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DER Orchestration Research - Request for Information (RFI)

Use Cases that Require Validation through Demonstration:

1. As California transitions away from traditional centralized fossil-gas generation and approaches a high penetration of intermittent renewables and inverter-based resources, what are the most needed grid service functions that aggregated DERs should be able to dispatch and that require validation in the near-term? Some examples are below:
   - Distribution-level voltage regulation (dispatched by a Distribution Service Operator or an electric utility provider)
   - Wholesale frequency regulation (dispatched by California Independent System Operator)
   - Ramping Support / Peak Power Injection (various markets)
   - Balance responding to multiple grid signals (i.e., Multi-Use Applications)

Answer: All of these functions are important; some of them may be more localized (e.g. if a distribution feeder does not have voltage issues, then the voltage regulation function might not be important). Since it is relatively easy to control and dispatch inverter-based resources (IBR), the simultaneous participation of IBR in all of these functions is not a major technical challenge, but more of a market challenge and scaling challenge to millions of devices. VPPs demonstrations should adhere to e.g. wholesale market rules for DER dispatch.

2. What performance metrics should a research demonstration achieve to assure confidence in resource dispatchability?

Answer: Potential performance metrics are outlined in the frequency regulation evaluation for PJM (PJM Manual 12). PJM evaluates frequency regulation performance as a mix of the following scores:

- Correlation score describes the correlation between the target signal and the DER signal.

- Precision score is a traditional error metric similar to the relative mean absolute error.
- Delay score measures the delay in the response of the DER signal relative to the target signal.

3. What role would Investor-Owned Utilities (IOUs) play in potential field demonstrations?

- Would IOUs need to develop new programs for grant recipients to bid into, or could projects use existing agreement structures?
- What role could dynamic hosting capacity have in expanding the depth of services that inverter-based DERs could provide to the grid?

Answer: Dynamic hosting capacity could significantly enhance the depth of services. Static hosting capacity limits present an unnecessarily restrictive barrier for inverter-based DERs.

- Should a Letter of Support from an IOU be a minimum requirement?

Answer: No, we believe this puts undue burden on IOUs and potentially excludes early stage applicants. The reviewers should decide which proposals have the most merit while being able to compare all proposals side-by-side and dedicate time to reading each one.

- Could utilities be potential technical reviewers during the application scoring phase as a means of providing insightful input to Evaluation Committee scorers?

Answer: Yes, absolutely. Utility insights could be very valuable. But there are also several private sector entities with VPP expertise.

- Are there additional considerations for utility's role in project demonstrations?

Answer: Utilities could also serve in technical advisory committees (TACs).

Gateway Conformance Testing for Dispatchable DERs:

4. What is the industry need for dedicated testing and certification of DER gateway functionalities and conformance independent of the inverter or DER they are paired with? Would there be interest in a unified, open testing procedure that verifies DER gateways' functionality and adherence to utility-mandated communication requirements?

5. Which requirements should this testing tool cover in its scope? These requirements may include:

- IEEE 2030.5-2023 "Standard for Smart Energy Profile Application Protocol"
- IEEE 1547-2018 "Standard for Interconnection and Interoperability of DERs with Associated Electric Power Systems Interfaces"

- IEEE 1547.1-2020 “Standard Conformance Test Procedures for Equipment Interconnecting DERs with Electric Power Systems and Associated Interfaces”
- IEEE 1547.3-2023 “Guide for Cybersecurity of DERs Interconnected with Electric Power Systems”
- Common Smart Inverter Profile (CSIP)
- Others that are not listed here

Answer: OpenADR should also be included.

6. What should be the baseline performance requirements of DER gateways for the following functions?

- Performance in DER communication
- Interoperability of communication between DER devices from various manufacturers
- Responsiveness in DER dispatch

7. Should this research scope (gateway conformance testing) be under a separate funding group to be conducted independent of the VPP demonstrations, or should this scope be incorporated as a phase of a larger VPP field deployment demonstration?
Answer: Both options are viable and we do not have a strong preference. Since the gateway testing will benefit from extended operation as part of a VPP demonstration, it may make sense to perform integrated gateway testing as a part of larger VPP projects. The CEC could include required language in the scope of work of larger VPP demonstration projects to require testing of gateways.

Valuation of Aggregated DER Services:

8. How could technology demonstrations be designed to increase confidence in the efficacy of market signals?

9. Identify existing market mechanisms that enable DER aggregators and VPP platforms to provide each of the grid services identified in Question 3. How effective are these market mechanisms in facilitating that service, and what barriers must be overcome for these market mechanisms to be more effective than they are now?

10. Are there existing market mechanisms for dispatching inverter-based resources to provide voltage regulation and transformer overload prevention at the secondary distribution level?

- Which ancillary markets (e.g., fast frequency response, spinning/non-spinning reserves) would DER aggregations be best suited for? Note that these services

may vary depending on a third-party aggregator's particular composition of DERs (e.g., energy storage, solar and hybrid smart inverters, Electric Vehicle chargers)

11. What consumer protections measures must be put in place for DER aggregation? This is especially important for projects to be designed with an equitable focus. For example, solicitation requirements could require including protections that ensure DER enrollees are fairly compensated by aggregators for the value they provide to the DER portfolio being dispatched. What are some examples of best practices?