

Distributed Energy Resource (DER)

Origination, Attributes, PRR/OGRR

QSTF - October 2, 2009

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Agenda

Agenda (30 min)

- a) General Description of DER
- b) Why DER
- c) Timeline to date
- d) DER Defined
- e) DER RRS Attributes
- f) Synchronous Condenser Fast-response Hydro RRS
- g) DER RRS draft PRR and OGRR
- h) SB361

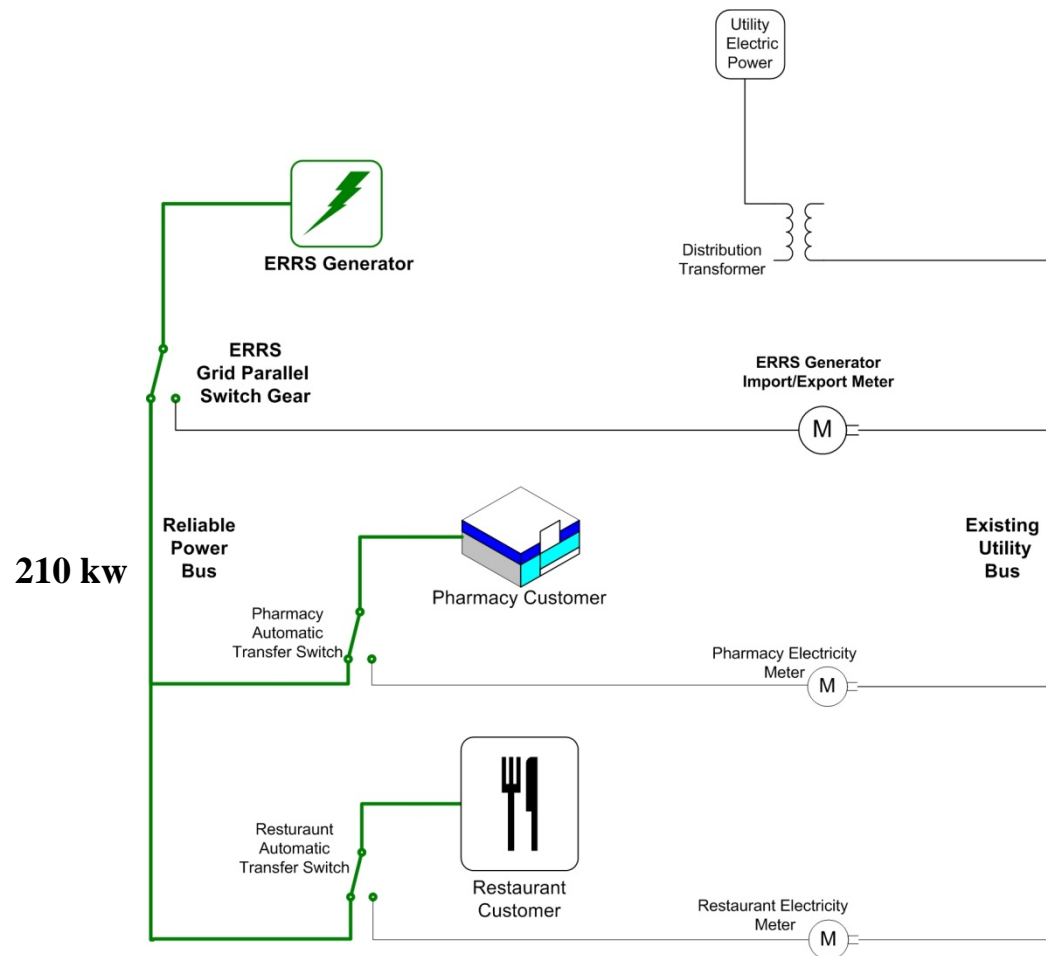
ERRS

Reliability System

The ERRS **Reliability System** is a *standardized*, 500 kilowatt generator, associated switchgear and controls, which operates in 2 distinct Modes:

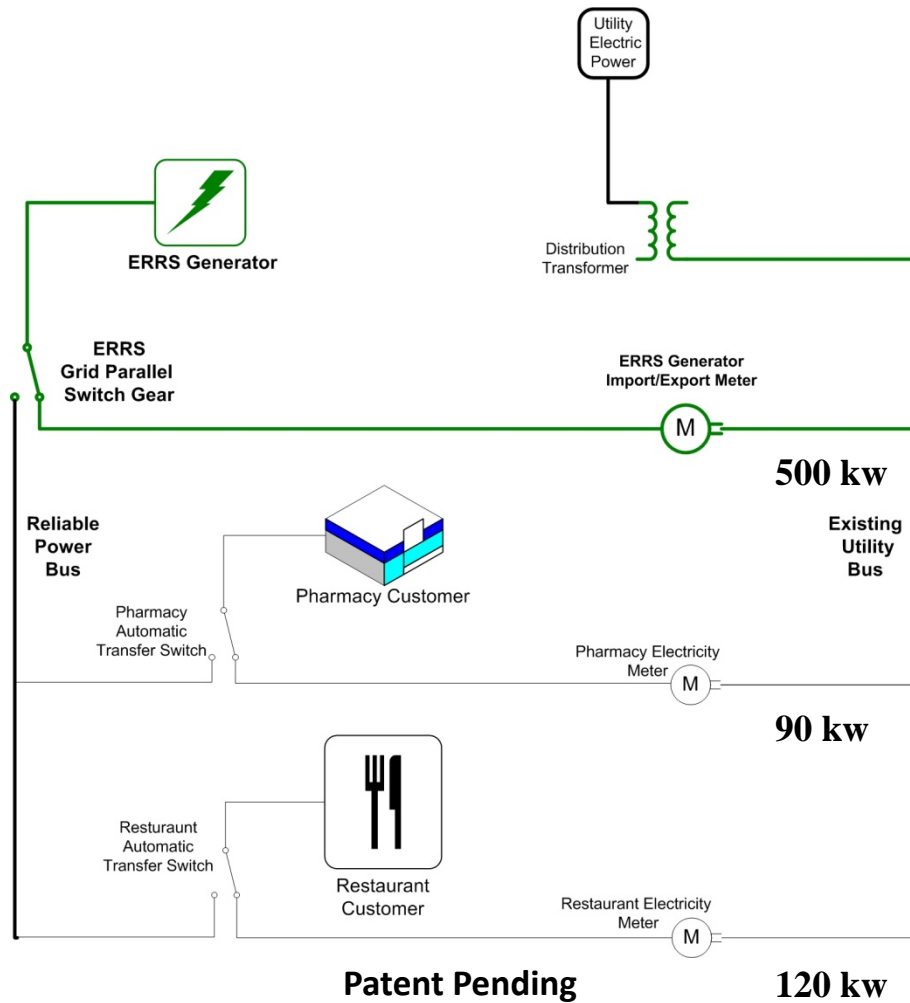
- I. **Customer Reliability:** Connects behind the meter through a transfer switch to the business facility and runs in disconnect mode during a power outage
- II. **Grid Reliability:** Connects directly to the distribution feeder for parallel/export operations, bypassing the customer meter

Customer Reliability Mode



Patent Pending

Grid Reliability Mode



Why DER and Not Load Resource

- Load Suitability. The customer loads served are not suitable for participation as Load Resource (LR), given highly variable consumption patterns, size of load and customer aversion to service interruption. The ERRS Reliability Systems, on the other hand, if exporting directly to the distribution feeder, are very suitable to participate, given fast, reliable response and predictable, consistent output. The DER bid is the consistent, metered output of the DG instead of a highly variable load.
- Capacity Factor. LR does not allow for exporting through a closed load breaker, thus the bid is limited to the load at the time of interruption. Many distribution level generation assets are designed to a 2-3x overcapacity factor to manage starting currents when disconnected from the grid. This extra capacity is wasted if bid in through LR.
- Multiple Customers. ERRS will be serving multiple customers at the same location when we install our Reliability System at shopping centers, hotel/restaurants, etc. Administratively it is untenable for both ERRS and ERCOT to try to manage 4-5 separate LC bids from a single DG asset. It is much more efficient and streamlined to have 1 DG bid than 5 LR bids.

Timeline

- 10/08: Introduction of concept to ERCOT Staff
- 12/08: Exploration of CLR applicability
- 2/08: “Negative” LaaRs equivalent approach
- 3/08: ERRS registration as Resource Entity
- 4/08: Initial application for LaaRs Resource submitted and accepted; follow-on email from ERCOT staff said PRR was necessary because of “export interconnect”
- 5/09: Centerpoint interconnection approval of RS, up to operational testing
- 6/09: ERCOT staff/ERRS draft PRR
- 7/09: PRR 825 submitted
- 8/09: PRR 825 rejected due to response time in seconds, not cycles. On 8/25/09, PRS voted to reject PRR825 and to refer the “Distributed Energy Resource” topic to the Quick Start Task Force of the WMS for further consideration.
- 9/09: ERCOT Meeting w/Sr Ops staff (Doggett, Saathoff, Dumas, Wattles) on 9/18; determined that best fit for DER was in same category as synchronous condenser fast-response hydro with 4 seconds positive gen, 10 seconds full output. Recommended presentation of draft PRR to ROS and WMS in October meetings, with briefing for QSTF

DER Defined

- **Distributed Generation:** As defined by P.U.C. SUBST. R. 25.211, Interconnection of On-Site Distributed Generation (DG), an electrical generating facility located at a customer's point of delivery (point of common coupling) of ten (10) megawatts (MW) or less and connected at a voltage less than sixty (60) kilovolts (kV) which may be connected in parallel operation to the utility system.
- DER RRS is DG that is:
 - ≤ 2 MW
 - Capable of starting on under frequency conditions through relay action in seconds or dispatch instruction in less than 10 minutes
 - All necessary safety and control functions required by local TDSP company
 - All necessary 2-second telemetry required by ERCOT

DER Attributes - 1

- ***Response time and shape:*** Symmetrical, < 10 seconds
 - Positive generation in ≤ 4 seconds
 - Standby to full output in < 10 seconds
 - Full output to Standby in < <10 seconds
 - Standby: offline and not synchronized
- ***Deployment:*** Dispatch instruction or under frequency relay auto-start @ 59.9 Hz
- ***Runtime characteristics***
 - Multiple starts within the same day
 - Min Runtime: None.
 - Max Runtime:
 - Limited by TCEQ permitted hours, typically 10% of available hours/year
 - Not limited by fuel availability
 - Reliability, not Energy, assets

DER Attributes - 2

- **Telemetry:** as required by ERCOT.
- **Resource Bid Size:**
 - Consistent Resource specific bid independent of customer load curve;
 - Function of generator output
 - Not a function of weather, economics, timing of business process, etc.
- **Diversified aggregation** of many small units
 - Greatly diminished operational risk
 - Aggregate bid for DER classification fairly consistent over time, similar to Load Acting as Resources (LaaRs), where Resources-specific outages do not materially affect the total DER available to ERCOT
- **Congestion:** No Transmission and Distribution (T&D) losses since DER is next to and displaces load

ERCOT Recommendation

Equivalent to Syn Cond Fast Response Hydro

- **From ERCOTs comments on PRR 825:** “Hydro Resources today, for example, must respond to frequency excursions of 59.9 Hz and only that capacity that can respond within ten (10) seconds may be used for RRS as indicated in Operating Guide Section 2.5.2.3, Types Of Responsive Reserve. ERCOT Operations recommends similar performance requirements for DERs based on the understanding referenced in paragraph (a) above. The behavior of DER is similar to that of hydro resources operating in synchronous condenser mode as opposed to under-frequency relays, as the response time is in seconds as opposed to cycles. There is more value added with a trigger level of 59.9 Hz on DER because if set at a lower frequency target (e.g. 59.7 Hz), under-frequency relays will act first, raising the frequency faster than the DER can respond, diminishing its utility.”
- **2.5.2.3 Hydro Responsive Reserve.** Hydro unit(s) operating in the synchronous condenser fast response mode may be designated as Hydro Responsive Reserve provided that:
 - Only the amount of a hydro unit's demonstrated ten (10) second response may be used as Responsive Reserve subject to verification as described in Protocol Section 6.10, Ancillary Service Qualification, Testing and Performance Standards;
 - Automatic controls using the "fast response" mode must be in operation to initiate a move to the generating mode. The initiation setting of the automatic controls shall not be any lower than 59.9 Hz and the unit must be generating within four (4) seconds of the set relay operation;
 - A Real Time signal of the MW output of hydro units being operated in the synchronous condenser fast response mode is telemetered to the ERCOT.
- **ERCOT 9/18 Mtg:** Definitive recommendation to proceed down Synch Cond Fast Resp Hydro instead of PRR 825 LaaRs equivalent path

DER RRS

PRR/OGRR

PRR: Section 2.1/2.2 Definition and 6.5.4 Para (1): Responsive Reserve Service (RRS) may be provided by ... [new section] (f) *Distributed Energy Resources*

OGRR: 2.5.2.3 ...*Distributed Energy Resource.* Distributed Energy Resource (DER) unit(s) operating in fast response mode may be designated as DER Responsive Reserve provided that:

- Only the amount of DER demonstrated ten (10) second response may be used as Responsive Reserve subject to verification as described in Protocol Section 6.10, Ancillary Service Qualification, Testing and Performance Standards.
- Automatic controls of DER must be in operation to initiate a move from standby mode to the generating mode. The initiation setting of the automatic controls shall not be any lower than 59.9 Hz and the unit must be generating within four (4) seconds of the set relay operation.
- A Real Time signal of the MW output of DER being operated is telemetered to the ERCOT.

T&D Risk

- DER T&D is risk equal to or less than most other Resources from an ERCOT operational perspective.
- As long as DER capacity is less than the load on that distribution circuit, the loss of that distribution circuit looks like generation coming on line/load shedding at the bulk transmission level.
- This is not true for transmission-level resources, where if the interconnection and/or transmission line connecting the Generation Resource to the transmission grid fails, there is a loss of generation that needs to be replaced.

SB361

- The 81st Texas Legislature passed of [SB361](#) which Governor Perry signed into law
 - *“affected utility shall: ...ensure the emergency operation of its water system during an extended power outage as soon as safe and practicable following the occurrence of a natural disaster and...”*
- The Texas Commission on Environmental Quality (TCEQ) Project # [2009-032-290-PR](#) will require many water service providers in the Houston metropolitan area to submit their plan for emergency electrical service early next year.
- Per SB361, one of the primary tenets of this plan must be the ability to supply electrical power from onsite generation to maintain water service operations when utility power is not available.
- Plans/decision made in Q4 '09