

2024 Distributed Energy Resources (DER) that participate in PJM Markets as Demand Response

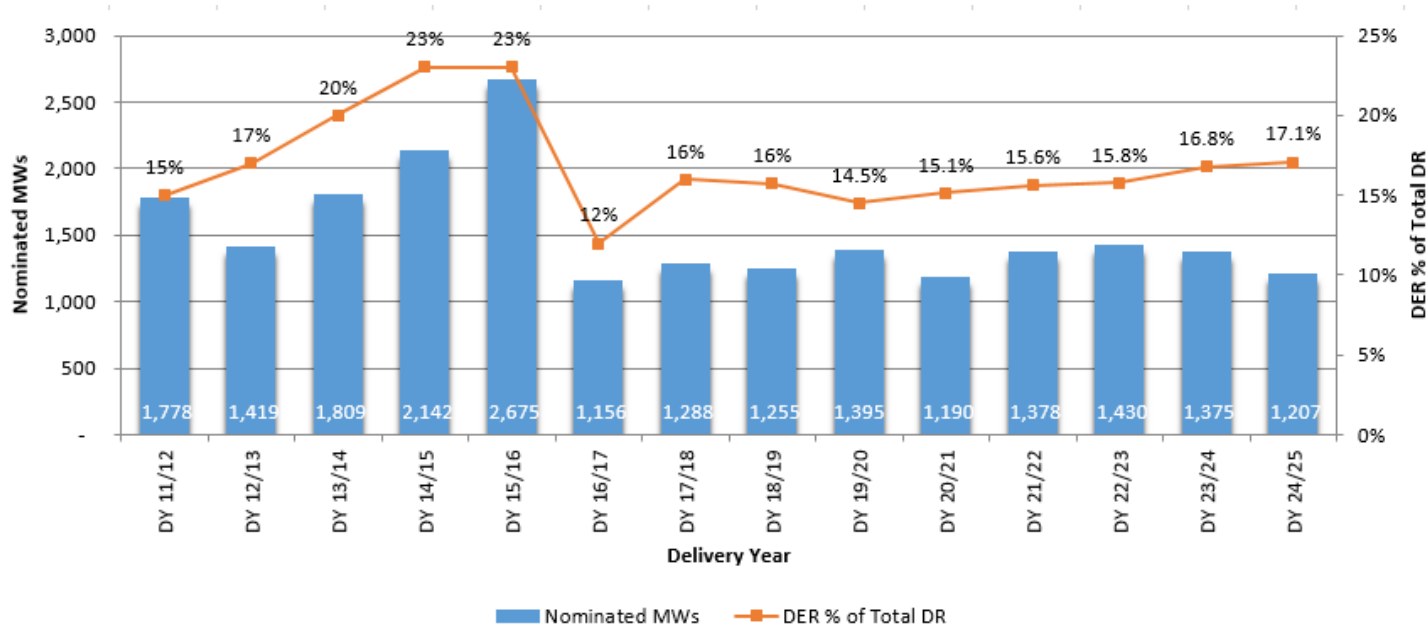
PJM Demand Response Operations

February, 2025



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 24/25 DY the amount of DR DER decreased from previous year by about 170MW and its share of total DR remained similar to 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 Registered Capability in DR Programs (2024 for Economic and 24/25 DY Load Management)

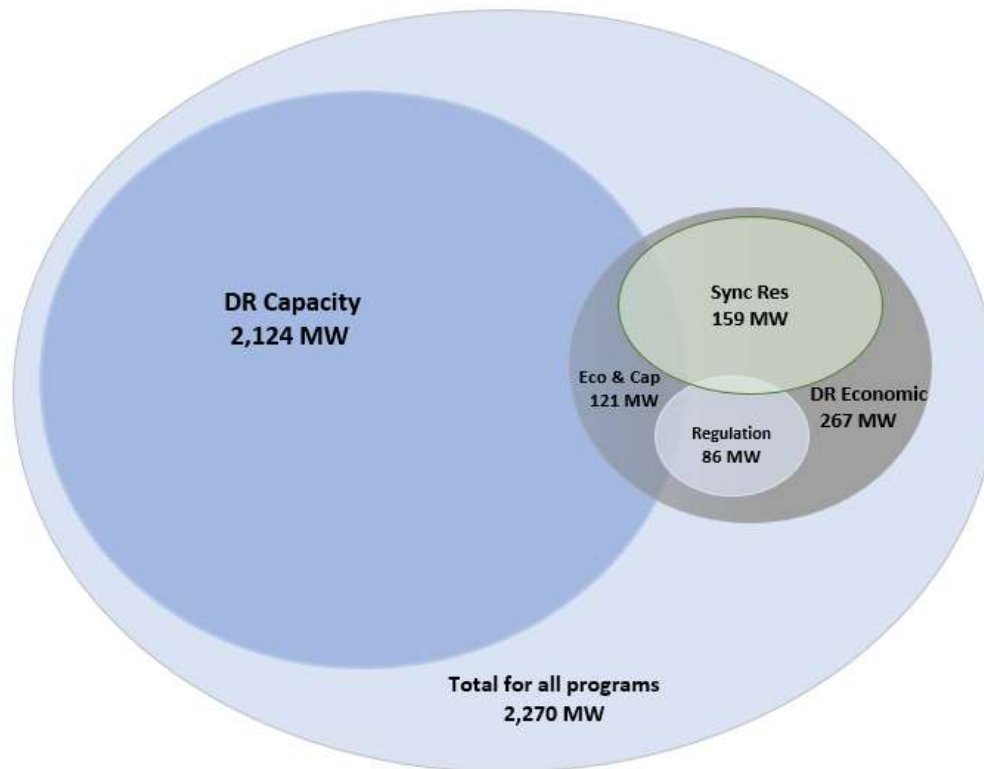
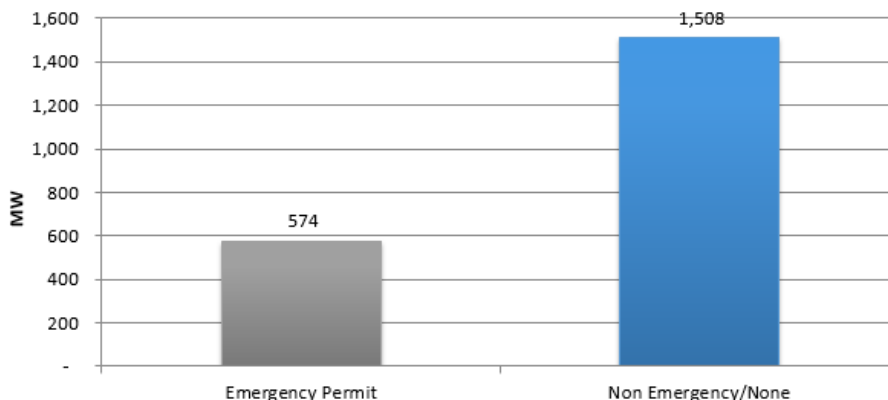


Figure 2 shows assigned for load reduction MW capability for DERs registered in Demand Response programs. Of 2,124 MWs registered in capacity market, only 121 MWs also participate as Economic DR in the Energy and Ancillary Service wholesale markets. 267 MWs of capability are registered as Economic DR. Total DR DER capability is 2,270 MWs. 84% of DERs participating as Economic DR have been certified to provide ancillary services.

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 3 locations that have a wholesale agreement (WMPA/ISA) and 36 locations that have other retail level agreement to inject energy onto the grid. Out of total 2,769MW nameplate capability only 274MW are associated with those that have an agreement to inject. The total amount of injection capability is estimated to be around 30MW. It is calculated as an excess MW capability of the generator/battery nameplate over the location's average load reading (available to PJM)

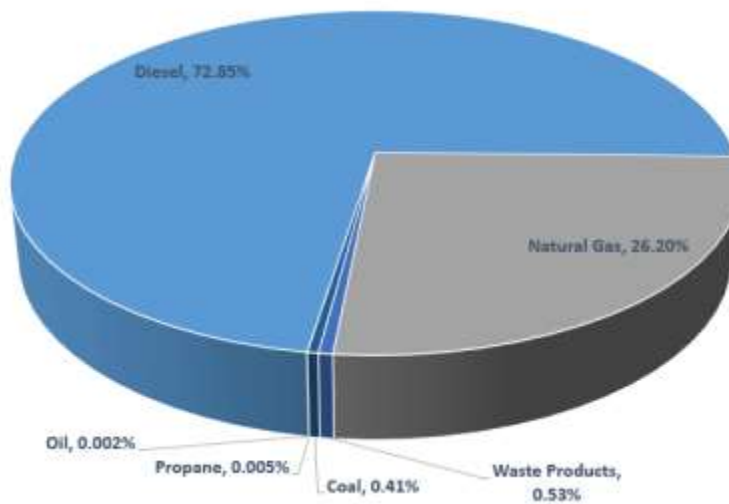
Notes: Values are CSP reported max output MWs assigned to reduce load in DR programs (real nameplate capability is higher and described in this report). These DER max output values may exceed nominated MWs for capacity resources because, in some cases, only partial capability may be offered. DER capability for economic registrations is captured as of 1/2025.

Figure 3: DER registered DR capability by generator permit type



Emergency generators account for approximately one quarter of total DER with generators registered capability (2,269MWs). Generators with 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 Registered generator MWs by fuel mix (2024 for Economic and 24/25 DY Load Management)



Fuel mix for behind the meter generation that participates in DR predominantly consists of diesel (73%) and natural gas (26%) which make up a combined 99% of the total fuel types. This is consistent with the previous year. Batteries are excluded from this chart.

Figure 5: DR Registered generator count by engine type (2024 for Economic and 24/25 DY for Load Management)

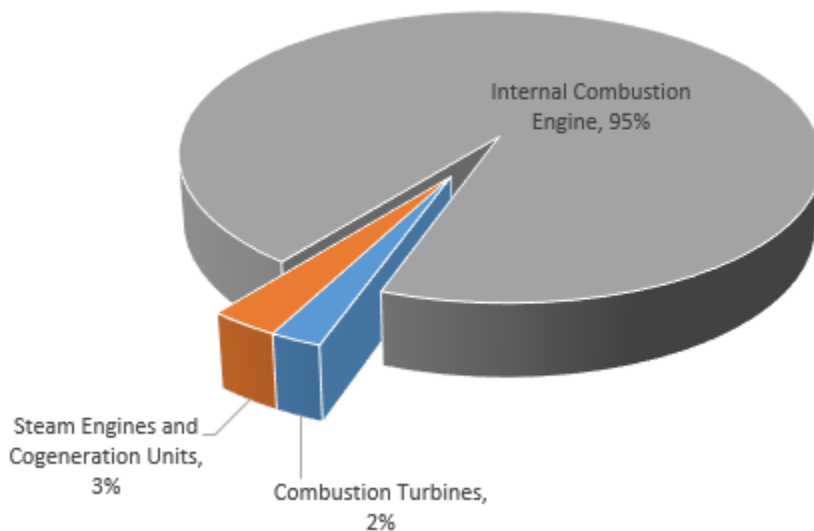


Figure 6: 2024 Batteries vs Generators DR registered MW capability

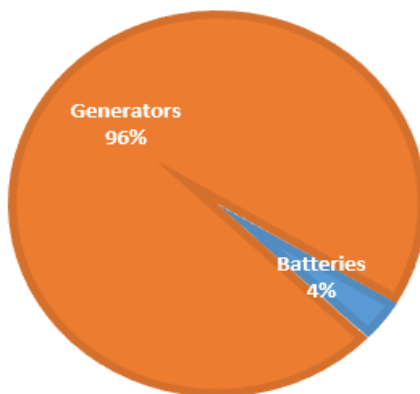
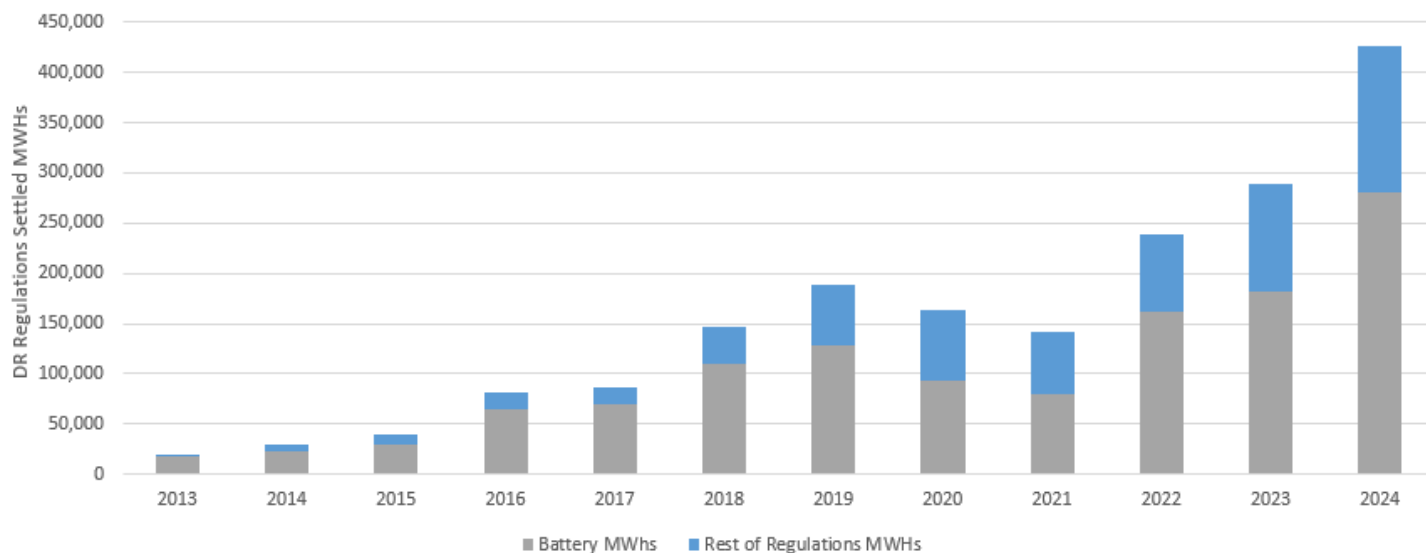


Figure 7: PJM Demand Response Regulation Settled MWhs trend for DER



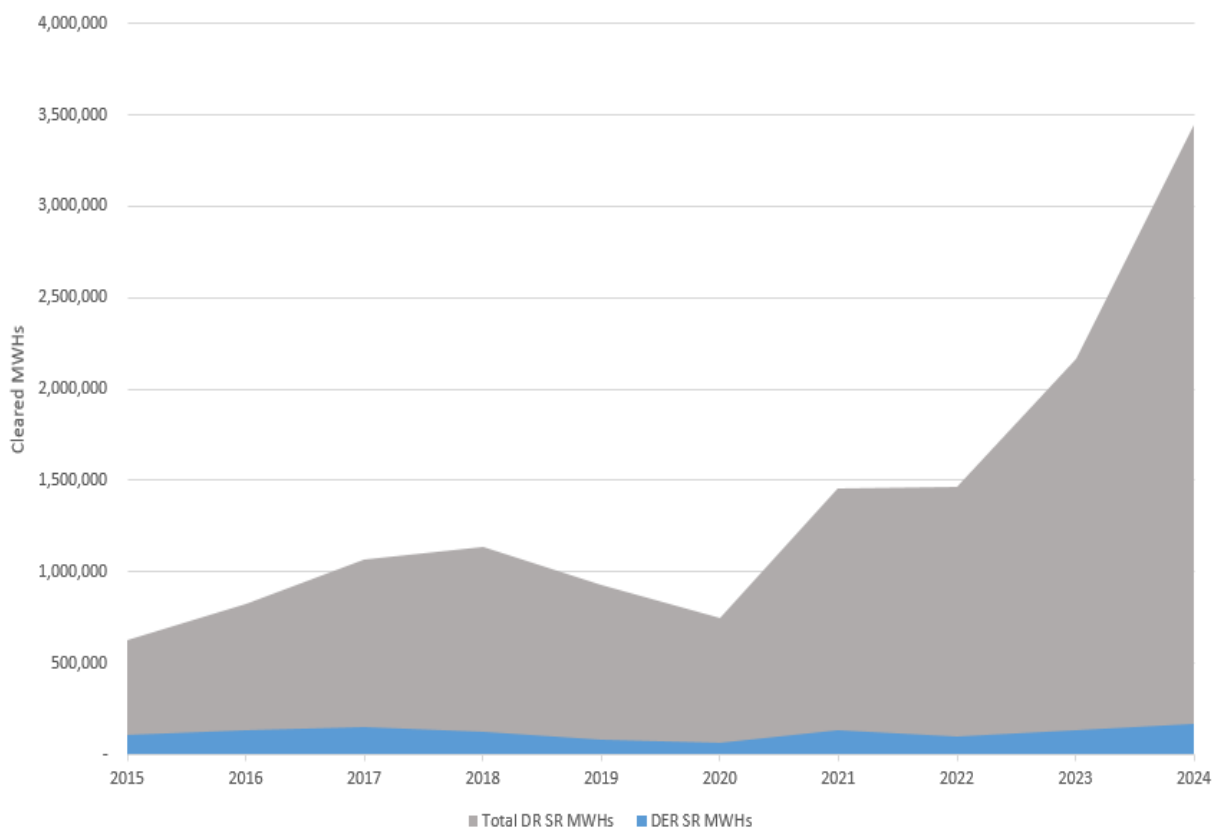
Behind the meter battery storage participation in DR regulation market increased in 2024. Batteries share of total DR increased by 50% from 2023. Electrical water heaters contribution (rest of regulation) also increased.

Figure 8: 2024 DR DER Regulation MW participation



DERs cleared volume in regulation market was at about 96% of the tested capability. Cleared capability is calculated as a sum of the highest amount cleared for each resource during 2024.

Figure 9: PJM Demand Response Synchronized Reserves Cleared MWhs Trend



DR Synchronized Reserves cleared MWhs increased by 25% from 2023. DER share of Total DR in 2024 remained approximately the same (5%).