



# 2012 HURRICANE OUTLOOK: WHAT WIND OPERATORS SHOULD EXPECT

Wind farm operators who have the right tools and an emergency plan that can be executed on very short notice will be able to weather any storm as safely as possible.

By Jeff Johnson

Jeff Johnson is the Chief Long Range Forecaster and Chief Science Officer for Telvent DTN. Johnson focuses on medium and long range weather forecasts for Telvent DTN. For more information, visit [www.telvent.com](http://www.telvent.com).

## HURRICANE SEASON OFFICIALLY BEGAN

June 1, but activity started early this year with four named storms appearing before July 1, making 2012 the only year on record that this many storms developed so early in the season. This continues the enhanced storm activity that we saw in 2011, which produced 19 named storms compared with a typical year's 11. This total tied the record for the third highest number of named storms in a single year.

While traditional hurricane season forecasts attempt to estimate the number of named storms that will form during the year, of greater interest is how many of these storms will impact the U.S. and its

business operations. On average, the U.S. experiences 1.78 hurricane landfalls per year. The most likely number for annual hurricane landfalls is one, which occurred 30 percent of the time between the start of hurricane records in 1861 until 2011. In recent years, hurricane landfalls have been much less frequent, with only one U.S. strike in the past three seasons (Hurricane Earl landed on the Eastern Seaboard last year).

It's important to avoid complacency, however from this recent quiet landfall trend: The challenge for the wind power industry – especially operations in the Gulf Coast states – is to stay alert and be aware of



the nuances in this year's climate conditions and how these patterns and storms could affect operations.

## THE BIG PICTURE

Each hurricane season depends on two ocean temperature cycles, one short-term and one long-term. The long-term Atlantic multi-decadal oscillation (AMO) cycle is, as the name suggests, a time of either warmer or colder water in the Atlantic Ocean that can last for several decades. We are currently in the warm phase, which typically leads to an increased frequency of hurricane development in the Atlantic Ocean (while the cooler water phase inhibits them). The short-term, more

annual cycle is the better known as El Niño/La Niña climate patterns in the Pacific Ocean, which can influence storm numbers from year to year.

The El Niño/La Niña patterns can vary from year to year and refer to deviations in the surface temperature of the tropical eastern part of the Pacific: warmer surface temperatures are known as El Niño ("little boy" in Spanish), named after the Christ child because the effects of the pattern are often felt around Christmastime in South America. The opposite, cooler temperature pattern is dubbed La Niña ("little girl"). The more extreme the El Niño or La Niña is, the more extreme the weather can become in many regions, bringing about floods, droughts and storms.

Climate scientists and weather forecasters recognize the formation of an El Niño climate pattern when the surface pressure over the Indian Ocean and South Pacific begins to rise, accompanied by a fall in air pressure over the central and eastern Pacific. The sustained warming of the central and eastern region often brings heavy rainfall with it, while the western Pacific is steeped in drought.

An El Niño also brings about increased wind shear (differences in wind speed or direction over a short distance in the atmosphere) downstream into the Atlantic region. Increased wind shear creates unfavorable conditions for storms to form or intensify in the Atlantic basin because there are stronger winds aloft in the tropical regions. In general, the El Niño effect tends to inhibit tropical storms from developing in the Atlantic (or if they do develop, they are more likely to remain less intense or of fewer numbers), while La Niña conditions are more favorable for the formation of storms. Studies have shown that there are many more storms on average during La Niña years, and fewer during El Niño seasons.

We are currently in a developing El Niño phase, although a weak one. We are predicting these conditions continuing through the fall and impacting hurricane development by making it a relatively quieter end to the year in terms of total numbers of storms that form in the Atlantic during the more active September/October part of the season. Conversely, the warmer waters we have been seeing in the Gulf of Mexico and off the southeastern coast of the U.S. this year are more likely to feed any storms that do develop and may help them reach hurricane intensity more quickly as they approach the mainland.

The bottom line: We are predicting an average or below-average year for the number of tropical storms and hurricanes that form, especially the latter half of the season due to El Niño, but those storms that do develop and head into the Gulf of Mexico and the southeastern U.S. could become more intense due to the warmer waters near the U.S. this year.

## THE GOOD NEWS: THE ATLANTIC COAST

As mentioned above, El Niño's increased wind shear creates less favorable conditions for storms to form in

the Atlantic basin. In addition, this year there is a large patchwork of cooler than normal sea surface temperatures in the central and eastern Atlantic area, where many late-season storms develop. This colder water may also help to reduce the number of the longer-tracked hurricanes that develop off the west coast of Africa and track westward. These storms can become stronger hurricanes as they travel for a long time over the open waters of the Atlantic. Many of these storms tend to curve north as they approach the East Coast of the U.S., so reducing the number and probable intensity of these storms is a step in the right direction. The exact track of any individual storm however is dependent on the steering winds in place at the time of each storm, so land falls or lack of them anywhere cannot be foreseen more than a few days in advance.

These conditions lead us to forecast a near-average or below-normal

number of tropical storms in the Atlantic region this season. This is good news for the relatively few wind farms up and down the coast: Although operators should always have a plan in place, we believe there is a reduced risk compared to average for an interruption because of tropical storms or hurricanes.

### WHERE TO BE WATCHFUL: THE GULF REGION

While the wind shear conditions generated by El Niño lower the likelihood of storms and hurricanes, we have also been watching the warmer sea surface temperatures in the Gulf of Mexico that have existed since the spring. This warmer water could contribute to more hurricane development closer to the U.S. mainland. In addition, we don't have the strong area of high pressure that we saw last year in the Gulf, which helped steer away hurricanes (and which also caused the unprecedented drought conditions).

These factors have led us to forecast an average or slightly above-average risk of tropical storms in the Texas coast and Gulf region for the remainder of the season.

But the simple number of storms isn't the whole story: The warmer waters in the Gulf also create more favorable conditions for storms to intensify quickly as they near the U.S. We are concerned that storms could strengthen rapidly as they approach the continent, giving us a shorter lead-time to secure business operations and evacuate the area.

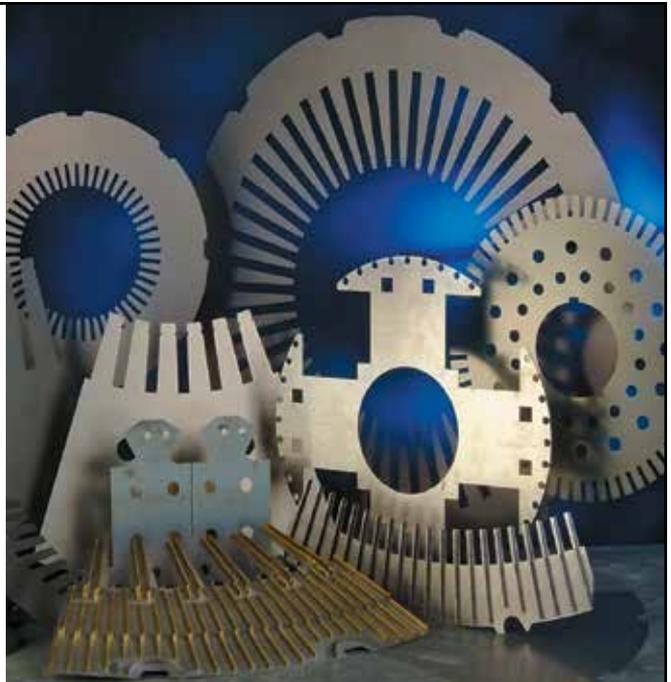
This is one of the most important details to be aware of if you are in the wind power industry: conditions that encourage storms to intensify quickly mean shorter notice of destructive storms. Storm intensity is generally volatile and difficult to predict, and the warmer Gulf waters may make that even more challenging. This year, do not assume a multiple-day lead-time on hurricane development: Ensure crews and

### When precision, reliability and quality are your expectations... **TURN TO SOTEK/BELRIX**

A leader in the manufacturing of precision metal stampings. We supply custom stamped laminations and assemblies to a variety of customers – large and small.

Whether your need is for immediate turn around or delivery of production quantities on a regular basis, we are equipped to meet your needs.

- Stator, Rotor, and Pole Laminations
- Stator, Rotor, and Pole Assemblies
- Vent and Finger Plates
- Stamping and Laser Capabilities
- Complete In-House Tooling Capabilities



Sotek, Inc. and Belrix Industries, Inc. • 3590 Jeffrey Boulevard • Buffalo, NY 14219  
716-821-5961 • fax: 716-821-5965 • www.sotek.com • info@sotek.com • ISO REGISTERED

**SERVING MEDIUM TO HEAVY INDUSTRIAL MOTOR AND POWER GENERATION INDUSTRIES**

available equipment are ready to move on short notice.

### WHAT THIS MEANS FOR THE WIND INDUSTRY

While we don't believe this will be a gangbuster year for tropical storm total numbers, any wind power operation in the Gulf of Mexico region should be aware that current and forecasted conditions can facilitate more storm development in the area and contribute to a storm swiftly intensifying. Rather than a week's notice, operators may only have a few days, so monitoring storm conditions closely will help ensure crews are kept safe and damage to movable equipment is minimized.

Typical threats to a wind farm from hurricane landfall include strong winds, storms and flooding: An average hurricane is about 300 miles wide with outer rain bands made up of dense thunderstorms. Damaging winds are generally confined to within 100 miles of the coastline, but tornadoes from the outer bands of a hurricane can reach as far inland as several hundred miles and are a risk for several days after the storm makes landfall. The stronger the hurricane, the more likely that tornadoes will result. Flooding rains can travel even further inland – even as far inland as the Midwest – where wind farms are more prevalent.

### TOOLS FOR MITIGATING RISK

While good wind farm operators always keep an eye on the weather, there are a few tools that can help increase an operator's understanding of conditions, how they will affect operations and when action needs to be taken to prepare for damaging weather and evacuate crews.

A comprehensive weather forecasting and detection solution should provide fast, accurate information with features specific to the wind industry, including wind speeds and lightning detection. Telvent's MxVision WeatherSentry Online® provides this level of service, including location-specific information, precipitation forecasts that

have earned awards for accuracy and the best lightning-alerting technology on the market.

MxVision WeatherSentry Online allows wind farm operators to easily assess risk with a display of all active hurricanes and tropical storms around the world. Users can also select individual storms for viewing, along with the ability to view mul-

iple forecasts along with the official track for any tropical storm or hurricane across the globe.

Because field workers typically do not have access to a computer, communicating via cell phone is critical. Telvent's MxVision WeatherSentry Online solution and its mobile application can provide detailed weather information about a wind farm

# WIND TURBINE TECHNICIAN ACADEMY

Competency Based, Hands-On Training  
Industry Guided Curriculum  
Safety Training Certification  
BZEE Certified Graduates  
24 week, Full Time Program  
Competitive Application Process

**KalamazooVALLEY™**  
community college

269.353.1250 kvcc.edu/wind





**Fig 1: Telvent MxVision WeatherSentry's Wind Edition, showing actual lightning strikes on a map – the rings on the map are wind farms watch and warning ranges.**

maintenance crew's specific location based on a cell phone's GPS signal. This is especially helpful to the wind industry, which often has crews moving across vast areas that would typically require them to enter new GPS coordinates into

the weather detection system every time their location changed. Instead, a crew's location is automatically updated, the forecasts are adjusted accordingly, and alerts will sound on a crewmember's phone when severe weather moves

into a predefined area (30 miles out, for example). Specific thresholds can be set for conditions like wind speed and lightning, providing crews with a customized detection system and alerts for their geographic area. This efficient solution gives them enough time to exit the area safely and seek shelter.

Lightning can be a major concern during tropical storms, especially for wind farm maintenance crews working on turbines. Telvent's tool is the only one in the industry to offer future lightning forecasts, which allows users to better visualize where lightning may strike in the next hour through a color-coded map, demonstrating the probability of lightning strikes. Future lightning allows wind farm operators to plan appropriately for crew safety.

Telvent's tool provides detailed, hourly forecasts three days out, making it particularly useful if hurricanes are approaching and crews need to be aware of high wind speeds that put maintenance activities at risk, or potential lightning strikes from subsequent thunderstorms. While operators will be aware of a hurricane's landfall several days out, the erratic nature of the resulting weather can affect operations for several days. Close monitoring of weather conditions and readiness to change course quickly will ensure that no one is caught off guard.

### THE FORECAST: KEEP AN EYE OUT IN THE GULF

The good news is that we expect an average or quieter-than-average fall season for total tropical storm and hurricane activity in the Atlantic basin. In the event that storms do develop, there is a greater chance however that they will be located near the U.S. – especially the Gulf region – and gain strength more quickly than expected. Wind farm operators who have the right tools and an emergency plan that can be executed on very short notice will be able to weather any storm as best and as safely as possible. ✈