# Oncor Application for Interconnection of Distributed Generation

**DGR or DESR Projects** (05/10/2023)

This application is for the interconnection of Distributed Generation intending to register as an ERCOT resource. These may be referred to as DG Resources, DGR or DESR hereinafter referred to in this application as "DGR" which may be a generation or energy storage resources connected to Company's distribution system at less than 60 kV with exporting capacities of less than 10 MW. DGR are expected to be economically dispatched via the ERCOT Security-Constrained Economic Dispatch ("SCED") and capable of providing Ancillary Services. DGR must follow the registration processes prescribed by ERCOT and follow any required modeling requirements in ERCOT systems. Unless instructed otherwise, Company may presume that Customer storage resources intend to seek ERCOT approval for treatment as Wholesale Storage **Load**.

**Process, Information Submittal and Studies**

Please complete the following information and provide any requested documents. If the information is not available, then processing this application could be delayed. In general, an Impact Study, Steady-State Analysis, Long Term Dynamic Analysis and Transient System Analysis study will be performed. These studies will determine construction, engineering estimates and upgrade costs as well as any operational or other conditions to allow interconnection. A complete application along with the Study Fees and a signed Discretionary Services Agreement will begin the process. The results of the DGR Integration Studies could change the initial assumptions and study parameters assumed for charging and discharging rates and result in new or different operational parameters.

Email Application Submissions to: dg@oncor.com

*(Email submittals larger than 8MB will not be delivered through Oncor servers)*

# Application for Interconnection and Parallel Operation of Distributed Generation

Return Completed Application to:

Oncor Electric Delivery Company LLC
Attention: Distributed Resource Specialist
1616 Woodall Rodgers Fwy
Dallas, TX 75202-1234

Customer's Name:_____

Address: _____

Contact Person:_____

Email Address: _____

Telephone Number: _____

Service Point Address:_____

Information Prepared and Submitted By:_____

(Name and Address)_____

Signature _____

The following information shall be supplied by the Customer or Customer's designated representative. All applicable items must be accurately completed in order that the Customer's generating facilities may be effectively evaluated by Oncor (Company) for interconnection with the utility system.

**GENERATOR**

Number of Units:_____

Manufacturer:_____

Type (Synchronous, Induction, or Inverter):_____

Fuel Source Type (Solar, Natural Gas, Wind, etc.):_____

Kilowatt Rating (95 F at location)_____

Kilovolt-Ampere Rating (95 F at location):_____

Power Factor:_____

Voltage Rating:_____

Number of Phases:_____

Frequency:_____

Do you plan to export power:_____Yes_____No

If Yes, maximum amount expected:_____

Do you wish Oncor to report excess generation to your REP?_____Yes_____No

Pre-Certification Label or Type Number (e.g., UL-1741 Utility Interactive or IEEE 1547.1):
_____

Expected Energization and Start-up Date: _____

Normal Operation of Interconnection: (examples: provide power to meet base load, demand management, standby, back-up, other (please describe))_____

One-line diagram attached:_____Yes

For systems not using pre-certified inverters (e.g., inverters certified to UL-1741 or IEEE 1547.1), does Oncor have the dynamic modeling values from the generator manufacturer?_____Yes_____No

If not, please explain: _____
(Note: For pre-certified equipment, the answer is Yes. Otherwise, applicant must provide the dynamic modeling values if they are available.)

Layout sketch showing lockable, "visible" disconnect device is attached: _____Yes

**Authorized Release of Information List**

By signing this Application in the space provided below, Customer authorizes Oncor to release Customer's proprietary information to the extent necessary to process this Application to the following persons:

| | Name | Phone Number | E-Mail Address |
|---|---|---|---|
| **Project Manager** | | | |
| **Electrical Contractor** | | | |
| **Consultant** | | | |
| **Other** | | | |

Customer represents and warrants that it does not meet any of the ownership, control, or headquarters criteria listed in Lone Star Infrastructure Protection Act, Chapter 113 of the Texas Business and Commerce Code, as added by Act of June 18, 2021, 87th Leg., R.S., Ch. 975 (S.B. 2116) (relating to China, Iran, North Korea, Russia, and any other country designated by the Texas governor as a threat to critical infrastructure).

[ COMPANY NAME ]

BY: _____

PRINTED NAME: _____

TITLE: _____

DATE: _____

[CUSTOMER NAME]

BY: _____

PRINTED NAME: _____

TITLE: _____

DATE: _____

## Additional Information
## Application for Interconnection of Distributed Resource Generation

### 1. Owner of Generation Resource – Name for Interconnection Agreement

Please indicate the name and type of entity who is the owner of the distributed resource:

| **Legal Name of the Distributed Resource** | |
|---|---|
| Legal Name | |
| Type of Entity | |
| Examples | |
| *XYZ Business Inc.* | *a Texas corporation* |
| *XYZ Company LLC* | *a Delaware limited liability company* |
| *City of XYZ* | *a Texas governmental agency* |

### 2. Oncor Delivery Voltage Information

| **Please indicate the Oncor distribution delivery voltage at the PCC:** | | | |
|---|---|---|---|
| | 13,200/7,620 V – 3ϕ, 4 wire | | 12,470/7,200 V – 3ϕ, 4 wire |
| | 24,900/14,400 V – 3ϕ, 4 wire | | 21,600/12,470 V – 3ϕ, 4 wire |

### 3. Normal Operation of Interconnection

| **Briefly describe your intended method of operation:**<br>Discussion of when charging and discharging is expected to occur and any details on 'state of charge'. *(i.e. "the system will respond to ERCOT signaling for the ancillary services market. If not called upon the system will operate daily in the energy market")* |
|---|
| |

| **Briefly describe your protection scheme and back-up protection methods:**<br>*(i.e. In the event that PLC or system controller fails to operate for unintended system disturbances, please describe the intended failure scheme. Statements should explain the general inverter or system controller* |
|---|

| |
|---|
| *intended operation and use of the customer owned protective device at the PCC for failure protection. Please reference breaker and equipment labels for clarification.)* |
| |
| **If system connected nameplate capacities are greater than or equal to 10 MW, then please describe how the system is intended to operate to maintain less than 10 MW for charging and discharging:**<br>*(i.e. Primary control to maintain <10 MW will utilize system controller. Back-up control will be the reverse power setting on the customer owned protective device at the PCC. Please describe any additional control schemes provided by the inverters or if inverters have factory limited output.)* |
| |

## 4. Table of Equipment

Please provide totals and module sets of components for the Generation Resource.

| Equipment - Totals | | | | | | |
|---|---|---|---|---|---|---|
| | Qty | Manufacturer | Model Number | Nameplate Capacity (kW) | Total Nameplate Capacity (kW) | Certification |
| Inverters | | | | | | |
| Batteries | | | | Ah (per battery) | Total Ah | Volts |
| | | | | | | |
| Battery Composition | | | | Total Energy Storage Power (AC) kWh | | |
| | | | | | | |

## 5. AC, DC or Other Information

| AC, DC or Other Information | | | |
|---|---|---|---|
| | Parameter | Description | Value or Comment |
| AC | Inverter Short Circuit Information | Manufacturer Information | |
| AC | Inverter Maximum short circuit current contribution (p.u.) | Provide in p.u. | |
| AC | Inverter Harmonic Current Spectra (usually up to 50th harmonic) | Provide attachment | |
| AC | Power factor capability range at rated active power output | Manufacturer Information | |
| AC | Capability curve of the resource/inverter (if applicable) | Provide curve | |
| AC | Four quadrant operation? (Yes/No): | (Yes or No) | |
| AC | Maximum ac current output (kA): | kA | |
| AC | Rated ac coupling voltage (kV): | kV | |
| AC | Rated active power discharge (kW) | kW | |
| AC | Expected worst case discharging | _____ kW discharging for ___mins | |
| AC | Maximum power output/overload capacity (kW) | kW | |
| AC | Maximum power export to the grid in kW Energy Storage Power AC (kW) | kW | |
| AC | Rated active power during charge (kW) | kW | |

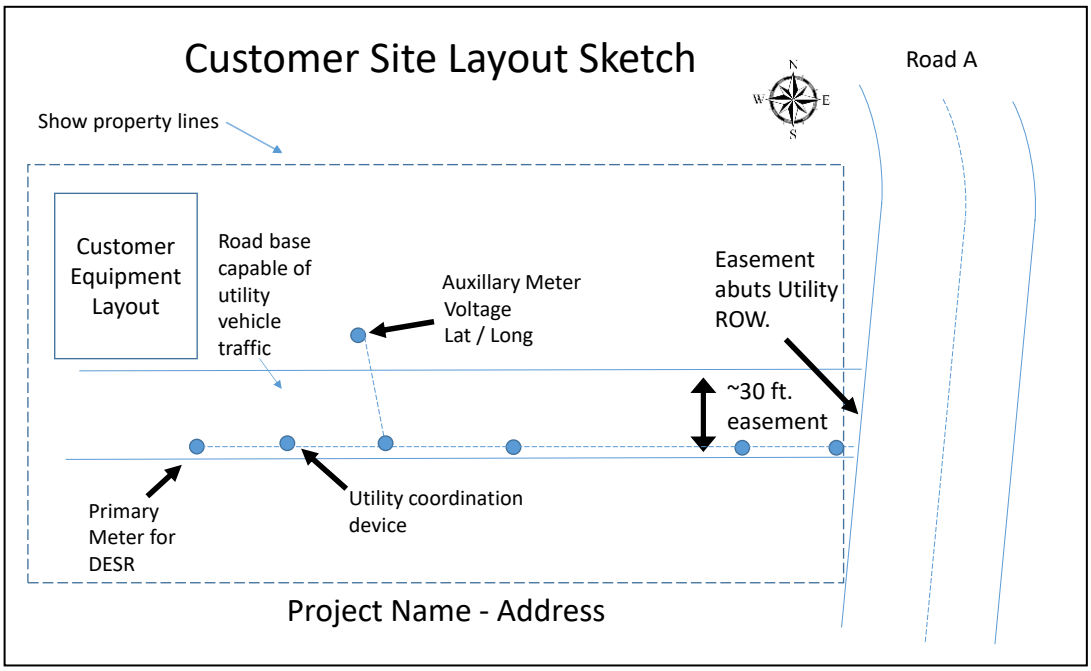
| | | | |
|---|---|---|---|
| AC | Expected worst case charging | _____ kW charging for ___mins | |
| AC | System ramp characteristics (up and down) -ideally a curve that shows in sub-second intervals going from zero to full discharge and full charge to full discharge to off | curve | |
| AC | Maximum rate of charge/discharge response (ramp up/ramp down limits): | kW/cycle | |
| AC | System response time when action is requested (for ramping up or down) | cycles | |
| AC | Customer requested ramp rate for charging | kW/minute | |
| AC | Customer requested ramp rate for discharging | kW/cycle | |
| AC | State pause time when changing from charging to discharging (or opposite) | seconds | |
| AC | Energy Storage Energy AC (kWh) | | |
| DC | Energy Storage Power DC (kW) | | |
| DC | Energy Storage Energy DC (kWh) | | |
| DC | DC Voltage range (V) | | |
| Other | Storage type (battery, flywheel, supercapacitors etc.) | | |
| Other | Storage technology type (chemical composition) | | |
| Other | Highest C-rate during discharging | | |
| Other | Will the resource be charged from the utility grid? (Yes/No): | | |
| Other | Specific charging time period of the day (if fixed and applicable): | | |
| Other | Expected system Cycle life (#) | | |
| Other | Expected System Calendar Life (years) | | |
| Other | Expected number of full cycles per year | | |
| Other | Round Trip Efficiency (AC-AC) (%) | | |
| Other | Manufacturer | | |
| Other | Model | | |
| Other | Version | | |

## 6. Required Attachments

| Requested Attachments | |
|---|---|
| PSCAD model for the BESS and Inverter | All the relevant project files, libraries along with a workspace file that loads all the necessary project files for simulation. |
| | Documentation with information on the required compiler, required simulation time step range, basic model setup, list of tunable parameters, and any limitations. |
| | Instructions to update the user settable parameters to change the active and reactive power output of the resource, protection limits etc. |
| PSS/E Equivalent Model (v33) | Load flow files (*.sav, *.raw) of the asset with the resource modeled up to the Point of Interconnection. |
| | Dynamic model files (*.dyr, *.lib, *.obj) of the asset including all the equipment up to the Point of Interconnection. |
| | Supporting documentation for the inverter model setup and simulations indicating capability in all the applicable modes of operation |
| Battery Data Sheet | Please provide any specification sheets for the battery data |
| Inverter Data Sheet | Please provide the manufacturer data and specification documents |
| Relay Functional One Line | Please provide electrical one-line (show battery combinations) |
| Load Form for Auxiliary Load | Please complete the attached Oncor "Commercial and Industrial Load Requirements" form |
| Site Layout (with Aux.) | Please provide site layout with auxiliary service points |
| Ramp rate curves (battery ramp characteristics) | If available, please provide battery ramp characteristics from full off to full load and opposite for maximum ramp rates |
| Inverter Harmonic Current Spectra (usually up to 50th harmonic) | Please provide manufacturer information |

## 7. Customer Layout Sketch [Right-of-Way and Easements]

Please provide as much detail as possible concerning paths and locations to allow utility designers to prepare estimates for construction. In many cases the Customer and Oncor will have to work together to determine the path from Customer location to the Oncor substation. Please show a proposed 30 ft. wide right-of-way providing a path to allow Oncor trucks and equipment to have access to the Primary and Auxiliary metering points (need road base for truck access). Please show paths with potential poles on one side of the road. Please provide any legal plats, descriptions or rights of way for review of easements. Please demonstrate that the entire path to the metering locations allow Oncor ingress and egress at all times.



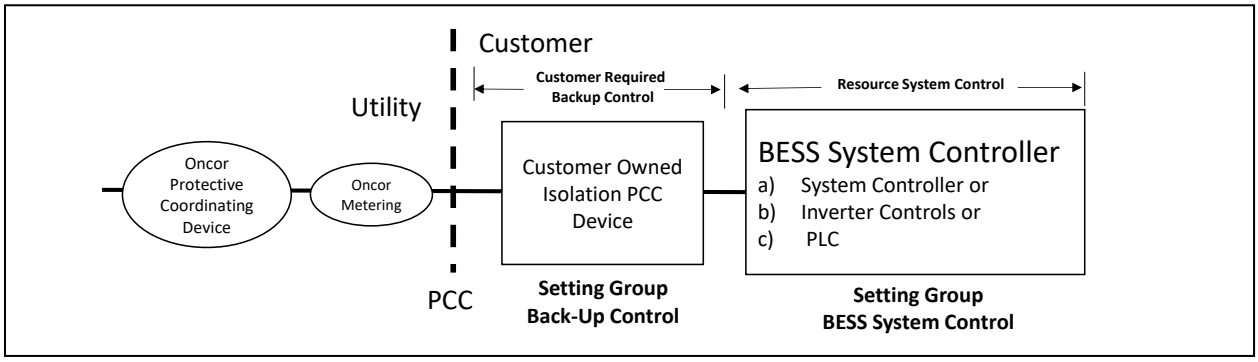

## 8. One-Line Relay Functional Diagrams

The one-line diagram is intended to be a stand-alone document which describes the electrical and protection schemes for the project. Please add comments to accompany drawing details such as operationally capability to switch out module sets consisting of groups of transformer, inverter and battery modules if this effects the modeling and operations of the facility.

| **Relay Functional Diagram Checklist** | **Check to Confirm** |
|---|---|
| Point of Common Coupling for BESS (PCC) | |
| Point of Common Coupling for Auxiliary Service (PCC) | |
| Delivery voltages at the PCC's | |
| Metering point(s) | |
| Protective devices at the PCC's (breakers, disconnects, transformers, VT's, etc.) | |
| Coordinating isolation device at the PCC (BESS / Auxiliary ) | |
| Relay manufacturer and model number for BESS isolation device | |
| VT configuration symbols (Wye, delta, corner delta, etc.) | |
| Sensing equipment ratios and quantity | |
| Required relaying elements for Isolation device (27/59, 81O/U, 67N or 59N, 32) for BESS | |
| Generator kW and voltage | |
| Transformer high and low side voltages, impedance (%), and kVA | |
| Transformer isolation schemes if i.e. one unit is taken out of service | |
| Normal breaker position (N/O or N/C) | |
| Breaker labels (i.e. UM-1 or GM-2 utility, etc.) | |

## 9. Relaying Settings and Relay Test Reports

Setting guidelines are subject to review at time of commissioning and can be dependent on ERCOT minimum ride-through requirements. Please note that Oncor approved settings may vary depending on results from the DGR Integration Studies. Shown in the graphic below are the Customer required **Back-Up Control** and **BESS System Control** setting groups.



## Oncor has established required settings for these control groups as follows:

### A. Frequency Ride-Through Settings / Voltage Ride-Through

Setting Group – "System Control" (see graphic above)

| Oncor Required Frequency Ride Through – BESS System Control | | |
|---|---|---|
| Shall Trip function | Frequency (Hz) | Clearing Time (seconds) |
| OF2 | 61.81 | 0.16 |
| OF1 | 61.2 | 299 |
| UF1 | 58.8 | 299 |
| UF2 | 56.99 | 0.16 |

| Oncor Required Voltage Ride-Through – BESS System Control | | |
|---|---|---|
| Shall Trip Function | Voltage (p.u. of nominal) | Clearing Time (seconds) |
| OV2 | 1.2 | 0.16 |
| OV1 | 1.1 | 12 |
| UV1 | 0.88 | 20 |
| UV2 | 0.70 | 10 |
| UV3 | 0.50 | 1.0 |

### B. Frequency Ride-Through Settings / Voltage Ride-Through

Setting Group – "Back-Up Control" (see graphic above)

| Oncor Required Frequency Ride Through – Back-Up Control Settings | | |
|---|---|---|
| Shall Trip function | Frequency (Hz) | Oncor Trip Settings (seconds) |
| OF2 | 61.81 | 0.16 |
| OF1 | 61.2 | 300 |
| UF1 | 58.8 | 300 |
| UF2 | 56.99 | 0.16 |

| Oncor Required Voltage Ride-Through – Back-up Control Settings | | |
|---|---|---|
| Voltage (p.u. of nominal) | Voltage (p.u. of nominal) | Clearing Time (seconds) |
| OV2 | 1.2 | 0.16 |
| OV1 | 1.1 | 13 |
| UV1 | 0.88 | 21 |
| UV2 | 0.70 | 11 |
| UV3 | 0.50 | 1.16 |

## C. Power Control

Setting Group – "BESS System Control" (see graphic above)

*Please provide the following settings:*

| "BESS System Control" Limiting Active Power during Discharging | | |
|---|---|---|
| | Pick-Up (kW) | Total Clearing |
| 32 – Phase A | | |
| 32 – Phase B | | |
| 32 – Phase C | | |

## D. Power Control

Setting Group – "Back-Up Control" (see graphic above)

*Please provide the following settings:*

| "Back-Up Control" - Limiting Active Power during Charging | | |
|---|---|---|
| | Pick-Up (kW) | Total Clearing |
| 32 – Phase A | | |
| 32 – Phase B | | |
| 32 – Phase C | | |

| Please describe your reactive power capability settings: |
|---|
| |

## E. Setting Review Process Discussion – Information Format Oncor

While Oncor will want to review actual setting files from relays and inverter controllers, Oncor requests that the information be initially condensed to a few pages for a summary review. Please provide a Summary Setting Sheet for a) Setting Group – "BESS System Control" and b) Setting Group Back-Up Control. Please include all relevant settings such as ramp rates, reactive power or other common protective settings in these summary sheets.

| Relay Settings Checklist | Check to Confirm |
|---|---|

| | |
|---|---|
| Summary setting sheet for inverter or system controller | |
| Summary Setting Sheet for relay at the PCC | |
| Provided settings for momentary cessation or trip | |
| When applicable, please show conversion calculations to determine characteristics at the PCC (i.e. showing calculations for each inverter times the quantity or values showing the total ramp rates applicable at the PCC ) | |