DOCKETED

Docket Number:	16-EPIC-01
Project Title:	EPIC Idea Exchange
TN #:	221753
Document Title:	World Business Academy Comments to Draft Microgrid Roadmap
Description:	N/A
Filer:	System
Organization:	World Business Academy/Robert Perry
Submitter Role:	Public
Submission Date:	11/13/2017 4:31:49 PM
Docketed Date:	11/13/2017

Comment Received From: Robert Perry
Submitted On: 11/13/2017
Docket Number: 16-EPIC-01

World Business Academy / Comments to Draft Microgrid Roadmap

Attached are my comments on behalf of the World Business Academy regarding the initial draft Roadmap for Commercializing Microgrids in California. Please note that these comments are policy-based and seek to address broad hurdles that need to be cleared in order for local and investment communities to embrace microgrid development as a core component of Californiaâ€™s new, distributed energy infrastructure.

To facilitate review, I have copied and pasted excerpts from the draft (in order of appearance in the draft) with each related comment.

Additional submitted attachment is included below.

ROADMAP FOR COMMERCIALIZING MICROGRIDS IN CALIFORNIA – COMMENTS TO INITIAL DRAFT

November 13, 2017

By Robert Perry, Director of Energy Research

1. **General Comments.** These comments are policy-based and seek to address broad hurdles that need to be cleared in order for local and investment communities to embrace microgrid development as a core component of California's new, distributed energy infrastructure. This will require active participation by state and local agencies to educate the public regarding the various economic opportunities available to distributed energy resources (DERs) that generate, store and manage energy for internal site use and within a local distribution grid.

   As microgrids are inherently local, one primary hurdle will be to engage and enroll local communities served by a particular distribution system in the development of an energy action plan. The Distribution System Operator (DSO), whether it be a utility or community choice entity, must therefore take a leadership role to convene and coordinate local stakeholders to develop such an energy action plan with attributes specific to that area.

   While energy goals must be articulated and implemented over a realistic timeline, a "plain english" description will be required that informs stakeholders on how such a system will operate and how different types of sites typically found in every community can contribute to, and benefit from, operating as a microgrid within a range of standardized use cases that streamline and facilitate accelerated permitting and interconnection.

   By identifying a full scope of locational benefits from operation of a microgrid site, a value proposition can then be developed that confers market certainty to incentivize investment using a variety of financing vehicles. To the fullest extent possible, coordinated, collaborative procurement practices should be utilized to lower costs through economies of scale, and applicants should be encouraged to incorporate as many non-grid elements (i.e., EV2Grid, HVAC, etc.) as possible to fully realize the commercial viability of a given microgrid site.

ROADMAP FOR COMMERCIALIZING MICROGRIDS IN CALIFORNIA – COMMENTS TO INITIAL DRAFT

2. CHAPTER 1: Why Microgrids Are Important to California

a. Page 4. **"As explained in the CPUC White Paper, *Microgrids: A Regulatory Perspective*, a microgrid can be as simple as a single generator providing power during an outage, or as robust as an entire neighborhood outfitted with solar and other technologies producing enough electricity to serve their local needs for hours, whether or not there is a grid emergency or blackout. In these instances, customers are seeking two primary services: reliability and resiliency."** This statement accurately illustrates the need for a range in microgrid use cases, and how each of these microgrid types would fit into a community distribution system connected to the state transmission network. Feature sets will vary, from a residence or small business with modest DG, ES, EE and DR attributes and greater grid reliance, to mission critical enterprises that should be incentivized to pursue a much higher degree of resiliency, both internally and in service of the larger community during prolonged outages. Codifying a set of commonly used microgrid use cases will help streamline procurement, permitting and interconnection, all of which would serve to accelerate DER adoption and integration.

b. Page 5. **"Microgrids can overcome the challenges of grid-scale integration by using distributed energy resources, as a "local portfolio" that can be managed at a distribution level and based on local conditions. Operating the distribution system at the local level (customer or load level) is simplified and improved by integrating microgrids into the electricity grid."** Microgrids, as implemented to address the specific needs of a distribution system, should offer not only on-site energy security, but also offer services and capacity in support of proximate grid requirements. The availability of these grid assets, whether on a continuous or contingent basis, will provide certainty against disruption during an outage. To maximize grid security, microgrids must be strategically designed and deployed with goals specific to the needs of a given location as determined through implementation of a local energy action plan.

3. **CHAPTER 2: Key Issues Facing Commercializing Microgrids in California**

    a. Page 11. **"(DER). Management of these resources as a microgrid allows for a single connection point with the distribution system. Reliability and resilience are dealt with locally, so that needs are determined by the individual customer sites. By allowing the customer or microgrid operator to manage itself according to its needs, and then acting as an aggregated single entity to the distribution system operator, a number of innovations and custom operations are possible. The interconnect point only needs to know whether power should be sent into the microgrid or whether power is flowing out. Microgrids are able to overcome the problems of grid-scale integration by using DER as a "local portfolio" that can be managed at a distribution level, based on local conditions. Further, operation of the distribution system at the local level (customer or load level) is simplified and improved by the integration of microgrids into the electricity grid."** This excellent synopsis of how a microgrid, or a cluster of microgrids, can interact with the wider distribution grid, is critical to fully and accurately assess site needs and how microgrid assets can provide additional grid benefits. This assessment could be achieved through development of a comprehensive survey and questionnaire for site owners that identifies and prioritizes areas such as site capacity, load management, potential electrification of internal machinery or fleet vehicles, resiliency needs via long-duration storage to fully protect mission critical operations, and scope of ancillary grid services. Also, it is important to note that such a survey/questionnaire would inform an advanced RFO process where one application covers all aspects of how the microgrid will function internally and in relation to the adjacent distribution grid.

    b. Page 13. **"The monopoly ownership and control of the existing distribution infrastructure creates a problem for independent microgrid development because the DSO is the gatekeeper for modifications to that infrastructure. This is the case both practically and in regulation. The DSO is responsible for safety, cost and operational stability. ¶ However, utility control of the distribution system can be addressed by regulators in a variety of ways. If a comprehensive site survey is done to determine optimal sites for microgrids, the distribution grid characteristics in the optimal sites can be modeled using automated grid simulation and power flow modeling tools."** As DERs directly impact the local community vis-à-vis their ability to relieve distribution grid stress and serve as an anchor of resiliency during outages and other grid disruptions, it is essential that a site survey be conducted of an entire community, both as a whole and in relation to distribution circuits, so that properties can be identified that offer the best value proposition, both to the microgrid operator and DSO.

c. <u>Page 14</u>. **"A second option for regulators would transform the role of the utility into a DSO responsible for ensuring the available capacity for distribution of electricity generated either behind the meter, connected on the utility side, or flowing from the transmission grid. The DSO would be able to determine appropriate costs for both interconnection and delivery of electricity traveling over the distribution grid. This approach would allow the customer and other service providers to offer additional products and services in support of a microgrid. It would also ensure that the utility, as DSO, is able to schedule and dispatch the two-way flow of electricity, as well as manage the stability of the distribution system. The DSO approach also addresses the potential loss of revenue as the utility would now be responsible for the maintenance and operation of the infrastructure and be allowed to earn a rate of return on those assets. This might ultimately lead to a fixed price calculation for access and use of the distribution grid. In this case, the cost to the microgrid operator for using the distribution grid infrastructure is based on the actual operation and maintenance costs, plus a rate of return for the distribution system operator. A fixed cost structure, or "rent," to use the distribution infrastructure would simplify the project planning process for developers and potentially lower costs for customers."** While in agreement with this approach, such a "fixed price calculation" must pertain only to the portion of the distribution grid used and accessed by a microgrid. It is entirely possible that in a properly constructed distribution system, energy consumed or exported by a microgrid could reside within a given circuit or circuit segment, depending upon the load profiles of other proximate ratepayers. Under such circumstances, it would not be equitable for a microgrid operator to be charged a fee in relation to portions of a distribution grid unaffected by microgrid operations. To the extent a microgrid offers services (with attendant revenue streams) that extend farther into the distribution grid, then there should be a cost associated with distribution to recipient grid areas. Theoretically, a distributed energy system should be designed to limit energy transactions within the smallest area possible, focusing first on adjacent loads and then spreading outward should no such need be identified. It doesn't make sense for a microgrid to send power to a substation when there are adjacent ratepayer accounts in need of that energy.

d. <u>Page 18</u>. **"If a microgrid is capable of supplying most or all of its own electricity needs and can island but remain connected to the grid, standby charges may also apply. The question for the regulator is who is responsible for these charges? Is it the microgrid owner/operator, or is it the individual customer? In either case, if the cost of standby service is included in the cost of service to the microgrid customer, it is a factor that will ultimately increase the cost of electricity and the competitiveness of the microgrid. For microgrid based electric supply to be cost competitive, the nature and amount of the standby charges need to be reevaluated by the regulator."** I think a standby charge should be calculated in relation to the degree of resiliency, i.e., the relative ability of a microgrid to island for an extended period of time. Microgrids looking only to island for a few hours should pay a larger fee than a large institutional microgrid, built to self-generate all its energy during normal operations, and for long-duration islandability in order to protect mission critical operations during grid disruptions. In other words, a standby charge should be relatively assessed only to the extent that a microgrid is likely going to need access to grid energy.

e. <u>Page 18</u>. **"Transmission and distribution, on the other hand, are the revenue base on which the utility can collect a rate of return. The rate of return is guaranteed by the state. Rates for transmission and distribution are set based on operating costs and a return on equity. Normally, the transmission and distribution costs represent about 40% of the total cost a bundled customer pays for electricity."** The amount and nature of these charges will vary in relation to the characteristics of a particular microgrid and distribution system. While a more distributed model should not be assessed access charges for a transmission system it doesn't use, there will be additional services that will likely increase costs related to distribution-level management by a DSO. Again, these costs should be contingent upon actual use by a microgrid.

f. <u>Page 19</u>. **"As microgrids continue to evolve, owners and operators of microgrids are in a position to fulfill opportunities to provide grid services outside of the microgrid itself as a means to generate revenue. The opportunity to provide services beyond the microgrid may allow the microgrid to develop in ways that utilize a greater amount of wind and solar energy generation than would be required when serving only the microgrid. This extra generation capacity can then be offered as services into retail and wholesale markets for balancing supply and demand, ramping capacity, or for providing ancillary grid services such as frequency regulation or voltage control."**

Microgrid sites must be designed to maximize available capacity, and have a use contingency plan in place to minimize any curtailment of excess energy. In particular, microgrids placing a high value on resiliency should allocate excess energy in a variety of short and long-term storage medium. By planning distributed generation in excess of forecasted load, a highly resilient microgrid can cover its load during periods of low generation (cloudy days low wind days), while storing and/or distributing such energy during optimal generation conditions. Furthermore, a highly resilient microgrid could serve as an anchor during extended outages by redistributing excess energy through its home grid system. Strategically locating such high-resiliency microgrids within a distribution grid will increase overall resiliency.

g. <u>Page 19</u>. **"Similarly, the microgrid management system can help provide distribution level services as part of a distributed control system. Individual resources, such as smart inverters that can supply reactive power or voltage support, can be controlled at a more local level. This functionality saves the engineering cost and need for monitoring that more centralized distribution system management implementation requires."** Agreed. To the extent one or more microgrids can service a segment or circuit of a distribution substation, those areas would not be in need of system management services. Ideally, in a highly developed distributed system, relatively little traditional systems management services or infrastructure would be required.

4. **Chapter 3: Roadmap Actions – Planning Action Items.**

   a. <u>Page 21</u>. **Microgrid Operation and Value.**

      i. **Item 1: Develop non-proprietary, publicly available educational and guidance materials for microgrids.** This is a critical first step in educating ratepayers as to the various value propositions available through investment in microgrids. Such materials should outline common use cases and also outline how a microgrid could offer non-grid-related services, such as charging site equipment and fleet vehicles, or incentivizing employees to own an EV as part of a V2G program. The wider the scope of potential benefits, the more persuasive a value proposition for a prospective microgrid owner/operator.

ii. **Item 2: Develop, evaluate, and publish improved metrics to assess microgrid system performance.** Improved metrics means more accurate value assessment which provides certainty to incentivize investment. These are all critical hurdles for widespread microgrid deployment.

iii. **Item 3: Complete research that defines the building blocks necessary to implement microgrids from start to finish.** Part of a value proposition is a viable schedule in which incremental milestones are identified that will lead to a fully functioning microgrid system. Again, this will be essential in educating the ratepayer base. Incremental steps over a viable timeline allows site owners to visualize a pathway towards successful completion.

b. **Page 22. Microgrids Role to Implement State's Policy Goals.**

i. **Item 1: Develop different microgrid use cases that will support increased penetrations of renewables on the California electric grid.** A full range of use cases must be developed, from smaller, more grid-connected versions providing a modest degree of resiliency against common short-term disruptions, to larger, institution-based systems built to endure extended outages, and to support nearby load centers until the affected area is brought back online. Again, standardized microgrid use cases will serve to accelerate procurement, interconnection and permitting of microgrids as part of overall distribution grid architecture.

ii. **Item 5: Define the role of microgrids in future grid management with higher concentrations of DERs.** Microgrid functionality should range from load reduction to generation and short-range distribution, depending on the size, load profile and capacity of a given site. This will require a completely new slate of functional values not currently in existence.

c. **Page 22. Microgrid Technical Challenges.**

i. **Item 4: Prepare guidelines to assist local government agencies and others in selecting and supporting future microgrid projects.** As previously stated, the community must be engaged early as part of the planning process. Distributed energy is part of the community, and they must understand the many benefits from local energy generation, management and use.

ii. **Item 5: Evaluate how microgrids can provide new options to address the impacts of the aging California natural gas infrastructure.** Since California's energy and heating infrastructure is almost exclusively based on natural gas, electrification will likely take decades to complete, even after assuming the retirement of current assets that are at or near the end of their useful lifespans. Microgrids can further accelerate this process by reducing reliance on GFG grid resources (i.e., peaker plants), while also reducing on-site use of natural gas through investment in HVAC replacement technologies. Although some microgrids will initially incorporate natural gas generators for back-up purposes, these assets would not be operated on a regular basis. As with transmission infrastructure, overall reduction in natural gas consumption also allows for more strategic and cost-effective operation and maintenance of the gas pipeline and storage grid.

iii. **Item 7: Analyze and compare the commercial viability of different microgrid configurations.** Commercial viability of microgrids will depend largely on development of a coherent value matrix based on the transfer of revenue from avoidance of costs related to the current centralized generation/transmission model. The more robust a microgrid system, the more services can be offered to the distribution grid that will increase commercial viability. Additionally, non-grid-related functions, such as electrification of site equipment/fleet vehicles and V2G flexibility, further enhance a microgrid's intrinsic value.

d. <u>Page 23</u>**. How Microgrids Operate in the Current California Regulatory Framework.**

i. **Item 1: Develop microgrid service standards necessary to meet state and local permitting requirements.** As previously discussed, service standards with value metrics will be a critical prerequisite to incentivize private investment in DERs and distributed energy systems. Such value metrics will require a comprehensive assessment of all traditional costs avoided by such services, both to local distribution and statewide transmission grids.

e. **Page 24. Economics of Microgrids.**

   i. **Item 1: Develop and validate new benefit metrics for the system reliability provided by microgrids.** Microgrids enhance system reliability to the extent they reduce overall system load, provide ancillary services and distribute excess energy to adjacent ratepayers within a given distribution circuit or circuit segment. This is especially true of remote, extended or low capacity circuits that require significant distribution grid upgrades, and selection of these types of grid-constrained circuits would be helpful in validating benefit metrics.

   ii. **Item 2: Enact the state approved rules under which microgrids can participate in wholesale and retail markets.** Within a distribution system, a use hierarchy needs to be established that prioritizes proximity to generation in order to minimize grid stress. For example, surplus energy from a microgrid should first be exported to adjacent loads within a segment or circuit, then to the nearest substation for distribution to other circuits, and then to the primary substation serving as the T-D nexus. At that point, energy should be distributed to load requirements of other distribution substations within the local system, and only when all load has been satisfied within the distribution grid should a DSO be allowed to transmit distributed generation via the transmission grid. Allowing distributed generation to be immediately sold outside the local system defies the primary purpose of DERs and increases cost through superfluous use of the transmission grid. All of this could be accomplished by a fee structure that increases as energy moves farther afield from the point of generation.

   iii. **Item 3: Define different revenue streams available to microgrids beyond the ones that currently exist, such as volt-amp reactive (VAR) services, flexible energy services, and emergency services.** The most obvious revenue streams would be from non-grid applications such as the virtual elimination of fuel costs from the electrification of site equipment and fleet vehicles and elimination of major load sources from HVAC operations. For a larger, institutional microgrid employing a power2gas component, renewable hydrogen produced on-site could also be sold to local refueling stations to generate additional revenue.