2021 OMS DER Survey Results

June 30, 2021
Executive Summary

This is the fourth year of OMS DER Survey

In the past we’ve only requested information on DER that was NOT registered with MISO (NM)

This was the first year where we requested information on DER that was Registered with MISO (RM)

Non-Registered DER is much smaller than previously reported
7.2 GW of Total DER Reported

- Over 60% of DER is registered with MISO
- Non-MISO registered DER has a larger portion that is residential
- Results indicate past results included DER that was registered with MISO

<table>
<thead>
<tr>
<th>Customer Class</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021 (NM)</th>
<th>2021 (RM)</th>
<th>2021 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential MW</td>
<td>456</td>
<td>411</td>
<td>528</td>
<td>719</td>
<td>434</td>
<td>1,154</td>
</tr>
<tr>
<td>Non-Res MW</td>
<td>2,124</td>
<td>3,387</td>
<td>3,845</td>
<td>1,878</td>
<td>4,211</td>
<td>6,090</td>
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<tr>
<td>Total MW</td>
<td>2,581</td>
<td>3,797</td>
<td>4,373</td>
<td>2,598</td>
<td>4,646</td>
<td>7,243</td>
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</table>
Survey results indicate past results included DER registered with MISO.

It was clear some respondents had difficulty separating information or fully understanding the request.

DER data person is often not familiar with MISO.
7.2 GW of DER by Resource Type
Solar and Demand Response Present in All Zones

DER by Resource Type and LRZ

Local Resource Zone (LRZ)

- Other
- Biodigesters
- Demand Response
- Battery Storage
- Gas Turbine
- Hydro
- Internal Combustion
- Microturbine
- Solar PV + Storage
- Wind
- Solar PV

Capacity (MW)
NON-MISO REGISTERED DER DATA
Non-MISO Registered DER: Residential

Solar and Demand Response dominate residential DER that is not registered at MISO. Zones 1, 8, and 9 all have over 100 MW of residential DER. Battery and Solar + Storage have begun to show up in several zones, but not in a meaningful way.
Non-MISO Registered DER: Non-Residential

There is a much greater variety of resource types in the non-residential customer class. Zone 7 has a large quantity of internal combustion engines that total over 200 MW. Battery storage is present in five LRZs and Storage + PV is present in four.
REGISTERED WITH MISO
Registered with MISO DER: Residential

Almost all MISO-registered DER is demand response. Some respondents may not have included their MISO registered DR portfolio on Slides 11-12, perhaps due to historical precedent.
Registered with MISO DER: Non-Residential

MISO-registered solar makes up a large portion of DER in zones 1 and 7. Demand Response is the largest resource type in the non-residential category as well.
WRITTEN RESPONSE ANALYSIS
Q2 - Is your utility considering future investments that will increase awareness or visibility into DER operations?

- Yes: 41%
- No: 59%

n=75
Q3: What current processes does your utility use to obtain initial or on-going awareness or monitoring of DERs?

- AMI: 22%
- Interconnection Requests: 27%
- Production Meter: 15%
- SCADA: 15%
- DERMS/ADMS: 8%
- Other remote monitoring: 5%
- Other (please describe): 3%
- N/A: 5%

n=205
Q4: What percentage of installed MW of DER has some form of interoperability with the utility?

- Price signals in contract or tariff: 31%
- Advanced inverter profile with autonomous functions: 16%
- Ability to read and/or write information: 17%
- Other (please describe): 16%
- N/A: 20%

n=128
Q5 - For each DER installation, what information does your distribution utility track the following through its interconnection process?

- The month and year of DER installation: 20%
- The DER installed capacity: 40%
- The DER inverter certification or technology standard: 40%

n=163
Q5b. Do you track any additional information beyond those listed above such as installed operating mode (e.g., power factor mode, voltage control, frequency-watt, etc.)?

- Power factor
- Voltage control
- Monthly verification of DER output
- Efficiency of DER
- For solar: shading, azimuth, tilt, tracking capabilities
- Fuel type, phase feeder/circuit, customer info
- Equipment specs, one-line diagrams, intended use of DER
- Operating modes, interoperability via SCADA
- Load side interval data
Q6 - What are the reasons behind DER growth (including EV adoption) in your territory?

- Increased affordability. Customer driven (lower costs, rebates, tax incentives, net metering)
- Concern for environment/sustainability/climate change
- Desire to lower utility bills
- Legislative driven
Q6 - What are the reasons behind DER growth (including EV adoption) in your territory?

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• Concern for environment/sustainability/climate change
• Desire to lower utility bills
• Legislative driven
Q6 b: Are there any known or claimed barriers to DER integration or DER growth in your territory?

<table>
<thead>
<tr>
<th>Barriers</th>
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<tbody>
<tr>
<td><strong>Lack of incentive</strong> (uneconomic, no policy, no capacity market value, no 'true' NEM - full compensation at time of production)</td>
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<tr>
<td><strong>Lack of program or DER access</strong> (renters, program cap/saturation, restrictions on DER location)</td>
</tr>
<tr>
<td><strong>Lack of grid access</strong> (circuit saturation, grid updates to support add’tl DER - utility and DER customer)</td>
</tr>
<tr>
<td><strong>EVs</strong> – lack of charging stations and dealership support</td>
</tr>
<tr>
<td><strong>Low footprint wide rates</strong> (energy and capacity)</td>
</tr>
<tr>
<td><strong>Increased use of demand response calls by MISO</strong></td>
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</tbody>
</table>
Q7 - Has your utility experienced DER penetration levels that have impacted the transmission system (Bulk Electric System - 100kV+) in some way in the past year?

- Yes: 83%
- No: 17%

n=75
Forecasting DER - Internal Planning (% Yes)

- Does your company explicitly project future growth of DER on your system?
- If yes, are the forecasts included in your resource planning process (either internal planning or required state/local planning process?)
- Does your utility employ any form of statistical end-use adjustment forecasting in resource planning (or other similar adjustments)? If yes, please explain.

n=71
Forecasting DER - External Planning (% Yes)

Are the DER forecasts incorporated into transmission planning processes?

Do these forecasts impact your Module E submission to MISO? If yes, please explain.

n=71
Q9 - Is your utility contemplating changes in light of FERC Order 2222?

- Yes: 59%
- No: 41%

n=71
On-Going Utilities Actions in Response to Order 2222

Monitoring and Involvement in the MISO DER Task Force; TSO/DSO Operation Coordination

Rates, Tariffs, and Program Changes: Proactive consideration of potential double counting issues between wholesale and retail programs; resource eligibility requirements;

Distribution System Planning Requirements or Needs

Resource Adequacy Considerations for the System and the Hosting Distribution Utility

Implications of DERA use of the Distribution System: including Cost Assignments

State Interconnection Process Changes and Distribution Interconnection Agreements: Standardization and Streamlining Processes; 60-day DERA review time allotment; Consideration of DERs not subject to IP

DER Metering and Telemetry Use for MISO purposes

Processes to support FERC Order 2222 DERA Registration and Participation
<table>
<thead>
<tr>
<th>Dx/Tx Language and Definition Issues Still Exist</th>
<th>Coordination Framework Needs</th>
<th>Variation of DER data by state</th>
<th>Varied ability to collect non-regulated data</th>
</tr>
</thead>
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<tr>
<td>DER data person is often not familiar with MISO.</td>
<td>Where is DER accounted for within MISO processes?</td>
<td>State based collection (both investor owned/regulated and non-reg)</td>
<td></td>
</tr>
<tr>
<td>Variation within utilities regarding what is considered a DER, in Dx, Tx; MISO/FERC terms may differ.</td>
<td>• Explicitly registered as MISO product (LMR, EDR, DRR)</td>
<td>No state based data or collection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Not-registered, netted from load forecast (load reduction in Module E load forecast)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Not-registered and not-netted from load forecast (no MISO visibility)</td>
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