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Roadmap for Commercializing Microgrids in California

Additional submitted attachment is included below.

GENERAL MICROGRIDS

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WRITTEN COMMENTS SUBMITTED VIA EMAIL

California Energy Commission
Dockets Office, MS – 4
RE: Docket No. 16—EPIC—01
1516 Ninth Street
Sacramento, California 95814 – 5512

RE: Docket 16—EPIC—01, "Roadmap for Commercializing Microgrids in California"

Dear Mike Gravely,

General MicroGrids thanks the California Energy Commission for the opportunity to provide comments and observations on your draft "Roadmap for Commercializing Microgrids" circulated on October 2, 2017. Enclosed, you will find some general comments on this draft.

Respectfully,

/s/ Larisa Dobriansky

Larisa Dobriansky
Chief Business & Regulatory Innovations Officer
General Microgrids

CEC DOCKET 16—EPIC—01

COMMENTS BY GENERAL MICROGRIDS ON THE DRAFT "ROADMAP FOR COMMERCIALIZING MICROGRIDS IN CALIFORNIA"

General MicroGrids believes that the following areas should be emphasized, added or more fully developed in the "Roadmap":

- **Need for a Definition of Microgrids to be issued officially through legislation, regulation or directive:** To support investment in microgrids and their bankability, it is important to officially define microgrids so that their functions and benefits can be taken into account and monetized. The Roadmap sets out the salient elements of a microgrid, but should stress the need to have this definition memorialized in an official issuance;

- **Differentiating "Advanced Microgrids" from Traditional Microgrids:** In addressing commercializing microgrids, the Roadmap should describe how microgrids are changing in functionality as a result of increasing use of "smart" technologies (information, communications and control technologies). These changes may be crucial to moving microgrids out of "niche" applications and into the market mainstream, with prospects for replication and scaling up.

  The U.S. Department of Energy defines an **"Advanced Microgrid" as one that provides functions at its Point of Common Coupling (PCC) with the Macrogrid beyond basic islanding (disconnect) and synchronization (reconnection) functions.** An Advanced Microgrid is a "dynamic" microgrid that can interact with the larger grid (Macrogrid), cooperatively managing power flows across the PCC and optimizing benefits for both the microgrid and macrogrid. Advanced Microgrids can be differentiated from Traditional Microgrids based on factors such as scale, cost, resilience/security, performance, and scalability, factors that could significantly influence the "commercialization" of microgrids.

  Advanced Microgrids contain the same essential elements of the Macrogrid: Balance electrical demand with sources; Schedule the dispatch of resources; and Preserve grid reliability (both adequacy and security). Key features of an advanced microgrid include: ensuring maximum utilization of renewable energy sources and other assets; resource and load profiling, controlling and forecasting; load prioritization as critical or non-critical; real time data acquisition and monitoring of electrical and physical signals; and minimization of outages and fast response to network disturbances through the automatic connect/disconnect of system components. An advanced microgrid is an electricity distribution system (which also differentiates microgrids from individual Distributed Energy Resources) containing loads and distributed energy resources (DER) (distributed generators, storage devices or controllable loads) that can be operated as a "system" in a controlled, coordinated way, either while connected to the main power network or while islanded.

  Pilots and Demonstrations are evaluating changing capabilities of microgrids and envision systems that could contain multiple customers across non-contiguous properties, multiple resources, resource interconnection on both sides of the meter, islanding capabilities;

functionalities to provide grid services and use existing distribution infrastructure, as well as to create new dedicated delivery networks ("distributed networked electricity systems," "networked microgrids," or "local energy networks").

Advanced microgrid functionalities are already "re-shaping" the purposes for microgrid investments, with regulatory implications. Advanced microgrid functionalities, for example, could support the development of "community" microgrids and "public purpose" microgrids. These functionalities are prompting thinking by some jurisdictions about the development within communities of dedicated districts that could be entitled to public support and provided an exemption/or a "safe harbor" from triggering "utility" regulation, such as "Energy Improvement Districts," Distributed Energy Resource Development or Energy Efficiency Zoning. Advanced functionalities could support a "Microgrid Infrastructure as a Service" business model that could foster an "Energy Sharing" economy within communities. Advanced Microgrids and/or Networks of Microgrid Cells could support the harmonization/interfacing of Community Energy Assurance Planning and Sustainability Planning and such Community Development Planning with Utility Planning.

- **Microgrids and Advanced Microgrids need to be distinguished from their distributed resource components, as well as from Virtual Power Plants and "Aggregated" Portfolios of DER:** Microgrids are electricity distribution networks or power delivery systems. Advanced Microgrids are intelligent electricity distribution networks that coordinate and control multiple distributed energy, energy storage and demand-side assets to integrate these resources (manage and optimize the assets) within the microgrid "system," using specialized hardware and software to control such integration. The optimization provided by a microgrid "system" produces "value"/outcomes/benefits that exceed the sum of the individual system components; and therefore, a microgrid system is not merely an aggregation of DER. The "Integrated Energy Systems" approach taken by Advanced Microgrids, enabled by information, communications and control technologies, could maximize benefits and minimize incremental costs, beyond what is achievable on a technology-specific application basis or through aggregations or portfolio combinations of DER. Integrated Energy System Management outcomes could potentially reduce/defer traditional T&D investments.

- **Advanced Microgrids could not only support Grid integration and management of RE/DER, but also shape the configuration of a 21st Century Grid:** California should support the vision of "Advanced Microgrids" as a **Third Element of Smart Grid** (along with macrogrid planning/operations and grid-load interaction). Advanced Microgrids could strengthen the capabilities of the electricity sector by optimizing energy availability across a larger variety of energy resources; comprise infrastructure for more optimum management of overall energy requirements (power, heating and cooling); and enable the control and management of reliability and resiliency at the local level.

  An alternative to a "smart grid concept" that governs many DER units with an elaborate and sophisticated utility command and control system, is to build upon advanced microgrid applications to dispatch microgrids in a distribution system to achieve public policy objectives and further the efficiency and reliability of the electricity system. If advanced microgrids are compatible with operating protocols, with the macrogrid and neighboring microgrids, these "systems" could complement and participate as a functional unit in a modernized grid. This combination or networking of microgrid cells within communities (local energy networks) could minimize stranded assets and assure that resources are used to their design capacity. Advanced microgrids could, therefore, provide a cost-effective means of integrating large amounts of DER into the macrogrid, offering significant system efficiency and reliability improvements.

Advanced Microgrids could potentially shape Grid Architectural Design and the Role of Distribution System Operators: (i) Advanced Microgrid Investments could potentially alter the configuration of the grid; help to shape highly flexible, configurable and interactive networks of utility, customer and third-party applications; (ii) Enable a "System of Systems" (hierarchical management and control of dynamic sets of DER from building to district to community to utility service territory levels), enabling independence, intelligence and flexibility for optimizing energy use and management within local energy networks and to integrate local energy resources into the grid and market; (iii) Enable and help evaluate appropriate distribution system-based investments and operation protocols that could support Utility Distribution Company innovation, efficiency and reliability (while reducing the need for costly distribution system capital investments), as well as helping to place more efficient demands on the bulk power system.

- **Advanced Microgrids need to be placed not only in the context of transforming our Electricity Sector, but also in the context of transforming Community Energy Infrastructure. Advanced Microgrid could affect the nature of future Electricity System investments that could, in turn, promote "convergence" of energy systems and the harmonization of currently "siloed" regulatory regimes governing, for example, electricity and natural gas, as well as energy using infrastructure (water, waste, transportation, etc.).**

The potential role of advanced microgrids is not just significant from the perspective of project development, but also from the perspective of market development that could shape the transformation of our power system, as well as community energy infrastructure, with a view to supporting a future "Enernet" and IoT. Advanced microgrid development could help shape a flexible/configurable, interactive and innovative Macrogrid (one with highly flexible, configurable, modular networks of utility, customer/community and third-party applications; market data, price signals and transactions; "System of Systems" operations for DER integration and load-side management; all electricity resources treated as primary resources).

Advanced microgrids could support resource integration within communities, managing and optimizing local energy across end use sectors (leveraging data sets that span diverse facilities, systems and purposes to interrelate/link and optimize the energy-using functions of diverse infrastructure systems and the built environment of communities).

A more flexible, modular and intelligent grid structure with local energy networks would be more conducive to energy systems integration and networking across all forms of energy conversion and use. Flexible, interactive, intelligent electricity architecture (both macrogrid and networked microgrids) could "converge" with other infrastructures to support the IoT and an "Enernet."

- **Advanced Microgrids, as locally-based smart distribution architecture, could leverage private investment to help utilities, customers and communities achieve higher levels of electricity/energy performance, while protecting key community facilities/functions during grid outages and energy disruptions.**

- **The Roadmap is too targeted in the way in which it addresses regulatory and institutional reforms needed to support the commercialization of microgrids. The Roadmap needs instead to describe a "Policy Eco-System" that can support not just microgrid projects, but more broadly, advanced microgrid market development as part of transforming our electricity system and community energy infrastructure.**

  To capture the benefits and services of microgrid "systems," this policy eco-system needs to address standards for interoperability and integration to support standardized interactions between microgrids and the macrogrid, as well as the use of DER throughout the electricity value chain; Smart Systems Architecture, including establishing a 3.0 Grid Operating System; Consistent, uniform and verifiable resource valuation, including microgrid "systems" as a grid and market resource; new utility and market rules and moving towards more cost-reflective pricing/charges; Distribution System Resource Planning; more granular pricing (extention/disaggregation of LMP/nodal pricing) at the distribution system level; customer engagement. This policy ecosystem needs to address the **definition of microgrids**, and to **distinguish these distribution systems from distributed resource assets** that comprise these integrated systems.

  Reforms are needed to align utility financial interests with customer and societal demands. Incentives are needed to allow utilities to perform more efficiently (both productive and allocative efficiency) and reliably at least cost, taking advantage of (taking fully into account and monetizing) the cost savings and the value that "advanced" microgrids systems could generate through providing "integrated energy solutions."

  Utility Regulatory Reform is needed to make utilities "indifferent" with respect to sourcing the most cost-effective solutions, including from third parties/prosumers such as microgrids. Utilities need to be incentivized to provide long-term customer value regardless of ownership and service models. This will necessitate new tools and methods to address: utility compensation/incentives to reward utilities for their performance in achieving policy objectives (efficiency, resiliency/reliability, sustainability, etc.), rate design for more cost-reflective valuation, dynamic pricing, interconnection reform that recognizes the value of microgrid system services to the grid (beyond streamlining and process reforms), results-based regulatory model using performance metrics, etc., to enhance overall the efficiency and reliability of our power system, as well as to incentivize innovation.

  Power Market Reform Needed: Continued reforms are needed to increase market access for distributed resources and microgrids. Current power market design/participation models reflect the physical and operational characteristics of conventional generation to serve end-use load; Classifications can be arbitrary and Power Market Implementation Processes can impose high transactive costs and be administratively burdensome – with the effect of discriminating against the market participation of DER and microgrids or limiting that participation.

  CAISO and FERC are addressing the multi-function nature of energy storage as a market resource, which is essential for recognizing the value of other multi-function resources such as advanced microgrids. Market reforms are needed to increase opportunities for Energy Storage, DER and Microgrid resources of all sizes to provide energy, capacity and ancillary services for which they are technically capable.

- **Address Relationship between Microgrid-Produced Outcomes and System-wide Outcomes**: Seamless interaction with the Distribution Utility System will necessitate addressing the relationship between outcomes produced by advanced microgrids and system-wide outcomes for which Distribution System Operators/Utilities may be held legally accountable. But the increased interactions also will provide the opportunities to develop standards and protocols to govern such interactions so that net benefits can be captured, while preserving system reliability, security and affordability.

- **Social/Customer Acceptance and Engagement:** Need to build customer acceptance and engagement through education, information dissemination, pilots and demonstrations. Need to support accurate and appropriate price/value signals to incent changes in customer behavior and investment in new technologies.

- **Building Retail Markets:** Advanced microgrids could play a crucial role in building transactive energy markets (peer to peer transactions). The "System of Systems," hierarchical control provided by advanced microgrids and networks of microgrid cells, could help support dynamic pricing and peer to peer transactions.

- **This Roadmap should describe how CEC/EPIC programmatic activities directed at technology-specific applications could benefit from the development of microgrid systems that could provide "integrated strategies" for the deployment of such technologies. This Roadmap, for example, should prompt action steps to re-examine technology-specific strategies (for example, CEC Strategy White Papers addressing energy storage, demand response, electric vehicles, etc.) within the context of microgrid "systems" and integrated control strategies.** This proceeding should seek to break down programmatic and regulatory "siloes," through advancing coordination between the CEC, CAISO and the CPUC.