

# 2019 Distributed Energy Resources (DER) that participate in PJM Markets as Demand Response

PJM Demand Side Response Operations

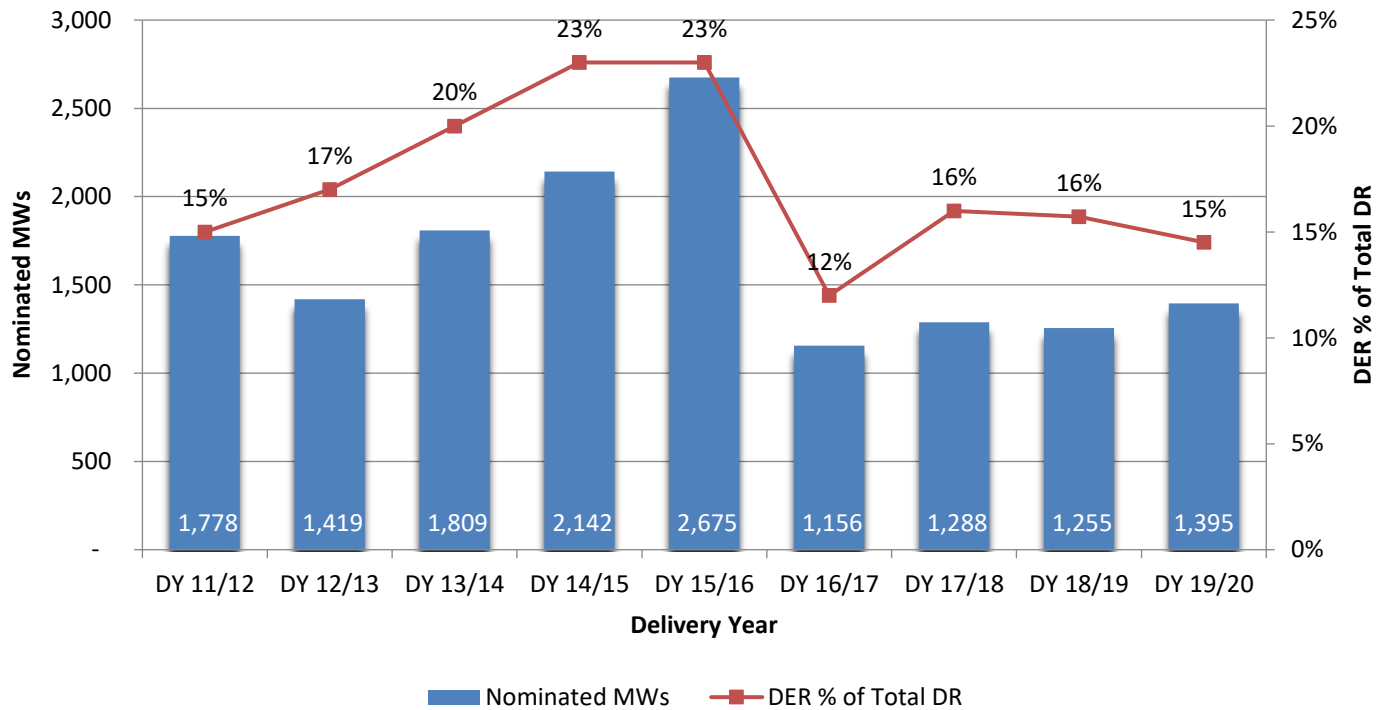
February, 2020



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For the purposes of this report PJM will refer to behind the meter devices capable producing electricity in Demand Response as “DR DER”.

**Figure 1: Demand Response from DER in Capacity Market**



DER participation in the Capacity Market as Demand Response, represented here both in MW volume and as a percentage of overall Demand Response volume, showed steady growth through 15/16 DY and then dropped by close to 50% in 16/17 DY. For 19/20 DY the amount of DR DER went up by 140MW and its share of total DR remained close to two previous delivery years.

*Observation:* Based on discussions with CSPs, PJM believes the drop in 16/17 DY was due to U.S. Court of Appeals for the District of Columbia Circuit issuing a mandate (May 1, 2015) vacating specific RICE NESHAP and NSPS provisions for Emergency Engines with the further guidance released by the EPA on April 15, 2016.

**Figure 2: DER Capability in DR Programs (2019 for Economic and 19/20 DY for Load Management)**

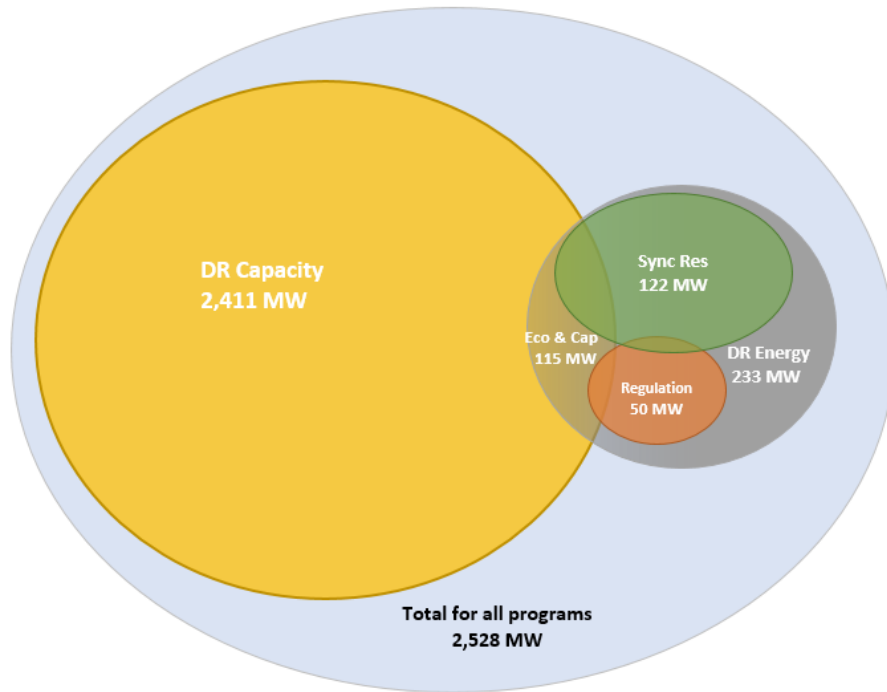
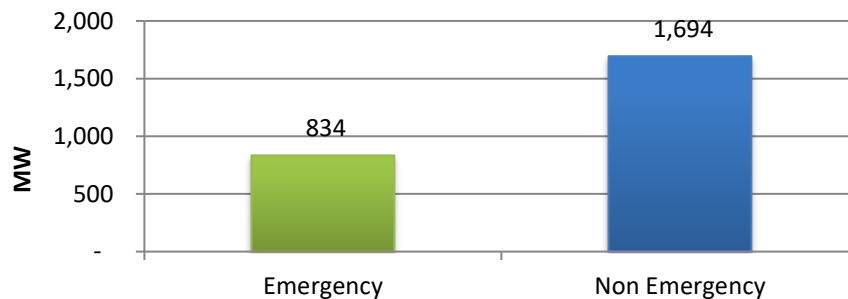


Figure 2 shows MW capability of DERs registered in Demand Response programs. Of 2,411 MW registered in capacity market, only 115 MW also participate as Economic DR in the Energy and Ancillary Service wholesale markets. 118 MWs of DR capability are registered as Economic DR only. This brings total DR DER capability to 2,528 MWs. The majority of DERs participating as Economic DR have been certified to provide ancillary services (172 MW).

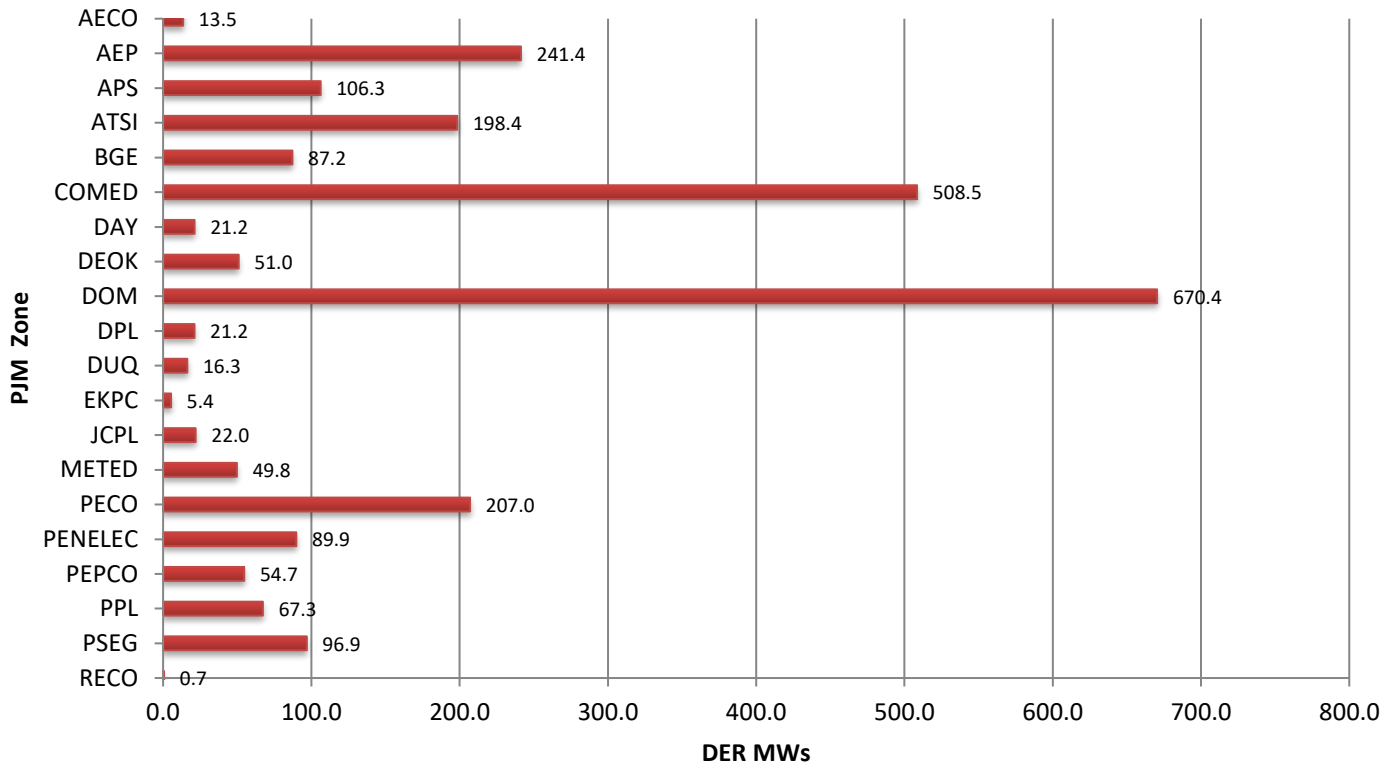
Notes: Values are CSP reported nameplate MWs for DER participation. These DER capability values may exceed nominated MWs for capacity resources because, in some cases, only partial capability may be offered. DER capability for economic registrations is captured as of 12/2019.

**Figure 3: DER capability by generator permit type**



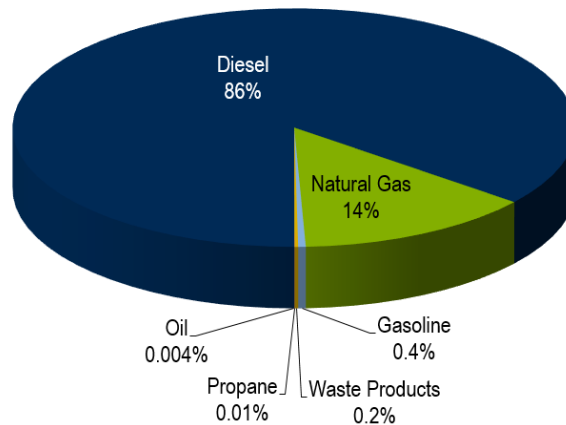
Emergency generators account for approximately half of total DER nameplate capability. Generators with an emergency permit can only operate during emergency conditions. Even if they have extra capability beyond their load they cannot use it unless they upgrade machine and/or upgrade emergency permit to non-emergency permit.

**Figure 4: DR DER Registered MW Capability by Zone**



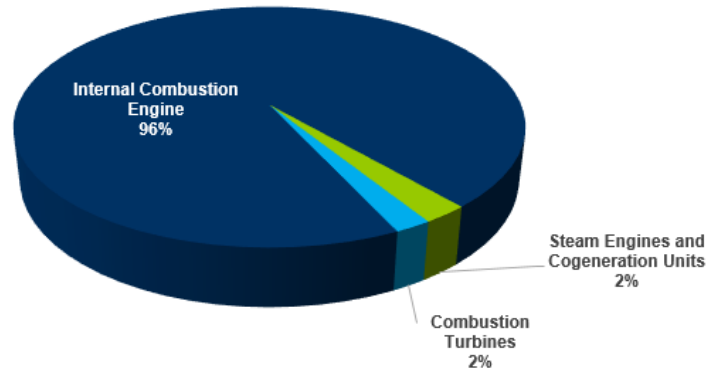
Note: Values are CSP reported nameplate MWs for DER participation. Locations that participate in both Load Management and Economic are included only once.

**Figure 5: DR DER Registered MW Capability (19/20 DY) Fuel Mix with Behind the Meter Generation**

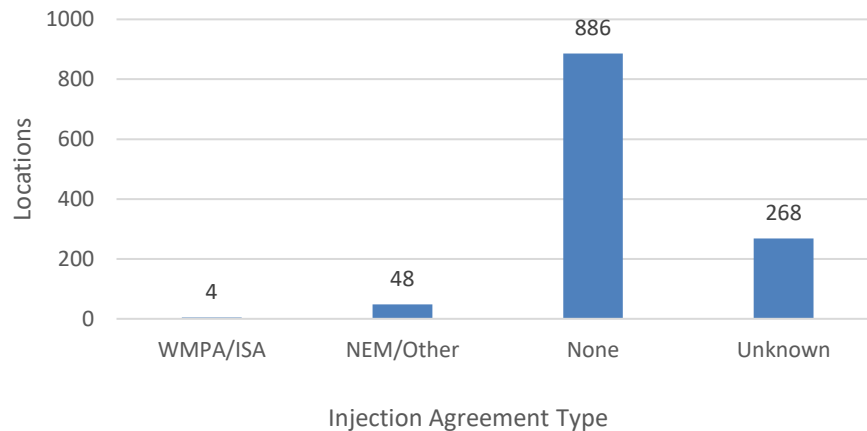


Fuel mix for behind the meter generation that participates in Capacity Market as Load Management for DY 2019/20 predominantly consists of diesel (85.6%) and natural gas (13.8%) which make up a combined 99.4% of the total fuel types. This is consistent with previous delivery year.

**Figure 6: DR DER Registered generator count by engine type (2019 for Economic and 19/20 DY for Load Management)**



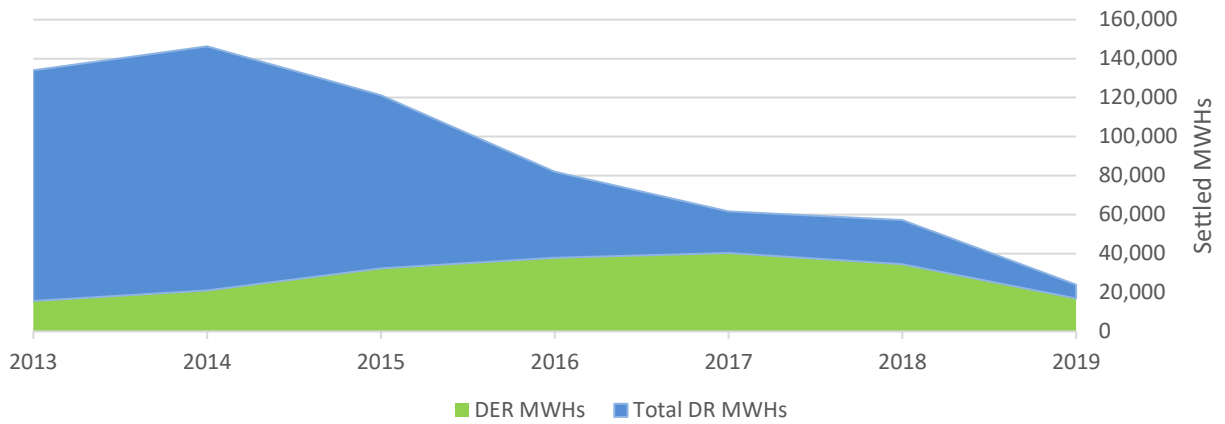
**Figure 7: DR DER Registered Locations by interconnection agreement type**



Majority of locations with behind the meter generator or battery do not have any agreement to export excess energy onto the grid. As of time of this report there are only 4 locations that have a wholesale agreement (WMPA/ISA) and 48 locations that have other retail level agreement to inject energy onto the grid<sup>1</sup>.

<sup>1</sup> There are 268 locations with unknown agreement status.

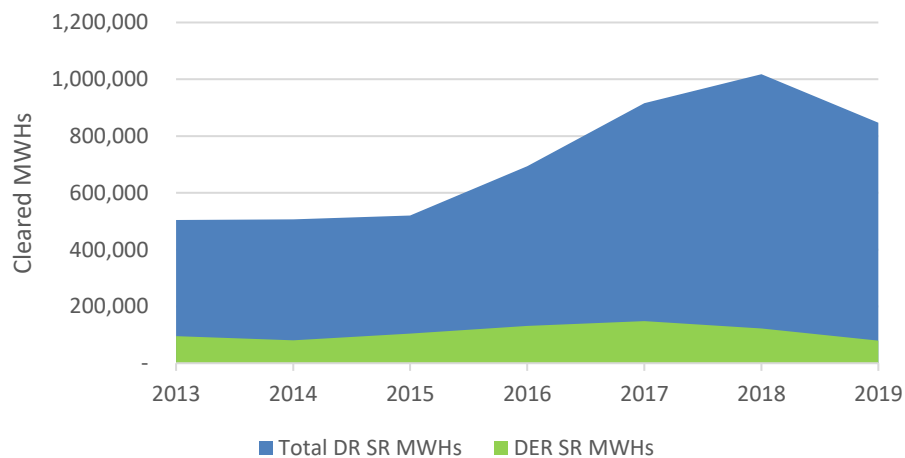
**Figure 8: PJM Demand Response Economic Energy Settled MWhs Trend**



DR DER participation in Economic Energy market in 2019 decreased by more than a half from 2018. At the same time, the share of DER participating as Demand Response gradually increased from 2013 level, thus, driving the DER/Total DR ratio up to 70% in 2019. This means the majority of economic DR activity in the energy market in 2019 came from DER.

\*Note: 2019 settled MWhs number may increase when all settlements for events in December get confirmed. The final number will be reflected in 2020 DER report.

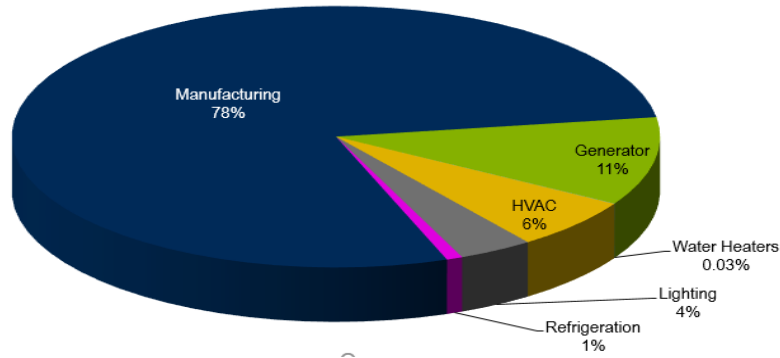
**Figure 9: PJM Demand Response Synchronized Reserves Cleared MWhs Trend**



DR Synchronized Reserves settled MWhs decreased by 17% from 2018. DER share of Total DR in 2019 decreased slightly from the previous year as well.

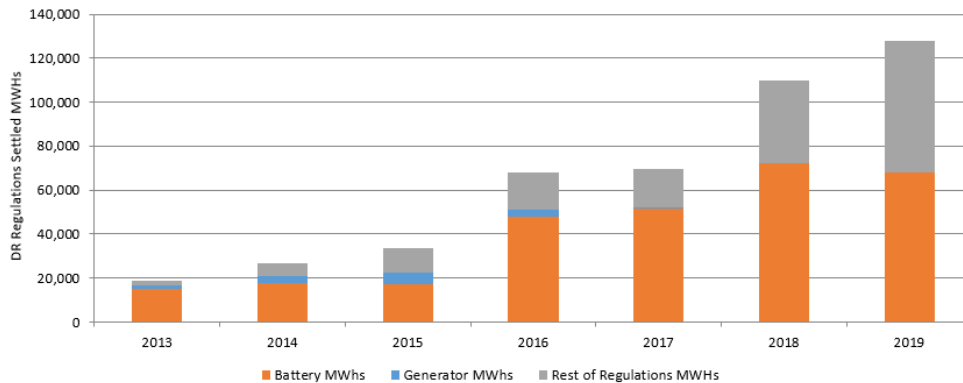
Note: PJM findings are based on extrapolation of DR capability by load reduction method submitted by curtailment service providers. PJM does not know what load reduction method was deployed in any given event.

**Figure 10: 2019 PJM Demand Response Confirmed Synchronized Reserve Registrations Load Reduction Methods**



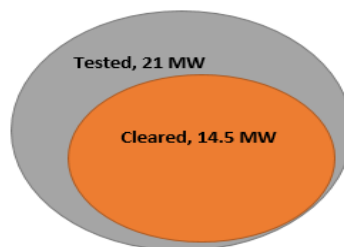
Behind the meter generators represent only 11% of total Synchronized Reserves participating as Demand Response while the load reduction from the adjustment of a manufacturing process leads with 78%.

**Figure 11: PJM Demand Response Regulation Settled MWhs trend for DER**



Behind the meter battery storage participation in DR regulation market decreased in 2019 by 5% from 2018. Batteries share of total DR provided has decreased by 20% from 2017 to 53% in 2019, while total MWhs participation increased from 70,000MWhs to 128,000MWhs accordingly. The reason for the drop in the amount of regulation from batteries is due to growth of non-battery DR participation. Electrical water heaters contributed to the growth in 2019 and accounted for 47% of regulation participation.

**Figure 12: 2019 DR DER Regulation MW participation**



DERs cleared volume in regulation market was at about 70% of the tested capability. Cleared capability is a sum of the highest amount cleared for each resource during 2019.