Continuing to execute on our path to premium

Distributed Generation

Glossary of Terms – ERCOT Terminology

These are the different fuel sources and types of generation technology that are installed on CenterPoint Energy's distribution grid

Technology / Fuel Source		Synchronous			Induction			Inverter		
		Diesel	Natural Gas	Landfill Gas	Hydro	Natural Gas	Landfill Gas	Wind	Solar	Battery
Unregistered w/ ERCOT Typically, < 1MW CNP refers to these as DER		DG	DG	DG	DG	DG	DG	DG	DG	DG
Registered w ERCOT Typ. 1MW to 10MW	Self Dispatched	SODG	SODG	SODG	SODG	SODG	SODG	SODG	SODG	SODG
	Dispatched by ERCOT	DGR	DGR	DGR	DGR	DGR	DGR	DGR	DGR	DGR/DESR

Distributed Generation

— Relevant Definitions from Protocol Section 2

Distributed Generation

An electrical generating facility located at a Customer's point of delivery (point of common coupling), 10 megawatts (MW) or less, and connected at a voltage less than or equal to 60 kilovolts (kV), which may be connected in parallel operation to the utility system

Generation Resource

A generator capable of providing energy or Ancillary Service to the ERCOT System and is registered with ERCOT as a Generation Resource

Distribution Generation Resource (DGR)

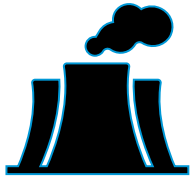
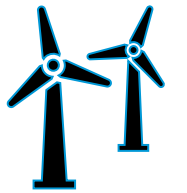
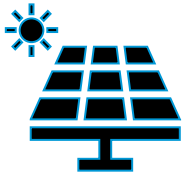
A Generation Resource connected to the Distribution System that is either:

1. Greater than ten MW and not registered with the Public Utility Commission of Texas (PUCT) as a self-generator; or
2. Greater than one MW that chooses to register as a Generation Resource to participate in the ERCOT markets

Source: https://www.ercot.com/services/rq/re/dgresource

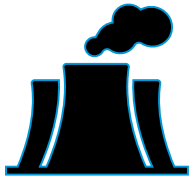
- **SODG – Settlement Only Distribution Generation**
  - Do not actively participate (no bids/offers) in the ERCOT wholesale markets
  - Self-deployed (can chase prices)
  - Can reduce demand charges (4CP) if behind a Load meter on 4CP tariff
  - Any technology (including storage) that can inject into the Point of Common Coupling (PCC) on the DSP system
- **DGR – Distribution Generation Resource**
- **DESR-Distribution Energy Storage Resource** (NPRR 995 in flight)
  - "R"esource that actively participates (submits bids/offers, telemetry, COP,..etc.) in ERCOT wholesale markets
  - Will have Resource Node Settlement Point on the modeled transmission grid
  - Any technology (including storage) that can inject into the Point of Common Coupling (PCC) on the DSP system
- **Examples of SODG, DGR and DESR technologies:**
  - Reciprocating Engines (Diesel or Natural Gas)
  - Community or commercial Solar
  - Li-Ion Battery

Application Process – Small Scale DG/DER

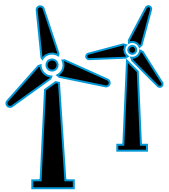
Fuel Sources	< 20kW Residential	20 to 500kW Small Business/Commercial
 Traditional – Natural Gas, Diesel	• Customer will submit an **initial application** through **web portal** (Need an established service ESI ID) https://plus.anbetrack.com/cnp-dg/#/ • If no existing service, **e-mail** residential_dg@centerpointenergy.com or commercial_dg@centerpointenergy.com for a **paper application copy** • CenterPoint Energy will review the application and follow-up with **DER Design Specification** & Study fees Refer to Slide 5 for Technical Study Criteria Matrix & Timeline Refer to CNP Tariff for Study Fees • After receiving the study fees, CenterPoint Energy will perform the **System Impact Study**. The study results along with **Construction Cost Estimate** will be provided • A **signed Construction Agreement** along with **receipt of construction estimate payment** will kick-off construction activity Refer to Slide 5 for Construction Timeline • After CenterPoint Energy and customer's site activity is complete, customer will schedule **witness testing** Refer to Slide 5 for Testing Timeline • CenterPoint Energy will issue **Interconnection Connection Agreement (ICA)** after successfully commissioning the project site	
 Renewable – Wind, Solar		
		
 Alternate Technology (Storage) – Electric Vehicle, Battery		
		

Application Process – Large Scale DG/DGR/DESR

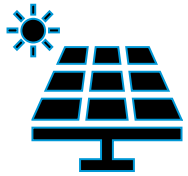
Fuel Sources	Typ. < 1MW Unregistered w/ ERCOT	Typ. < 10MW Registered w/ ERCOT



Traditional – Natural Gas, Diesel



Renewable – Wind, Solar



Alternate Technology (Storage) – Electric Vehicle, Battery

- Typically, for these requests, a customer requires to **establish a service**
- **E-mail** commercial_dg@centerpointenergy.com for an **initial screening discussion**
- CenterPoint Energy will schedule a one-on-one virtual screening discussion, review the application process and follow-up with **Pre-screen Application**
- CenterPoint Energy will perform the **pre-screen study** and will share the results
- After customer indicates to move forward CenterPoint Energy will send a **paper application copy, DER Design Specification, Primary Service Specification** & Study fees

Customer will contact Service Center or MUG Engineering for OH/Underground Primary Service

- After receiving the study fees, CenterPoint Energy will perform the **System Impact Study**. The study results along with **Construction Cost Estimate** will be provided
- A **signed Interconnection Agreement (ICA)** along with **receipt of construction estimate payment** will kick-off construction activity
- After CenterPoint Energy and customer's site activity is complete, customer will schedule **witness testing**
- CenterPoint Energy will issue **Permission to Operate Letter (PTO)** after successfully commissioning the project site

Design, Construction, & Commissioning Timeline

Technical Study Criteria for Small/Large Scale DER

Grid Connected Capacity	(OH/URD) Device Rating < 1 Week	Planning / Loading Facility Ratings Study 4 Weeks			System Impact Study & Cost Estimate (Inc. Sys. Protection, Stability & Dynamic) 2-4 Months*	Design & Construction (Includes timeline for OH/UG Primary Service if needed)	Witness Testing & Commissioning (Demonstrate successful performance of protective functions) 4 Weeks*
		N/W TR Config & Loading	Series Elements Rating	Feeder Margin			
< 20kW Small Scale Residential	Y	N	N	N	N	0-2 Mo.	N
20 to 500kW Small Scale Commercial	Y	Pre-Screening Study			Potential Y	2-8 Mo.	Y
500kW to 1MW Large Scale	NA	NA	NA	NA	Y	8-12 Mo.	Y
> 1MW upto 10MW Large Scale DG/DER/DGR/DESR	NA	Pre-Screening Study			Y	12-18 Mo.	Y

Study Criteria Technical Reference Documents:

- ERCOT Nodal Operating Guides/Protocols
- NESC, IEEE 1547 – 2018, NEC, UL
- PUCT Substantive Rules 25.211, 25.212
- CNP Design Specification Rev 4, CNP Primary Service Standard Specification Rev 9

Assumption: DER with High-Speed Close Transition do not need an Impact Study. If the Point of Common Coupling is on the secondary network system irrespective of the size, all requests must require an Impact Study

* All pertinent technical documents (not limited to one-line diagram, metering and relaying drawing with protective devices, a layout diagram of the site/installation), customer installed equipment specifications, manufacturer cut sheets, submitted to CenterPoint Energy and inconsistencies addressed by the requester

Questions & Answers