GRIDWORKS

Summary of the California Public Utilities Commission's
High DER Future Grid Study Workshop #1

Thursday, February 8th, 2024 | 1 p.m. - 5 p.m. PT

Overview:
On February 8th, 2024, Gridworks facilitated the first of three workshops for the California Public Utilities Commission's (CPUC or Commission) 2024 Future Grid Study workshop series, under Task 7, Track 2 of Rulemaking (R.) 21-06-017. Throughout this workshop series, Gridworks, a contractor supporting the Commission, will facilitate conversations between utilities, stakeholders, and the CPUC on how to ensure additional distributed energy resources (DERs) installed provide maximum value to the grid through effective distribution system operations. This three-part series will identify operational needs, assess gaps, and develop recommendations to address gaps, and provide an opportunity for parties to collaborate to modernize the electric grid for a high DER future. Each workshop in the series will build upon the previous workshop, assisting parties to develop their input on the rulemaking.

The first workshop was divided into four sections: introductory remarks from the CPUC and Gridworks, and three panels. Each panel was 45 minutes long, and all presentations from these three panels are posted online.

Meeting Materials:
- Recording
- Workshop Agenda
- Presentation materials posted at https://gridworks.org/initiatives/california-future-grid-study/

Workshop Objectives:
A. Update parties on the current proceeding scope, the Commission's aims, and next steps
B. Share expert and party perspective on the following question:

    a. *What are the operational needs necessary to efficiently operate a high DER grid, unlock economic opportunities for DERs to provide grid services, limit market power, reduce ratepayer costs, increase equity, support grid resiliency, and meet State policy objectives?*

C. Co-create a list of operational needs responsive to this question
D. Lay the groundwork for the focus of our next workshop, "*What are the existing gaps and barriers in achieving the needs identified above within our current Distribution System Operator (Utilities)?"*

Workshop Structure:
Workshop #1 spanned four hours and contained presentations from 18 speakers, including utilities, DER providers, industry and advocacy organizations. There were 256 participants in total. Throughout the panel presentations, the audience had the ability to use the chat feature in Zoom to ask questions and provide comments and to use Slido, an external survey tool to submit answers to the workshop question: *What are the operational needs necessary to efficiently operate a high DER grid, unlock economic opportunities for DERs to provide grid services, limit market power, reduce ratepayer costs, increase equity, support grid resiliency, and meet State policy objectives?*

Commissioner Houck spoke at the beginning of the workshop about the context and goals within this proceeding, followed by five speakers from the CPUC Energy Division that provided background on this proceeding, High DER Future (R.21-06-017), and other current proceedings: Transportation Electrification (R.23-12-008), Microgrids (R.19-09-009), Interconnection (R.17-07-007), and Demand Flexibility (R.22-07-005).

The three panels were composed of speakers in three groups: utilities and CAISO, thought leaders, and advocates.

Operational Needs for a High DER Grid:
The list below is the identified operational needs, compiled from answers submitted through Slido and from the presentations during the workshop. Workshop #2 will use this combined list of operational needs to conduct a gap analysis.

We received four addtional comments on operational needs after the workshop.[1] They are available on the Gridworks' Future Grid Study webpage.

[1] Additonal comments were received from Dr. Eric Woychik, Steve Sherr (Foundation Windpower), Samuel Golding (Utility Consumers Action Network) and Lorenzo Kristov (The Climate Center).

DER Visibility to Distribution System Operator[2]

- Real-time awareness of DER status and output
  - Improve reliability through better understanding of current grid conditions
- Mutual sharing of DER schedules, operations, constraints
- Real-time monitoring and automated grid control enabled by intelligent sensors, switches, protection, communication devices
  - Improve reliability through faster response to emergencies and changing grid conditions and
  - Enable more granular ability to re-configure the distribution grid to re-route power during abnormal conditions

DER Visibility to CAISO[3]

- Coordinated visibility of specific DER information to understand and anticipate their impacts on grid operations
  - technology type, location, size, operational behavior and performance
  - at various granularities (aggregated and/or device level)
- Need enhanced data collection, access, and reporting:
  - For planning and forecasting processes to improve grid asset utilization;
  - short term load forecasting accuracy; and
  - ISO market optimization and dispatch.
- Situational awareness of both market participating and non-participating DERs is critical for CAISO operations
  - Understanding the impact of all types of DERs under various uses is critical to situational awareness and reliability
    - expect transportation electrification to present greater complexity
- Mutual sharing of DER schedules, operations, constraints
  - Enable multiple uses, avoid operational conflicts. Eventually, enable market coordination.

DER dispatchability/control[4]

- Signal participating DERs to provide output at specified time (day-ahead and real time)
- Progressively integrate DERs into scheduling and dispatch
- Develop emergency backstop capability (curtailment)
- Fast, secure and private communications infrastructure
- Software optimization platforms to support dispatchability (multiple levels)
- A communications platform and information sharing framework used to advise appropriate entities, in the appropriate timeframe, the status and feasibility of DER

[2] Source: IOU, Public Advocates, and thought leader presentations

[3] Source: CAISO, Public Advocates, and thought leader presentations

[4] Source: IOU, Public Advocates, and thought leader presentations; 1 stakeholder comment

activity in relation to grid operations and reliability.

Operational planning and analysis[5]

- Increase granularity of DER forecasts to utilize in operational timeframes
- Analyze High DER grid conditions to identify potential reliability risks
- Optimize use of grid assets based on DER forecasts to provide maximum value
- Maintain operating reserves to control the supply/demand balance and to meet reliability standards

Reliability Coordination at T-D interface[6]

- Coordinate operation of DERs providing services to distribution and bulk electric systems
- Communications and information sharing to support coordination of DERs across distribution and bulk electric systems
- Framework to coordinate operation of DER resources when they are providing services to the distribution system or to the bulk electric system to ensure the feasibility of those services and preserve reliability.

DER Technical Performance Standards[7]

- Develop inverter ride through standards to support High DER grid
- Implement measures to ensure broad compliance with inverter standards

Cybersecurity[8]

- Growing concern with high levels of DER

Open access to distribution system[9]

- Improve, simplify interconnection agreements and process
- Treat DERs and loads in a microgrid in an equivalent manner as DERs and loads outside of microgrids
- Meet expected demand for transportation electrification while minimizing infrastructure upgrades
- Improve opportunities for DERs to avoid/defer infrastructure upgrades
- Utilize dynamic distribution prices to delay/reduce distribution system upgrades
- Fully implement an open-access distribution network & transactive distribution-level markets

[5] Source: CAISO, IOU, Public Advocates, and thought leader presentations
[6] Source: CAISO and Public Advocates presentations
[7] Source: Public Advocates and thought leader presentations
[8] Source: Thought leader presentations
[9] Source: Energy Division, IOUs, Public Advocates, and The Climate Center presentations; 5 stakeholders

- Define grid services DERs can economically provide
  - E.g., compensate DERs & Aggregators for flattening circuit-level peaks (load & supply "ducklings") to increase hosting capacity without upgrading circuits
- Conduct non-discriminatory procedures for procuring, dispatching & compensating DERs
  - Market mechanisms that receive & clear bids (day-ahead & day-of) linked to current distribution system conditions & transmit results to participants
  - Establish real-time communication with participating DERs
  - Conduct solicitations for longer-term grid services contracts
  - Accurately measure DER grid service performance & perform settlement
- Integrate DER grid services into distribution network planning
- Provide up-to-date network information to local governments, tribes, LSEs, DER developers & CBOs seeking to plan & deploy DERs
- Coordinate with CAISO operations & markets (day-ahead & real-time) at T-D interfaces to manage bulk system impacts of DER activities
  - Clear DSO markets in time to provide accurate forecast to CAISO DA & RT markets on expected net flows across T-D interfaces
  - Transmit customer meter data & current distribution system conditions to LSEs to support their CAISO bidding & scheduling
  - Support direct DER participation in CAISO markets through timely provision of current system conditions & non-discriminatory curtailment procedures

Layered system architecture from bottom-up[10]

- Distribution-system architecture built from bottom up from within homes to the ISO level
- Efficiently operate a High DER grid:
  - Efficient operation requires semi-optimal *utilization of all available distributed energy resources*
  - Utilization requires having enabling systems in place, i.e. any available means for DER to receive and respond to information with *reasonable* timeliness and *sufficient* certainty
  - Coordination of individual DER should include layered aggregation
  - *Efficient* operation means *least net cost*
- Unlock economic opportunities for DERs to provide grid services:
  - Smart Inverter Operationalization Working Group (SIOWG)
    - focused on utilization of *existing* advanced inverter functionalities
    - identified numerous high priority use cases and business cases
    - based on technological readiness, cost, scale, and timeline

[10] Source: 350 Bay Area presentation; 4 stakeholder comments

- Standard tariffs and contracts are needed
  - designed to *support stacked value uses* of resources
- DSO as the nexus
  - to simplify signaling (layered coordination)
  - *to simplify single point access to revenue streams* (market and utility/tariff)

Animate distribution-level markets/granular pricing[11]

- DSOs enable dynamic distribution prices
  - Integrate SCADA data with price machine to generate local distribution load forecasts
- Statewide distribution data sharing hub
  - Data Hub: "API of APIs" ensures data access for all parties
  - DER Register: database tracks location / capabilities of DER
  - DER Market: facilitate trading & scheduling DERs, microgrid &CAISO coordination.
- Market reforms to support distribution-level markets
  - Shift to 5-minute Supply/Demand Balancing
  - Dynamic Pricing + LSE Transmission + DER Submetering
  - Supplier Consolidated Billing
  - Account for Community-Scale DER as Load Reducers
- Enhanced data sharing between IOUs and CCAs to identify grid needs
  - CCAs already run a variety of DER programs that are generally optimized around wholesale market conditions
  - CCAs lack sufficient information and incentive to optimize DER programs based on distribution system needs
  - CCA DER programs can provide better value to all customers with better information on grid constraints and economic signals that incentivize solutions to those constraints

Additional important topics identified by participants that are not directly related to operational needs:

- Utility business model reform
- Do US /California have interoperability working groups similar to the EU (https://intnet.eu/)?
- Need for an agnostic view of DER technologies to assure resiliency and lower costs of service while transitioning to a renewable grid

[11] Source: Energy Division, thought leaders, IOUs, UCAN, The Climate Center, and Joint CCAs presentations; 7 stakeholder comments

- Need for a highly skilled workforce for DERs to provide real value; high road labor standards for DERs, microgrids, EV integration, etc.