Distributed Energy Resources (DERs) in ERCOT

Historically, most generation resources in the ERCOT region were large units – anywhere from 50 to 1,000 MW – located on high voltage transmission lines. There are established rules and procedures for effectively communicating and coordinating with these types of resources to ensure the reliability of the electric grid.

However, advances in technology and changes in technology costs are changing the types of resources that are being built in the ERCOT region. More energy is being produced by smaller generation resources located directly on lower voltage distribution circuits that connect customers to nearby transmission stations. Rooftop solar systems and small natural gas turbines are among these newer resources categorized as Distributed Energy Resources (DERs).

Current trends indicate a growing role for DERs in grid operations and reliability. This is due to the increased number of DER units that are providing backup services for businesses and being deployed in response to attractive market prices.

Growth of DERs in ERCOT

ERCOT is working with Transmission and Distribution Service Providers (TDSPs) and other stakeholders to develop processes related to the growing role of DERs in the ERCOT region. The goal is to ensure these new technologies can support grid reliability similar to larger generating units.

Initiatives include appropriately defining DER resources within the ERCOT system, increasing visibility of these units and establishing a connection between DER activity and the system's needs.

Defining DERs

Characteristics of DERs:

- Generation, energy storage technology or a combination of the two
- Interconnected at or below 60-kV
- Renewable (i.e., rooftop solar) or thermal (i.e., natural gas)

As of December 2018, there were approximately 1,300 MW of registered and un-registered DERs in the ERCOT region. The data collected is a combination of voluntary and mandatory information reported by Non-Opt-In-Entities (municipally-owned utilities and cooperatives) and the competitive choice TDSPs.

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Operating concerns associated with DERs

ERCOT continues to evaluate potential reliability impacts related to increasing DER activity. An increase in DERs will result in more flow of energy from the distribution system into the transmission grid. As higher levels of DERs begin to impact the power grid, it will become increasingly important for them to be able to respond to ERCOT system needs.

Currently, DERs that inject energy onto the grid are not compensated based on their location and therefore may not respond appropriately to transmission congestion.

Other impacts include:

- Inaccuracies in forecasting net load (system load excluding variable generation and DERs)
- A need to change reserve requirements to support added uncertainty
- Inaccuracies for key inputs used for operational studies and managing the electric system
- Reduced or limited reactive power, voltage control and dynamic response to faults
- Lack of coordination during system restoration

Visibility into DERs for reliability

ERCOT manages the electric grid using detailed network models that tell grid operators where all of the generation resources and transmission lines are located. If DER units are not included in the models, then grid operators do not have an accurate depiction of the electric system. ERCOT continues to work with stakeholders to include these resources in the models, to better understand the impacts of DERs and to prepare for reliability challenges that may occur.

In 2018, ERCOT worked with stakeholders to develop a standard approach for obtaining the data needed to map registered DER units to their appropriate transmission loads. With lower reserve margins heading into summer 2019, mapping DER units to the correct locations will improve situational awareness and help grid operators more accurately assess ERCOT system conditions.

Mapping also provides a foundation for enabling larger DERs to receive localized (nodal) price signals, to help ERCOT manage congestion on the grid. ERCOT is currently working with stakeholders on market rule changes that will enable nodal pricing for these units.

Adding more visibility and mapping DER resources will not change who models and operates the distribution system. These tasks will remain the responsibility of Distribution Service Providers.

What are DER registration requirements?

Any generator greater than 1 MW that is connected at the distribution level and injects onto the grid is required to register with ERCOT. Backup generators that do not inject power into the grid are not required to register. Most of the registered units are thermal generators, community solar projects and a small number of storage devices.

Generators that are smaller than 1 MW, such as residential and commercial rooftop solar systems, are not required to register with ERCOT. The grid operator estimates these unregistered DERs total 450 to 550 MW. ERCOT is working on developing standard utility reporting rules for these unregistered DERs.

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