



Control Number: 51840



Item Number: 28

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PROJECT NO. 51840

RULEMAKING ESTABLISHING  
ELECTRIC WEATHERIZATION  
STANDARDS

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2021 JUN 10 10 10 AM  
PUBLIC UTILITY COMMISSION  
OF TEXAS  
REGISTRATION

COMMENTS OF ENEL NORTH AMERICA, INC.

Enel North America, Inc. (Enel) files these comments in response to the request of the Staff of the Public Utility Commission of Texas (Commission of PUCT) filed in this proceeding on June 9, 2021. Enel appreciates this opportunity to provide feedback on generation requirements related to weather. Enel appreciates the seriousness of providing reliable and affordable energy to Texas consumers. Because of this, Enel designs and operates its resources to industry standards or above. Standards for generators are complex and depend on the type of generator, generator location, effective and available technologies, and manufacturer availability. Additionally, maintaining manufacturer's warranties is an important consideration. Enel encourages the PUCT to take this complexity and variability into account in its consideration of weatherization requirements. Enel offers this feedback on wind, solar, and batteries, as well as substation requirements.

- 1. To fulfill the requirements of Texas Utilities Code § 35.0021(b), under what weather emergency conditions should the Commission require a provider of electric generation service in the Electric Reliability Council of Texas (ERCOT) power region to be able to operate its generation facilities? At a minimum, please address standards for temperature, icing, wind, flooding, and drought conditions. For each, please address whether the standard should vary by region or by type of generation facility. Please provide any relevant support for your recommendations, including existing or proposed standards in other jurisdictions, or related studies.**

As noted above, Enel respectfully recommends that the Commission recognize that the potential strategies to address weatherization concerns depends on the location of a generation resource as well as the specific technology at issue. As a result, as the Commission considers standards, Enel recommends that the standards adopted be flexible to accommodate the variety of

issues that can impact a particular resource and that overly prescriptive standards may have an unintended impact of reducing reliable grid operations rather than enhancing reliability. The following comments provide weather related standards and considerations for the types of generation resources Enel is in the process of developing and constructing or already owns and operates in the ERCOT region.

## **Wind Generation**

### ***1. Temperature***

Any weatherization requirements applicable to wind turbines need to take into account turbine location, local climate, and whether or not turbines are optimized for cold or warm weather operations. Turbines that are optimized for cold weather performance are typically restricted or less efficient in hot temperatures, and vice versa. Each version of a wind turbine offered by a manufacturer has (i) a minimum low “survival temperature” which is the lowest temperature the wind turbine model can endure without damage while shut-off; (ii) a minimum low “operating temperature” which is the lowest temperature at which the wind turbine model can operate without becoming damaged; (iii) a maximum high “operating temperature” which is the highest temperature at which the wind turbine model can operate without becoming damaged; and (iv) a maximum high “survival temperature” which is the highest temperature the wind turbine model can endure without damage while offline. The difference between the high “operating temperature” of a wind turbine and the low “operating temperature” of a wind turbine is known as the “operational temperature envelope. For the Texas climate, the operational envelope should be from -10C to +40 Celsius for standard temperature versions, and from -20C to +40C for cold temperature versions, if this low temperature occurs on site frequently. Enel does not recommend requiring lower operational temperatures, as these typically limit the hot temperature to +30C or

+35C and thus would severely restrict wind turbine production during summer and during high loads for air conditioning needs.

## **2. *Icing***

When ice builds on the blades of wind turbines, the additional weight on the blades compromises the balancing of blades and causes additional vibration to the blades when they are in operation. This ice build-up also compromises the aerodynamics of the blades of the wind turbines. With the build-up of ice on the blades, wind turbines automatically shut off. This is a standard function implemented into the wind turbine operating software to prevent damage to the blades and drive trains of the wind turbines.

Currently, de-icing technologies are not offered for most turbine models and blades by manufacturers. Developers are limited by what manufacturers offer. Additionally, retro-fits can void original equipment manufacturer warranties. Enel encourages the Commission to continue to monitor de-icing technologies, and re-visit requirements when consistently available and effective technologies enter the market.

## **3. *Wind Speed***

Wind turbine cut in speed ranges from 6-9 miles per hour and cut out speed is about 55 miles per hour. At wind speeds higher than that, turbines cannot operate safely. No wind turbine manufacturer offers models that can operate in wind speeds higher than 55 mph, although turbines can withstand gusts up to 80 miles per hour in standstill with blades feathered. These industry standards should be taken into account in any requirement on wind's performance.

## **4. *Flooding***

Enel projects are designed to allow uninterrupted generation during 100-year historic floods, even though access roads may not be accessible. The Commission may want to consider

requirements that mandate the ability for production equipment to withstand a 100-year flood, or demonstrate effective mitigation.

## 5. *Drought*

Wind generation has minimal water requirements and is not significantly impacted by drought.

## **Solar Generation**

### 1. *Temperature*

Solar PV modules have operating ranges from -40C to +85C, however their performance decreases with increasing temperature, which results in lower electric output. Maximum efficiency range is typically between +15C and +35C. Currently, three module standards are extensively used: IEC 61730-2, IEC 61215-1 (international) and ANSI/UL 1703 (United States).

The temperature range for solar inverters (equipment that transforms DC into AC electricity) is less standardized than some other types of generation and may vary by typology, manufacturer, and site location. Before the inverter reaches the max operating temperature, it would typically gradually reduce its power output (de-rating). Most inverters will derate at around 45C – 50C.

### 2. *Icing*

Solar panels are either installed on fixed structures or movable trackers. All systems are tilted though to have the optimal angle to the sun. The tilting promotes ice and snow melt and is therefore self-cleaning. Enel recommends the Commission should not make any additional requirements, as the tilting is already a design feature for solar panels that helps shed snow and ice.

### 3. *Wind*

Requirements related to wind should take into account different module features, and the variety of technologies available to withstand wind. Some tracker panels can be moved to a stowage setting to prevent torsion and damage. Other systems use tilting mechanisms to prevent damage, and are still able to generate during windy conditions. All solar plants must be designed to comply with ASCE 7 wind loads, which are defined by a 3 second wind gust, at 33ft above ground with a 300 year return period. This wind speed varies with location, and ranges from 95 to 107 mph for the Texas region.

#### **4. *Hail***

Standard solar modules can withstand hail to a size of 1.3 inch without damage (IEC 61730-2). This standard should guide any requirements.

#### **5. *Flooding***

Enel projects are designed to allow uninterrupted generation during 100-year historic floods, even though access roads may not be accessible. The PUCT may consider requirements that mandate the ability for production equipment to withstand a 100-year flood, or demonstrate effective mitigation.

#### **6. *Drought***

Solar generation has minimal water needs and is not significantly impacted by drought conditions. In fact, solar panels perform better in dry conditions, as a dryer atmosphere transmits more irradiance.

### **Battery Energy Storage**

#### **1. *Temperature***

Batteries require a consistent and narrow temperature range to operate efficiently. Hence it is industry practice to have batteries equipped with heating and cooling systems to accommodate

those needs. Heating and cooling systems should be a requirement for all batteries. The operating temperature range for these cooling systems is typically from -20°C to +50°C

## **2. *Ice and Wind***

It is standard for batteries that are being developed today to be stored in containers that provide protection from heat, cold, wind and moisture. Providing this protection is important regardless of the specific manner in which a storage resource is constructed.

## **3. *Flooding***

Enel projects are designed to allow uninterrupted generation during 100-year historic floods, even though access roads may not be accessible. The PUCT may consider requirements that mandate the ability for production equipment to withstand a 100-year flood, or demonstrate effective mitigation.

## **4. *Drought***

Batteries have minimal water needs and are not significantly impacted by drought conditions.

## **Substations**

### **1. *Temperatures***

IEEE standards for substations equipment define normal service conditions as ambient temperatures ranging from -30 to +40 degrees Celsius. The Commission may consider using this industry standard to guide any requirement.

## **Transformers**

### **1. *Temperatures***

Transformer main equipment have standard ambient operating temperatures range from -30 to +40 degrees Celsius. The PUCT may consider using this industry standard to guide any requirement.

**2. *Flooding***

Enel projects are designed to allow uninterrupted generation during 100-year historic floods, even though access roads may not be accessible. The Commission may want to consider requirements that mandate the ability for production equipment to withstand a 100-year flood, or demonstrate effective mitigation.

**CONCLUSION**

Enel appreciates the opportunity to provide these comments and looks forward to working with the Commission on these important issues.

Respectfully submitted,

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