Microgrids in the District of Columbia

pepco

MEDSIS, Formal Case No. 1130 Workshop – April 28, 2016

Microgrids Are Emerging Distributed Energy Resources

Public-Sited Microgrids are the most complex form of DERs and present unique challenges and opportunities:

- Microgrids may be composed of multiple types of DERs, all with unique operating characteristics and legal and regulatory implications[1]
- Microgrid assets may exist both in-front-of and behind-the-meter
- Microgrids require complex financial transactions to be facilitated among numerous stakeholders including developers, PJM, Pepco, and customers
- Microgrids must be designed and integrated into the distribution grid so that grid reliability can be enhanced and customer and public safety will not be impacted
- Microgrids should incorporate important customer service and consumer protection features (e.g., RAD, LIHEAP, Customer Bill of Rights)

[1]In Pepco's April 18, 2016 comments to the Commission, Pepco broadly defines DERs among the following six categories: 1) Backup generators, 2) NEM facilities, 3) Community Renewable Energy Facilities, 4) Qualifying Facilities, 5) Generators selling into the PJM wholesale market, 6) Behind-the-meter generators that partially offset the customer's load but are precluded from exporting electricity to the grid.

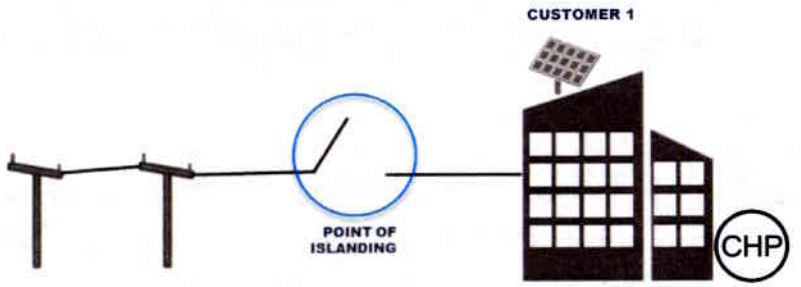
[2] D.C. Code § 34-207

Pepco Sees Two Potential Microgrid Models Emerging in the District

Fundamentally, a microgrid is a combination of distributed energy resources (generation, storage & controllable load) that can be operated in parallel with the distribution system or in an islanded mode. Microgrids may take two forms:

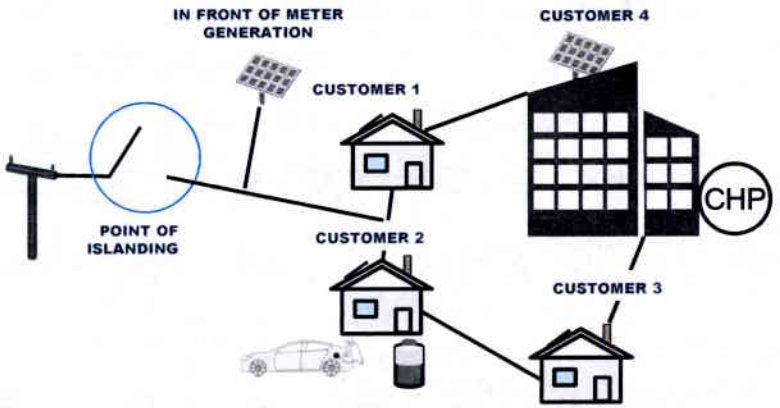
Campus Microgrids
are owned and operated by a single customer. The owner has complete responsibility for the operation, maintenance and performance of the system. Existing examples include:

- White Oak Federal Campus (MD)
- University of Maryland (MD)



Public-Sited Microgrids
serve multiple customers. The owner of the generation will likely be different than the customers served by the microgrid. Examples currently under evaluation include:

- ComEd's Bronzeville Microgrid Cluster (IL)
- Central Hudson Gas & Electric (NY)



Guiding Principles for Public-Sited Microgrid Development

Microgrid development in the District should adhere to the following principles:

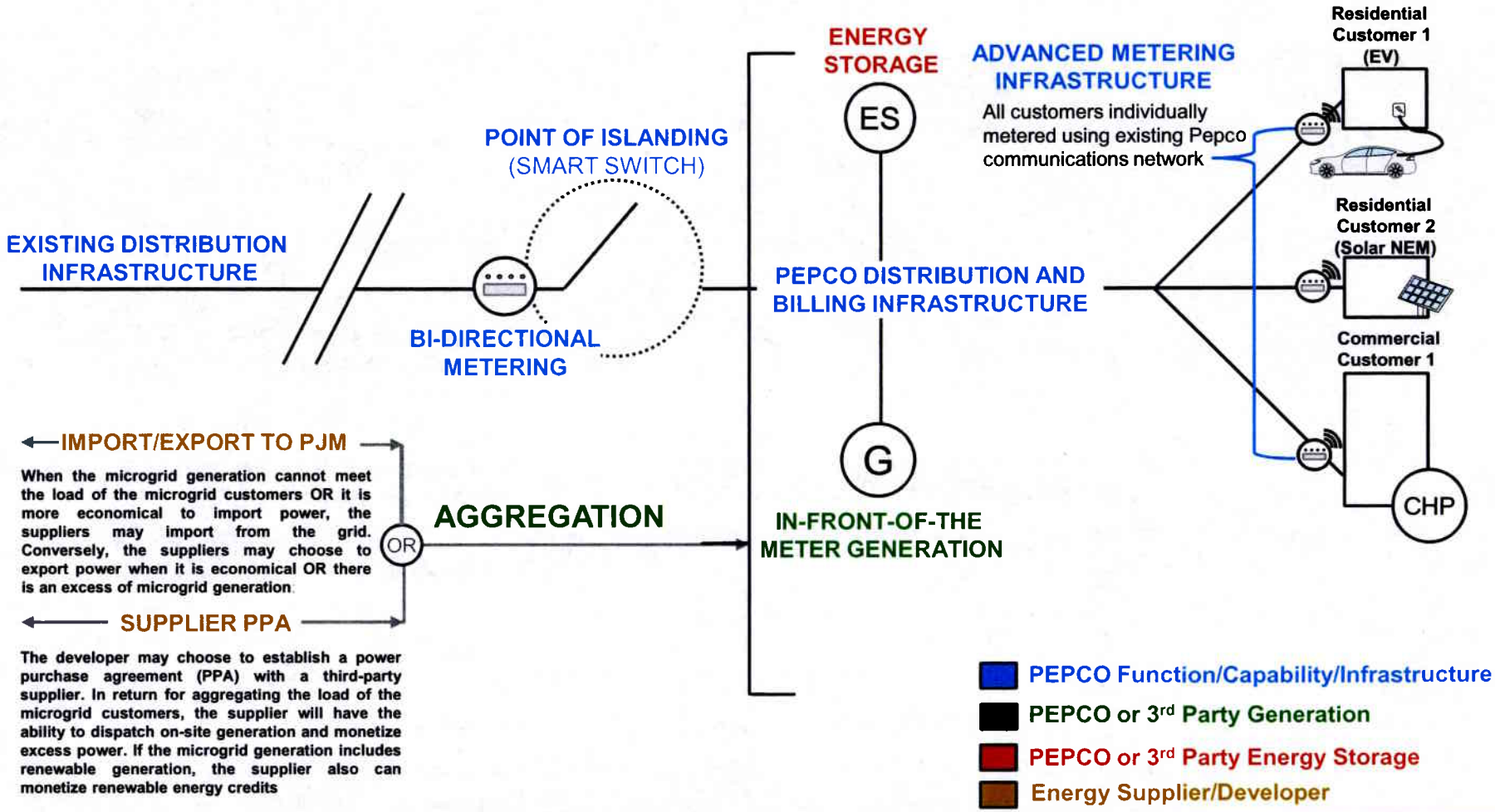
1. Public-sited microgrid development should further District policy goals, such as increasing the use and awareness of renewable energy generation technologies among District residents and businesses, assisting low-income residents with their energy needs, and promoting customer choice in supply
2. The costs of public-sited microgrids should follow the benefits such that only customers who receive the microgrid benefits pay the associated costs
3. Public-sited microgrids should be encouraged to act as a resource to enhance the reliable operation of the electric distribution system, and the associated costs should be socialized accordingly
4. The regulatory framework for public-sited microgrids must include the applicable retail customer protections, including anti-discrimination and other rate and terms of service protections and customer service and reliability protections

Integration of Public-Sited Microgrids Allows Improved Planning, Design and Operation

- Integrated operation between public-sited microgrids and electric distribution can unlock benefits that improve distribution system reliability and avoid the need for future investment
- Pepco can facilitate successful integration of public-sited microgrids
- Campus microgrids provide benefits to the facilities served but not to customers served from the grid

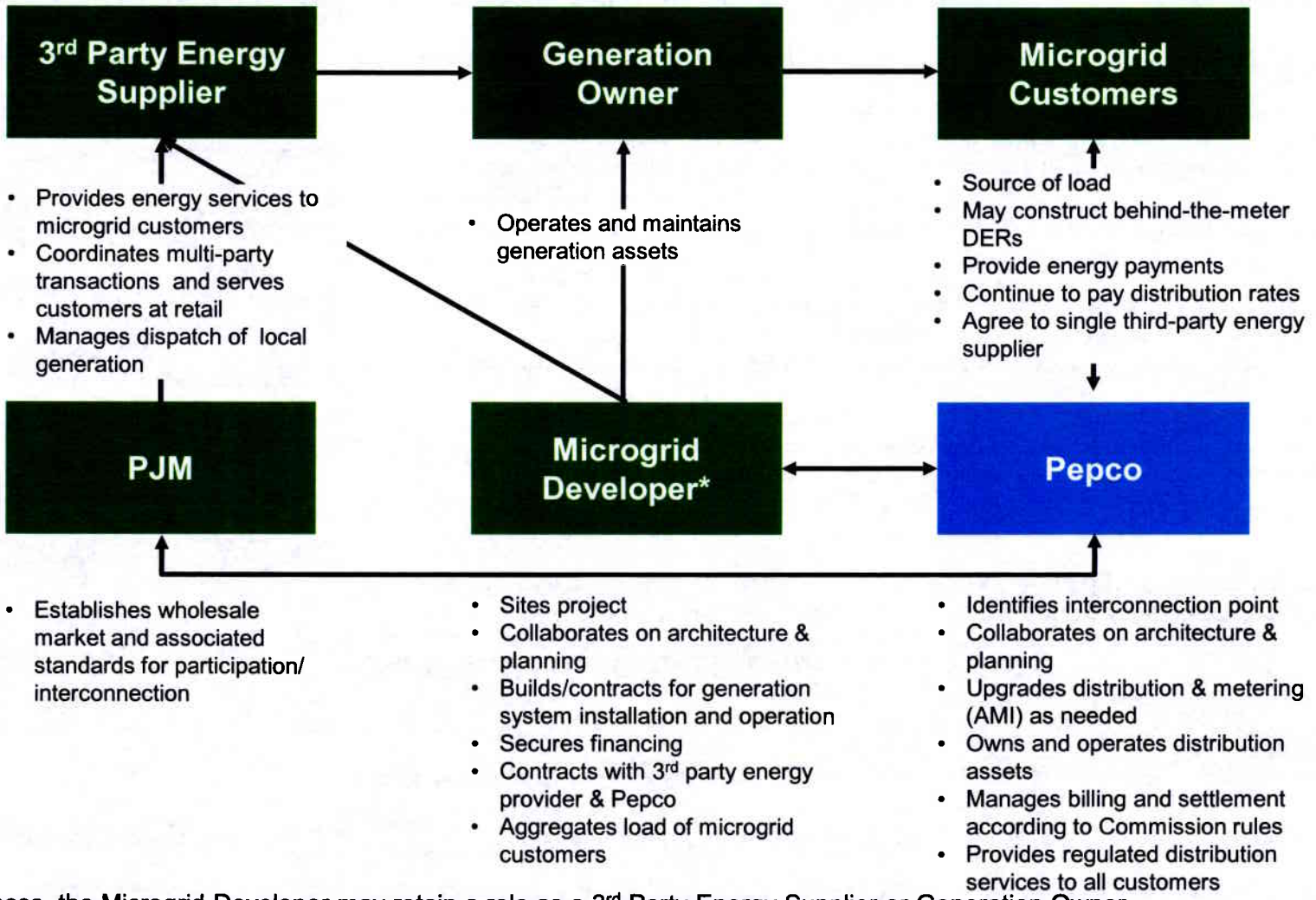
Potential Benefits	Benefits Realization	
	Campus Microgrid	Public-Sited Microgrid
On-site power source	✓	✓
Improved customer control and management of electricity consumption and production	✓	✓
Improved distribution system reliability	✗	✓
Potential distribution system investment deferral or avoidance	✗	✓
Transmission congestion relief or deferral	✗	✓
Improved bulk power system operation	✗	✓

Illustrative one-line diagram of community microgrid architecture and asset/services coordination



When a microgrid is operating in an island mode all generation in front of the meter or behind the meter must be managed so that the generation and load are balanced. The distribution system within the microgrid must be planned to support load flows that could be very different during grid-connected and islanded operations.

Illustrative public-sited microgrid energy supply contract structure



*In some instances, the Microgrid Developer may retain a role as a 3rd Party Energy Supplier or Generation Owner