widely mentioned after the Texas incident that turbines, for example in Sweden, are actually



producing in cold conditions throughout the winter. How is that possible?

PA: The sites referred to mainly use our blade heating technology. Project developers knew about our technology and wanted it to be integrated into their turbines. The sites in Sweden have turbines from three different OEMs, with Wicetec technology.

PES: So, is your technology available for all OEMs?

PA: Yes, we are open to all OEMs, although all solutions on the market are not ours. We have worked with a number of OEMs over the years.

PES: Previously, many OEMs were relying on hot air blade heating technology, but yours is electro thermal surface heating. Can you briefly explain the main differences between these two?

PA: Our heating is on the surface of the blade and the heat is delivered right there where it is needed. Hot air systems blow heated air inside the blade, where the blade structure is an insulator making it difficult for heat to get to the blade's surface. As turbine size is increasing and blade length is getting longer, it is more difficult to bring heat from the blade root to the tip. The surface base heaters are winning the game and, for example, in Finland for the past few years, there have not been any new hot air systems, but several sites with surface-based heaters.

PES: Are there any other advantages of blade heating?

PA: The wind farm owners can make good money when it is cold, as the energy price is typically higher then. If there are disturbances in energy production, the higher the price rises. Therefore, a wind farm owner whose turbines can produce reliably throughout the whole winter can make good profits.

Then there is also the safety aspect. The blades equipped with blade heating gather a minimal amount of ice, if any, on the surface of the blade. Therefore, the risk of ice throw is mitigated significantly.

Additionally, the damage to blades from the falling ice hitting the blades are decreased, potentially saving a lot of money on repair costs. The ice layer on the blade surface increases the noise level caused by the wind turbines. In some areas there are strict noise regulations and this is why turbines must be stopped due to exceeding the permitted noise level.

PES: Wicetec has been involved with blade heating solutions for new turbines, as well as with the retrofits. Can you share your future plans and latest developments?

PA: I am extremely happy that the overall awareness of wind turbine icing issues has increased remarkably over the 25 years that I have been working in this field. In general, previously there was a widespread denial of potential icing issues, whereas an ice assessment during the development phase of a new wind site is standard practice required by the investors.

We have listened to our retrofit customers and done a lot of R&D work to make it possible to install our technology uptower. Previously, the blades were brought down for the heating element installation, but when manufacturing the element in smaller pieces, no blade lowering and cranes are needed. With uptower installation we are lowering the overall costs to the customer by 25-30%.

Our aim is to maintain our market leader position in the future and with the uptower solution, we can serve more customers with competitive pricing.

www.wicetec.com