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TO: Abigail Hopper, Director (cc: Kyle Haas, Paul Bollinger, and David Beugelmans)
Maryland Energy Administration

FROM: Michael Burr (cc: Michael Zimmer and Chris O'Brien)
Microgrid Institute

RE: Resiliency through Microgrids Task Force, Meeting 4, "Roadmap" comments

Microgrid Institute is pleased to offer comments in response to the following four questions[1] raised for discussion during the final meeting of the Maryland Resiliency through Microgrids Task Force on March 31:

- What can Maryland do today to build resiliency through public purpose microgrids?

- What is the appropriate method for choosing the location of a public purpose microgrid?

- In the case of public purpose microgrids, can/how do you appropriately split costs between the rate base and microgrid customers?

- How can the State of Maryland further promote microgrid deployment and cost reduction?

These questions all are interrelated, with an interrelated set of answers and considerations. In sum, public purpose microgrids will flourish in a market environment that fosters transparent

[1] Questions provided to the Task Force include the following: "What can Maryland do today to build resiliency through public purpose microgrids? What is the appropriate method for choosing the location of a public purpose microgrid? What would a public purpose microgrid in Maryland look like in the current regulatory landscape? What would an ideal public purpose microgrid look like in Maryland in an alternate regulatory landscape? How important are PJM energy markets to the economics of microgrid projects? In the case of public purpose microgrids, can/how do you appropriately split costs between the rate base and microgrid customers? What is the appropriate vehicle to lay the groundwork for EDC-owned, public purpose microgrids? What regulatory regime is appropriate for third party microgrids that utilize assets separate and apart from EDC assets? What regulatory regime is appropriate for third party microgrid service providers that facilitate microgrid services over existing EDC assets? How can the State of Maryland further promote microgrid deployment and cost reduction?"

allocation of costs and risks, and provides commensurate rewards for productive innovation in meeting local energy needs.

That summary leads to these basic questions:

- Who bears the various incremental costs and risks of development, operation, and maintenance?
- How will the value streams be priced from an operating microgrid?

Microgrid Institute believes that MEA's most productive effort can be focused on resolving these questions for the benefit of all Maryland energy customers – not just direct stakeholders in public purpose microgrids. The most effective approach to market development will ensure a bright future for a broad range of innovative energy solutions, and will avoid creating frameworks that encourage public purpose microgrids but inadvertently discourage other options that can deliver value for Maryland's people and economy.

At the same time, however, the State's interest in encouraging timely development of public purpose microgrids in particular merits an approach that expedites projects in a straightforward way while laying the groundwork for a long-term strategic approach.

Our comments address four major themes for consideration: 1) **Fostering Innovation with a Strategic Policy Approach**; 2) **Capturing Full Value from Microgrid Services**; 3) **Risk Management and the Public Interest**; and 4) **Public Purpose Microgrid Pilot Projects**. Our comments on these themes include several recommendations, including:

a. *Develop Maryland's public purpose microgrid policies as part of a long-range, holistic Utility 2.0 vision.*
b. *Consider establishing performance-based rate incentives for utilities that facilitate the successful deployment of public purpose microgrids.*
c. *Establish a pilot program to foster the immediate and mid-term development of public purpose microgrids.*
d. *Establish transparent, non-discriminatory methodologies for fairly and accurately valuing and monetizing all costs, risks, and benefits associated with microgrids.*
e. *Ensure State interconnection standards and practices facilitate optimal deployment of microgrids.*
f. *Consider providing State support for public purpose microgrids, perhaps in the form of commercial insurance or other risk-management instruments usable by any kind of project sponsor.*
g. *Clarify Maryland's interest in Transactive Energy – both in the microgrid context and the electricity market generally.*

We at Microgrid Institute appreciate being included in the Resilience through Microgrids Task Force initiative, and we welcome the opportunity to assist Maryland and stakeholders in navigating the process of developing public purpose microgrids.

## 1) Fostering Innovation with a Strategic Policy Approach

A singularly important role for policymakers in Maryland is to establish policy goals and regulatory frameworks that foster innovation in serving local energy requirements – not only with microgrids, but with a full range of demand-side services, including distributed supply and storage either behind the meter or in grid-tied configuration. Policy provisions that aim to encourage public purpose microgrids should – at a minimum – avoid discouraging other distributed energy solutions, and ideally the State's policies would result from a long-term strategic plan. Such a plan might seek to foster development of a Utility 2.0 grid topology, business model, and open-access energy services marketplace in Maryland.

### *a. Public purposes and value drivers*

MEA's amplification of the term "public purpose microgrid" has been helpful to guide the Task Force's work.[2] The main distinction of a public purpose microgrid seems to be to prioritize public-interest benefits over other potential microgrid services – a logical and helpful distinction. However, public-interest drivers don't inherently diminish other value streams deriving from microgrid operation. In fact, other value streams (besides resiliency for public purposes) can improve the cost-effectiveness of a microgrid project, and thereby increase its ability to deliver public benefits. (*See 2) "Capturing Full Value from Microgrid Services" below.*)

Especially to the degree microgrid tenants have substantial curtailable loads, dispatchable generation and storage, and other attributes that provide energy optionality, then microgrid controls can add value by economically dispatching distributed resources. An economic dispatch approach can foster innovation in providing services, yielding more effective microgrids that are better capable of serving the public's interest in resiliency.

### *b. Planning, interconnection, and integration policies*

As microgrids advance to serve critical customer needs, key questions are arising about planning, interconnection, and integration of microgrids into the utility grid. A thoughtful approach will allow optimal development of microgrids – to enhance overall grid reliability, and to improve the resilience, efficiency, and economics of options available to customers.

As interconnection standards evolve – most notably IEEE 1547 and the FERC Small Generator Interconnection Protocols / Agreements (SGIP/SGIA) – Maryland can encourage development of public purpose microgrids by ensuring State standards and processes meet industry best practices for innovation and optimal deployment of microgrids as part of a 21st-century utility system.

[2] MEA Director Abigail Hopper referred the Resilience through Microgrids Task Force to the following notes that were written on a white board for the purpose of guiding discussion and limiting its scope: "Public purpose microgrid means a series of interconnected loads, generation assets, and advanced control equipment across a defined geographic areas that are capable of disconnecting from the regional distribution system and operating independently. A public purpose microgrid must provide uninterrupted electric service to a series of critical community assets across multiple properties, such as community centers, commercial hubs, and emergency service complexes. A public purpose microgrid may be owned in whole or in part by either an electric utility or a third-party entity, and must provide services to multiple customers."

*c. Transactive Energy in Maryland?*

During the 3rd meeting of the Task Force, on March 24, 2014, MEA Clean Energy Policy Program Manager Kyle Haas referred to "transactive energy" in his discussion of microgrid assets and value streams. This topic bears clarifying, as do its implications for microgrids in Maryland.

Using the term "transactive" in a broad sense can be helpful when describing more dynamic operation of electricity systems on the basis of economic dispatch for a larger number of nodes, including end-use devices and DG resources. "Transactive energy" can mean, simply, "economic dispatch to the grid edge." A public purpose microgrid with multiple tenants could provide an opportunity to demonstrate transactive principles in operation (*see "4) Public Purpose Microgrid Pilot Projects" below*).

However, the technical term "Transactive Energy" (TE) has a narrower definition that implies a specific free-market structure based on a combination of forward contracts and real-time pricing, with distributed intelligent controls performing safe economic dispatch in accordance customer needs – in seamless interoperability, and in compliance with industry standards and practices. All of those concepts are still in development at this writing. The GridWise Architecture Council and the OpenADR Alliance, for example, are working on TE standards.[3]

It bears clarifying whether and how Maryland is interested in developing transaction-based energy markets and interoperable systems, and whether the State wishes to encourage demonstrating transactive principles in the specific context of public purpose microgrids. The State could play a key role in facilitating such demonstrations by establishing goals and provisions appropriate to public policy interest – and in concert with the industry's ongoing efforts to develop TE standards and practices.

*d. Monetizing the value of resilience for public purposes*

Where prospective microgrid tenants have few substantial loads that can be curtailed (or cycled in an integrated and intelligent way) then opportunities for transactive energy likely will be more limited, and the economic case for full-scale microgrid deployment will become more complex. In such cases, the ability for sponsors to innovate in producing public benefits will depend on their ability to appropriately monetize the value of providing resilience for State-defined public purposes.

One regulatory approach might be for Maryland to establish the appropriate methodology for determining the life-cycle value to the public for the resiliency attributes of a given public purpose microgrid, and then to create incentive programs that help microgrid sponsors to monetize that public-purpose value as part of the microgrid business case. Such incentive programs could come in the forms of taxpayer-funded State grants, or special utility tariffs or rate riders. They also could be State-backed insurance, loan guarantees, or other types of assistance (*See 3) "Risk Management and the Public Interest" below*).

[3] http://www.gridwiseac.org/about/transactive_energy.aspx

Notwithstanding the structural approach, State incentive programs will be most successful if they are created with the goal of rewarding productive innovation, and allocated with full public transparency to avoid misperceptions and backlash.

*e. Rate-base and free market financing*

Electric distribution companies ("EDC" or "utility") in Maryland are well suited to develop, own, and operate infrastructure required for public purpose microgrids. Maryland's public utility laws already provide key components of the regulatory framework required to make microgrids viable as a utility investment – most notably revenue decoupling and flexibility with regard to ownership of distributed generation.

However, the ability to serve a public purpose does not require microgrid investments to be developed under a traditional public-utility cost-recovery structure. MEA acknowledged this point in the guidance it offered to the Task Force on March 24, explicitly stating that microgrids serving public purposes could be owned by either utilities or third parties.

Microgrid-related assets owned by EDCs in Maryland might logically be considered for rate-base treatment, as they support the utility's obligation to provide safe and reliable service. However, installing or operating microgrid assets with financing raised through general rate riders or other increases for all ratepayers will invoke cross-subsidy issues. To the degree the incremental cost of providing service to microgrid customers is borne in rates paid by non-microgrid customers, Maryland utilities and their regulators will be tasked with determining proper methodologies for establishing:

i. The value of public-interest benefits to microgrid hosts, the nearby community, and the rest of Maryland – which will facilitate development under any financing structure (*see 1)-c "Monetizing the value of resilience for public purposes" above*);
ii. Incremental costs of microgrid capital assets and services above and beyond avoided costs, including generation, transmission, and distribution; and
iii. Transparent pricing for all value streams associated with microgrid operation – including public benefits, energy resources, and grid-service values (*see 2) "Capturing Full Value from Microgrid Services"*).

In each case, for rate-based microgrid assets, a non-discriminatory and transparent approach will be most likely to produce methodologies that foster innovation and cost-effective investment for a range of distributed energy solutions. All values and costs attributed to microgrids as part of regulated utility tariffs should be derived in a way that is just, reasonable, and not unduly discriminatory, irrespective of the business models or ownership structures of assets involved.

**2) Capturing Full Value from Microgrid Services**

Rate designs and market structures that devalue or exclude any components of a microgrid will mute or silence market signals for those components. Policymakers should ensure that to the greatest practical degree, pricing methodologies appropriately reward all potential value streams – including synergistic values produced uniquely by microgrids when operated in an integrated and economic fashion.

*a. Valuing distributed resources and assets*

A microgrid represents a bundle of distributed energy technologies and capabilities. Each component of a microgrid might produce a different value stream, but when technologies are combined, they work together to produce additional value – *i.e.,* the whole microgrid is greater than the sum of its parts.

The most successful microgrids are those that combine a full scope of functionalities and services to capture value – both for internal energy balancing and for providing market services. In other words, a microgrid business case that depends mostly or entirely on generation revenues will be weaker than a business case that fully captures all potential values, including demand-side and supply-side resources and optionality benefits. Examples:

- Energy efficiency
- Conservation
- Demand response, load shifting, and peak load management
- Energy storage
- Renewable energy integration and optimization
- Electric vehicle integration and optimization
- Greenhouse gas reduction
- Ancillary services including voltage support, volt-VAR control, etc.

*b. Valuing system benefits*

MEA's definition of public purpose microgrids could be expanded to include the potential value of using microgrids to achieve a more resilient and stable utility system overall, rather than just to achieve greater resilience for assets within the boundaries of the microgrid.

i. Microgrids as Utility 2.0 assets

Microgrids deployed as part of an integrated system could serve vital roles in system reliability and resilience. A so-called "self-healing" smart-grid system, for example, could dispatch microgrid resources to relieve local system constraints and provide voltage support at the distribution substation level, when the system is under stress.

A long-term strategy for Maryland that aims to foster development of Utility 2.0 network topology and market structures[4] could help establish methodologies for monetizing the public purpose value of operating microgrids as part of an integrated utility grid of the future.

The Utility 2.0 concept and its future development path involves many variables and questions that differ among jurisdictions. Some States might offer incentive rates as part of performance-based ratemaking initiatives. Maryland could define utilities' work in facilitating successful deployment of public purpose microgrids as milestones in a long-range strategic vision for Utility 2.0 – with performance incentives provided for utilities that achieve such milestones in accordance with the State's interests.

ii. Microgrids as non-transmission alternatives

Microgrids could be used in ways that provide regional relief from transmission congestion in some situations. This capability hasn't been a primary reason for development of microgrids, but it represents potential added value. Some microgrids could be defined as a non-transmission alternative (NTA) for purposes of the bulk power grid.[5] A microgrid that helps to address regional capacity or reliability requirements could qualify for FERC rate treatment, allocating costs regionally to pay for regional benefits.

### 3) Risk Management and the Public Interest

Risk management will be a fundamental challenge for public-purpose microgrids – whether sponsored by utilities, third parties, or hybrids of the two. The State of Maryland could accelerate microgrid deployment for public purposes by providing targeted financial risk coverage, as appropriate and commensurate with the public interest in microgrid deployment.

For example, if a franchised utility invests in microgrid assets on behalf of all ratepayers (*i.e.,* the PSC allows the microgrid assets in the rate base), and assesses special fees or rates specifically for microgrid customers to bear their incremental share of the cost, then utility ratepayers effectively are bearing the risk that microgrid customers could fail to meet their financial obligations. This could be considered a hidden cross-subsidy.

Likewise, for third-party owned microgrid assets, investors bear the risk that host customers could fail to meet their financial obligations. Capital costs (*e.g.,* debt-service coverage requirements and interest rates for commercial loans and bonds, and threshold ROI requirements for equity capital) will vary depending on the credit of the counterparties and contractual structures involved.

Maryland can foster public purpose microgrids by ensuring risks are assessed and priced in a transparent way, and the costs are borne equitably by the parties that benefit. Subsidies and

[4] Also sometimes called "utility of the future." See Burr, Michael T., "Reinventing the Grid," *Public Utilities Fortnightly,* March 2014.

[5] This idea has been discussed in many forums, but to our knowledge at this writing, it hasn't been demonstrated at an operating microgrid. See for example Krapels, Ed: "Microgrids as Non-Transmission Alternatives," Pace University Law School, February 2013.

risks borne by taxpayers or by all ratepayers should be clearly defined and limited to those risks and costs the State specifically identifies as meriting broad-based support.

Moreover, to the degree possible, risks and costs should be assessed and allocated in accord with commercial best practices and market norms. One approach might be for the State to establish a program to underwrite performance insurance that could help cover numerous liabilities, from technology risk to financial performance among some or all stakeholders in a microgrid. This would allow project risks to be valued commercially but with underwriting arranged by the State. Such an approach could yield a low-cost incentive for public purpose microgrids using any financial structure.

The State also could explore other program options, including loan guarantees, green bank funds, and other structures that allow project risks undertaken for the benefit of Maryland's residents to be shared in ways that are equitable, transparent, and appropriate to serve the public interest.

### 4) Public Purpose Microgrid Pilot Projects[6]

Microgrid Institute recommends that the State of Maryland establish a program to facilitate and support public purpose microgrid pilot projects in the state (the "Pilot Program").

The importance of State-supported projects with active utility involvement cannot be overstated. Because modern, integrated microgrids represent complex packages of technologies, processes, and arrangements, the first commercial-scale projects will face serious challenges securing the long-term customer commitments necessary to support development and financing. The State of Maryland can play a pivotal role in opening future opportunities for public purpose microgrids.

#### *a. Executing on Maryland's strategic goals*

A Pilot Program offers an opportunity to test various concepts and models in the field, with operating microgrids that are designed to serve public purposes. Pilot projects would allow stakeholders to work through various issues affecting different financing and ownership methodologies, as well as innovative technology approaches, operational models, and even regulatory models. The State could support, for example, public purpose microgrid pilot projects that apply new approaches to recovering utility fixed costs (*i.e.,* flat fees for network interconnection instead of volumetric price structures); Transactive Energy control systems and market structures; and hybrid business models and commercial structures that seek to optimize apportionment of costs and risks.

The Pilot Program will be most successful and create the greatest value for Maryland businesses and residents if it is developed and executed as part of a long-range planning effort – perhaps

[6] Portions adapted from Microgrid Institute's study, *Minnesota Microgrids: Opportunities, Barriers, and Pathways toward Energy Assurance*, Final Report, Sept. 30, 2013, produced under contract with the Minnesota Department of Commerce, Division of Energy Resources, pp.80-81.

toward a Utility 2.0 market vision. Such a pilot program should include criteria that consider the full range of interrelated public and commercial interests that microgrids can address, including not only energy assurance and emergency preparedness, but also clean energy development, energy system efficiency and stability, and business development to cultivate private funding and economic growth.

Transparent planning, management, and benchmarking, with regular and rigorous performance assessments, will ensure the best possible outcomes for the State. The Pilot Program will produce the greatest value if it is conceived and developed as a long-range initiative with multi-phase planning, monitoring, and improvement. In this way, best practices can be refined and applied from one phase to the next, and overall experiences will be captured in subsequent expanded projects. Moreover, a multi-phase program will focus first on achievable short-term objectives for microgrid development, with subsequent phases addressing broader objectives and higher goals for public benefit and technology advancement. Finally it will enable full transparency to maintain productive stakeholder engagement.

*b. State and local government microgrid opportunities*

The Pilot Program could make rapid progress by first considering sites owned and operated by units of State and local government. Opportunities exist in Maryland to develop microgrids with such facilities as anchor tenants. Examples include law-enforcement and administrative buildings, community centers, and some schools and universities. Other examples could include State-affiliated prisons, as well as housing authorities, hospitals, and other facilities with populations that are particularly vulnerable during outages. CHP and district energy systems serving public facilities provide obvious opportunities for further development.

Ultimately local communities will lead the effort to site potential microgrids as well as other resilience and energy projects. The State of Maryland could cultivate interest and effort among local stakeholders by sponsoring statewide outreach and education programs. Such outreach efforts could be undertaken and sponsored as part of the Pilot Program.

*c. "Pilots" vs. "demonstration" projects*

The Pilot Program will be most effective if it facilitates development of public purpose microgrids for cost-effective commercial operation, rather than focusing on technology demonstration for its own sake. Demonstration projects in Maryland and around the world already have established microgrid technology capabilities. While the technology will continue advancing, systems available today are ready for public purpose microgrid deployments. An ongoing "pilot" program to advance public purpose microgrid applications will be more effective and appropriate than "demonstration" projects.

*d. Maryland funding avenues*

Pilot projects could be partially supported with existing clean energy funding sources, utility rate-base treatment, and funding pre-approvals for microgrid-related investments. Other possible sources include state implementation planning (SIP) processes to comply with Federal

Clean Air Act requirements; and provisions under State bonding authority related to special projects.

Further, some phases of the Pilot Program likely will require direct funding from the State, potentially with appropriations from the General Assembly for State-backed insurance, direct loans and grants, loan guarantees, and agency support.

The regulatory and administrative processes described above require substantial commitments of time and expertise. To the degree microgrids can serve Maryland's policy goals, the State's efforts to clarify related policies and facilitate project development merit appropriate budget allocations.

Thank you for the opportunity to contribute. We welcome future initiatives toward microgrid development in Maryland.

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