



An Exelon Company

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December 18, 2015

Via Electronic Filing

David J. Collins, Executive Secretary
Maryland Public Service Commission
William Donald Schaefer Tower
6 St. Paul Street, 16th Floor
Baltimore, MD 21202

Re: BGE's Public Purpose Microgrid Proposal

Dear Mr. Collins:

Baltimore Gas and Electric Company ("BGE" or the "Company") is pleased to present to the Maryland Public Service Commission ("Commission") for consideration and approval BGE's Public Purpose Microgrid Proposal ("Microgrid Proposal"). Pursuant to the Microgrid Proposal, BGE seeks Commission approval for a pilot project to construct, operate and recover costs associated with two "public-purpose" microgrids located within BGE's electric distribution service territory – one in Baltimore City and the other in Howard County. As part of this approval, BGE also seeks a waiver of the requirement to obtain a certificate of public convenience and necessity for the pilot project. This Microgrid Proposal consists of a background discussion, a formal request for approval and information on the following key aspects: technical specifications, cost profile, siting objectives and criteria, site selections, cost recovery and energy market opportunities. Additional information is contained in exhibits attached hereto, with corresponding references in the appropriate sections below. BGE welcomes the opportunity to explain this Microgrid Proposal in greater detail, and respectfully requests that the Commission consider this matter at the January 27, 2016 administrative meeting.

1. Background

Pursuant to a February 24, 2014 executive directive, a Resiliency Through Microgrids Task Force (“Task Force”) was formed to examine certain barriers to deploying microgrids in Maryland. The Task Force was comprised of representatives from the Maryland Energy Administration (“MEA”), the Maryland Department of Natural Resources’ Power Plant Research Program, and the Maryland Emergency Management Agency. The Task Force convened a series of roundtable discussions in the first half of 2014, inviting multiple stakeholders to participate, offer ideas and suggestions, and submit comments regarding microgrids. The Task Force defined “microgrid” as “a collection of interconnected loads, generation assets, and advanced control equipment, installed across a defined geographic area, that is capable of disconnecting from the macrogrid (the utility scale electric distribution system) and operating independently.” More specifically, the Task Force was interested in analyzing the potential for deployment of “*public purpose* microgrids”, which the Task Force explained were microgrids “serving critical community assets across multiple customers and multiple properties.” According to the Task Force, a “critical community asset” includes resources that provide important community functions, such as community centers, commercial hubs, and emergency service complexes.”

BGE was an active participant in the Task Force roundtable meetings, offering comments on technical issues, as well as insight on legal and regulatory considerations impacting the deployment of public purpose microgrids in Maryland. Following the conclusion of the roundtable meetings and the collecting of information and comments from the stakeholders, the Task Force issued its *Resiliency Through Microgrids Task Force Report* (the “Task Force Report”) on June 23, 2014.¹ The Task Force Report contains several key conclusions and makes multiple recommendations pertaining to the technical, financial, legal and regulatory aspects of public purpose microgrids, including but not limited to the following:

- Public purpose microgrids have the potential to offer important societal benefits during periods when the macrogrid is down, while allowing for the economic and innovative integration of distributed generation and energy storage systems during normal operations.
- Electric distribution companies should incorporate public purpose microgrids, with accompanying distributed generation and energy storage systems, into their existing grid upgrade planning processes.

¹ A copy of the Task Force Report is available at:

http://energy.maryland.gov/documents/marylandresiliencythroughmicrogridtaskforcereport_000.pdf

- It is in the policy interest of the State to pursue utility-owned public purpose microgrids that serve multiple customers over multiple properties. The State should focus on the deployment of these microgrids in the short term.
- Electric distribution utilities should facilitate the deployment of public purpose microgrids by filing applications for project preapproval with the Public Service Commission.

The Task Force Report also notes that the number of named Atlantic storms has increased 67% since 1995, with annual associated costs between \$20 billion to \$50 billion. Additionally, the Task Force Report concludes that the benefits of public purpose microgrids emerge on many different fronts, including the ability to island critical portions of the electric distribution grid following severe weather events, marked improvements in power quality, system balancing and voltage regulation, reduced peak demand during times of grid constraints, the ability to monetize value in PJM to offset costs, and reduced costs for distribution system upgrades and line losses.

Given the benefits of public purpose microgrids, and keenly aware of the Commission's longstanding interest in ensuring electric grid resiliency for the citizens of Maryland, BGE now brings to the Commission for review and approval a proposal for a pilot project to deploy two public purpose microgrids in BGE's service territory to benefit BGE's customers and the greater public during periods of macrogrid outages. If successful, BGE envisions seeking approval for additional microgrid project proposals, with an eventual goal of developing at least one public purpose microgrid in each county within BGE's electric distribution service territory, as well as Baltimore City. As detailed below, BGE believes public purpose microgrids, when carefully planned and implemented, can provide significant benefits for BGE's customers and the greater public, especially during periods when the larger electric grid may be inoperable due to severe storm events or other substantial disruptions.

2. Request for Approval

A. *Request to Construct, Own and Operate Two Public Purpose Microgrids*

BGE seeks approval from the Commission to construct, own and operate two public purpose microgrids, and seek cost recovery through a monthly charge billed to applicable electric customers through a new microgrid rider to BGE's Electric Service Tariff. BGE proposes to construct two sites initially and apply lessons learned from those projects to the design and construction of future microgrid sites, with an ultimate goal of constructing and operating one or more public purpose microgrids in each jurisdiction of BGE's electric distribution service territory. Details regarding cost recovery through the new rider are provided below.

BGE carefully considered how sites might be identified and evaluated for potential microgrid applications. The overall process considered the current state for reliability and resiliency impacts and any other planned system work that might address those issues. The process then looked for clusters of critical services and establishments, including but not limited

to urgent care facilities, schools, gas stations, grocery stores, restaurants, banks, pharmacies and home improvement stores. Also included were facilities that can provide shelter space, places for assembly and temporary service centers. Another criterion was how many residents surround the proposed microgrid location and how many would be supported by available services. Lastly, potential sites were reviewed for ability to interconnect and reconfigure the distribution system to support the desired public benefit operation. This process and the included criteria are discussed in more detail below.

BGE evaluated a number of locations as part of the process in developing the Microgrid Proposal. As a result of that evaluation, BGE proposes initially to construct, own and operate two public purpose microgrids in the BGE electric distribution service territory. One microgrid would be located at Edmondson Village (the 4600 block of Edmondson Ave, Baltimore City), and the other microgrid would be located in the Kings Contrivance area of Howard County (centered on the 8600 block of Guilford Road in Columbia, Maryland). Attached hereto as Exhibit A are aerial photographs of the two proposed microgrid locations. BGE would operate both locations as public purpose microgrid pilot projects to gain hands-on, real-world understanding and experience in the design, operation and performance of public purpose microgrids. Upon completion of the pilot, BGE would incorporate all lessons learned to further develop microgrids across the BGE service territory, with a goal of developing at least one public purpose microgrid for each of the counties within BGE's electric distribution service territory, as well as one or more microgrids for Baltimore City.

B. Commission Approval Authority

The Commission has the authority pursuant to Public Utilities Article ("PUA") § 7-510 (c)(6) to approve BGE's Microgrid Proposal, including the construction, ownership and operation of the microgrids by BGE, and the recovery of associated costs through Rider 12. PUA § 7-510 (c)(6) provides the following:

In order to meet long-term, anticipated demand in the State for standard offer service and other electricity supply, the Commission may require or allow an investor-owned electric company to construct, acquire, or lease, and operate, its own generating facilities, and transmission facilities necessary to interconnect the generating facilities with the electric grid, subject to appropriate cost recovery.

Each microgrid included in BGE's Microgrid Proposal includes a generation facility component. The generation components will provide a continuous and reliable source of electricity to customers during storm events or other instances when the larger utility grid is not operating, thereby meeting the long-term demand in Maryland for electricity supply.

Recently the Commission commented on the potential for microgrids in Maryland. In Case No. 9298, Order No. 85385, the Commission ordered Maryland utilities to conduct an assessment of the adequacy of their damage modeling and projections related to weather forecasts, and determine if advancements in these areas could improve restoration times. One of

the technologies the Commission suggested that utilities consider applying was microgrids with generators.² BGE now seeks approval from the Commission pursuant to PUA § 7-510 (c)(6) to construct, own and operate the public purpose microgrids described herein.

C. Request for CPCN Waiver

In addition to seeking the approval to proceed with its Microgrid Proposal, BGE hereby petitions the Commission for approval of a waiver from the requirement to obtain a certificate of public convenience and necessity (“CPCN”) as part of the process in constructing the public purpose microgrids included in the Microgrid Proposal. PUA § 7-207.1 (a)(2) provides that the Commission may approve the construction of an on-site generating station without issuing a CPCN if (i) the capacity of the generating station does not exceed 25 megawatts; (ii) the electricity that may be exported for sale from the generating station is sold only on the wholesale market pursuant to an interconnection, operation and maintenance agreement with the local electric company; and (iii) at least 10% of the electricity generated at the generating station each year is consumed on-site.

The public purpose microgrids in BGE’s Microgrid Proposal are eligible for the PUA § 7-207.1 (a)(2) CPCN waiver. The capacity of each of the generation facility components of the public purpose microgrids is well under 25 megawatts. In addition, nearly all of the electricity generated at these generating stations in a year will be consumed on-site, as the purpose of the microgrids is to supply electricity to consumers at the sites during larger utility grid outages. Finally, to the extent there is excess energy available, it will be sold to the wholesale market through PJM’s energy and capacity market constructs. An interconnection agreement with the local electric company is unnecessary since BGE, as the local electric company at each microgrid site, will own and operate the generation facility. Upon Commission approval of the Microgrid Proposal, BGE will file with the Commission all necessary CPCN waiver applications and supporting documents. BGE requests that the Commission waive the requirement of an interconnection, operation and maintenance agreement with the local electric company, because BGE is the local electric company at each microgrid site. The Commission may waive this element of the approval process pursuant to PUA § 7-207.1(e).

3. Technical Description

BGE proposes to build “Public Purpose” Microgrids as described in the MEA Task Force Report to enhance the distribution system reliability and resiliency capabilities. The primary purpose of these public purpose microgrids is to continue to deliver energy to critical and public-purpose customer services to support the broader community impacted by a significant loss of electricity supply through the core distribution system due to outages or significant weather or other impacts. In non-outage conditions these microgrids will be connected to the general electric distribution system and will operate as a portion of that system. On initiation of a

² See Commission Order 85385 at 19.

significant outage and/or extended loss of service from the distribution system, the microgrids will island from, or in some cases, be islanded from, the larger distribution system, and the microgrids' generation sources will initiate operation and provide energy to the islanded loads, enabling their operation. When service is restored to the larger electric distribution system, the microgrids will revert back to the standard interconnection with the distribution system and resume non-outage status.

BGE reviewed a number of potential microgrid sites across its service territory. BGE expects each individual microgrid location to require 2-3 megawatts (MW) of generation to support the customer load. However, sites may require more or less generation depending on the number and size of services supported in each microgrid. BGE intends to modify the existing 13.2 kV distribution circuit configurations and add new switching and control capability as needed to each location. All work would be on the utility distribution side of the service interconnections with the customer and would support the connected group of customers within the microgrid.

Natural gas generation is the proposed fuel source and preferred option for installed generation where natural gas distribution infrastructure is available (including both microgrid locations included in the Microgrid Proposal). In areas where such infrastructure is not available, diesel shall be considered as the alternate fuel source. While renewable energy sources are not currently included in the proposed generation footprint, customer-owned generation such as solar or wind resources can be integrated into the microgrids to offset fossil fuel-based generation. BGE expects the configuration of the microgrids will enable customer-owned solar or on-site generation to operate while the microgrid is in islanded mode. This is in contrast to the current environment where a customer experiencing an outage is unable to operate their renewable energy source while utility service from the larger utility grid is unavailable. BGE also expects that the proposed microgrid configurations will not preclude further consideration or installation of customer-owned or other renewable energy sources or efficient generation as desired. BGE evaluated energy storage opportunities and is not incorporating them into the initial microgrid designs due to current cost, interconnection and control challenges. BGE will continue to look to incorporate storage in the future as costs decline and technical issues are resolved.

The specific layout of each microgrid site is highly dependent on the existing BGE infrastructure. BGE intends to utilize existing feeders and equipment as much as possible as the main backbone of the microgrid. Underground cable and overhead wire will be replaced or hardened where necessary, but will remain as a main component. Switching is expected to be the most complex component of the microgrid. Where possible, BGE shall reuse existing switchgear. New switching configurations, however, will require different sizes and types of switchgear than may be typically incorporated on the BGE system today. For each location, BGE is comparing automated switchgear to manually operated switchgear to determine the preferred method of reconfiguration. Automation allows for faster switching and restoration of service, yet may not be the most cost-effective alternative in some cases. Where automation is

used, BGE will deploy a centralized automation control system to monitor and control the microgrid while allowing for a complete override from the BGE control room.

4. Cost Profile

BGE's preliminary estimates indicate costs of approximately \$3.5 Million per MW of load supported. Below is a sample cost estimate for the typical 2 MW microgrid location:

<u>Microgrid Component</u>	<u>Capital Expenditures</u>
Generation	\$2,700,000
Switch Gear	\$2,200,000
Controls	\$1,300,000
Gas Extension	\$250,000
Miscellaneous	\$500,000
Cable	\$50,000
Total Estimated Cost	\$7,000,000 or \$3,500,000/MW

Costs can vary, however, by microgrid location. Accordingly, BGE has calculated preliminary cost estimates per MW of load supported specific for each of the microgrid projects included in this Microgrid Proposal. Attached hereto as Exhibit B are cost breakdowns for both the Baltimore City microgrid location and the Howard County microgrid location.

5. Site Selection Process

BGE developed a comprehensive process by which it considered and evaluated potential sites for inclusion in the Microgrid Proposal. BGE's objective was to identify sites for microgrid deployments that would significantly enhance reliability and resiliency capabilities – as well as support important public benefit services – for the surrounding communities during major disruptions to the local electric distribution system. Key steps in BGE's site selection process include:

- Review electric distribution system performance for reliability and resiliency.
- Identify prospective areas that could benefit from microgrid support.
- Review prospective locations based upon a multitude of factors:
 - The mix of services included within a prospective location.
 - The size of the population that could be supported by the microgrid location.
 - The feasibility of incorporating microgrid capabilities.

- The availability of natural gas at a prospective location.
 - The proximity of a prospective location to other prospective microgrid locations.
 - Available space at a prospective location for generation and interconnection equipment.
 - The proximity to known evacuation routes or shelters.
 - The availability of 13kV distribution feeders and the necessity for feeder upgrades.
- Conduct site visits and site evaluations to determine the viability of the site and to verify the potential customer mix.
- Consider any particular customer or local concerns.
- Consider the ability to leverage the microgrid for other benefits or system support.
- Score each prospective site based on the siting criteria.

BGE's system review encompassed a composite process that weighted both system average interruption frequency index ("SAIFI") and system average interruption duration index ("SAIDI"). The results allowed BGE to identify a number of locations that may be more suitable for public purpose microgrids. BGE considered two metrics in the system review process:

- Distribution feeder SAIFI during all weather conditions over the prior five year period (2010-2014).
- Distribution feeder SAIDI during major outage events over the prior five year period (2010 – 2014).

BGE then developed a composite metric based 50% on SAIFI – All Weather and 50% on SAIDI – Major Outage Events Only, and applied the metric to each quarter square grid of BGE's electric distribution service territory.

BGE evaluated potential sites for reliability and resiliency with the composite metrics and then evaluated each potential site against the other proposed sites with additional factors, including:

- Customer information (transformer location and capacity, summer and winter peak demands).
- Interruptions during major outage events (number of hours out of service during each major outage event in the prior five year period 2010-2014).
- Interruptions during normal conditions (number of interruptions during normal conditions over the prior five year period 2010-2014; number of customer minutes of interruptions during normal conditions over the prior five year period 2010-2014).
- Distribution feeder SAIFI and SAIDI during both major outage events and normal conditions over the prior five year period (2010-2014).
- Number of special needs facilities in proximity to the site.
- Number of critical and business significant customers in proximity to the site.
- Number of customers within set radii of the site (5 miles).
- Total overhead and underground mileage of proximate distribution feeders.

- Substation supply diverse routing; substation rating; automatic transfer capabilities.
- Exposure to vegetation outages on proximate distribution feeders.
- Any recently performed reliability improvement projects at or near the prospective site.

BGE evaluated a number of sites across the service territory prior to selecting the two sites included in the Microgrid Proposal. Although each proposed site was evaluated, not all sites are currently recommended for pilot or microgrid deployments. In addition, BGE recognizes that the list of considered sites is not a list of all possible microgrid locations within BGE's service territory, and that additional work is needed in portions of the service territory that do not currently have access to natural gas – particularly in the southern end of the service territory. BGE also recognizes a need to discuss locations with the local jurisdictions to assure a strong fit with meeting their needs and providing the desired public benefits.

The list of initial sites BGE considered included:

Anne Arundel County

- Annapolis Towne Center – 1900 Block Towne Centre Drive
- Pasadena Plaza – 8100 Block Ritchie Highway

Baltimore City

- Edmondson Village – 4600 Block Edmondson Avenue
- Mondawmin Mall – 2400 Block Liberty Heights
- North Hampden – 1000 Block W. 41st Street
- Northwood Shopping Center – 1500 Block Havenwood Road
- Reisterstown Road Plaza – 6700 Block Reisterstown Road

Baltimore County

- Perry Hall – Joppa Road and Ebenezer
- Towson – York Road and Burke Avenue

Calvert County

- Prince Frederick – 10000 Block Town Center Boulevard
- Prince Frederick – 100 Block Hospital Road

Carroll County

- Westminster – Route 140 at Center Street

Harford County

- Belair – 500 Marketplace Drive

Howard County

- Ellicott City – Route 40 and Chatham Road
- Kings Contrivance – 8600 Block Guilford Road

Prince George's County

- Bowie Town Center

6. Proposed Pilot

BGE proposes to construct initially two sites as pilots to test design and operating principles and determine lessons learned for additional projects. These pilots would:

- Determine whether the actual design, equipment selection and installation processes deliver the technical solution desired.
- Allow BGE to clearly understand the physical and financial requirements of the public purpose microgrids for refining future cost estimates and designs.
- Allow BGE to clearly understand the land requirements, acquisition process, and challenges.
- Verify operations and support for reducing reliability and resiliency impact hours for islanded areas (customers), and identify any unexpected issues.
- Verify that equipment – especially equipment not standard to utility applications today – can be effectively interconnected and operated to meet the desired outcomes.
- Identify operating and cost opportunities for future equipment, design, and operating evaluations.
- Verify microgrid implications for local renewable (solar) generation.
- Verify energy market contributions as compared to initial expectations.
- Continue to seek opportunities to incorporate storage in future design configurations or as retro-fits to initial pilot installations.

BGE estimates that it could take 12 to 18 months to design and construct a microgrid once a site is selected, but BGE would incorporate findings as soon as they are available into the planning and evaluation of future microgrid sites. BGE recommends a pilot period of 12 months of operations for evaluating the operating factors described above.

7. Proposed Pilot Locations

BGE proposes to build out initially two sites as pilot locations to work through the siting, design engineering, construction and operating requirements. The two sites – Edmondson Village (4600 Block Edmondson Ave., Baltimore City) and Kings Contrivance (8600 Block Guilford Road, Columbia, Howard County) – were selected based on considerations as described above and the ability to reconfigure the electric systems in a reasonable manner, the available room for generation and switching, and the proximity to residents and other services supported by the locations.

Of the potential sites considered by BGE, these sites evaluated particularly well compared to others in that the two sites would see a benefit in reliability and resiliency, the sites included numerous public benefit services, the locations were at or very near major highways and, in the case of Edmondson Village, is located along major bus routes, enabling access to the locations by those immediately nearby, as well as others driving, riding or travelling through the area. Additionally, the recommended sites are in contrasting environments (urban and suburban), thereby offering BGE the opportunity to work through and learn from differences in technical configurations and design considerations. Finally, BGE recommends these sites because they have reasonable space on or adjacent to the site for the design and build out of the initial public purpose microgrids.

Edmondson Village, Baltimore City

This location includes the following facilities in close proximity:

- Major grocery store and pharmacy³
- Gas station
- Approximately six local and chain restaurants
- One to two general stores
- Medical offices (UniversityCare at Edmondson Village)
- Dental center
- Auto parts store
- Westside Skill Center and Edmondson High School facilities
- Enoch Pratt Free Library – Edmondson Avenue Branch

The microgrid design for the site includes reconfiguring and adding switching capability to isolate the portions of the circuits, and adding natural gas generation and controls. BGE estimates the site would require 3 MW of generation to support the load. The preliminary cost estimate for this location is \$9.2 million.

³ The site includes one of the few major grocery and pharmacy locations on the entire west side of Baltimore City.

The area to be supported by the microgrid includes the west side of Baltimore City and the nearby Uplands development. The site is located along a major thoroughfare with bus and vehicle access. Approximately 676,000 residents are within 5 miles of the site. The Westside Skill Center, Edmondson High School and the community library could serve as shelters or meeting locations as determined by Baltimore City officials and members of the community.

Kings Contrivance Village Center, Howard County

This location includes the following facilities in close proximity:

- Major grocery store with pharmacy
- Major pharmacy
- Multiple banks
- Gas station
- Several small and mid-size restaurants
- Personal services (barber, dry cleaners)
- Insurance offices
- Other small businesses
- Village meeting house (Amherst House)
- Hammond High School

The microgrid design for the site includes reconfiguring and adding switching capability to isolate the portions of the circuits, and adding natural gas generation and controls. BGE estimates the site would require 2 MW of generation to support the load. The generation and circuit configuration is expected to enable renewable generation (located within the site footprint) to operate while the circuit is in microgrid mode. The preliminary cost estimate for this location is \$7.4 million.

The area to be supported by the microgrid includes the south-central area of Howard County, not far from Columbia and major highways. Approximately 217,000 residents are within 5 miles of the site. The Village meeting house and Hammond High School can serve as shelters or meeting locations as determined by Howard County officials and members of the community.

BGE proposes to work with local officials at both sites to refine the configurations to best meet the needs of Baltimore City and Howard County.

8. Cost Recovery Proposal

BGE proposes that the costs to design, implement, and operate the public purpose microgrids be recovered through a microgrid service charge, with separate rates listed under a proposed new Rider 12 - Microgrid Service Pilot, to BGE's Electric Service Tariff. Rider 12 details the rates and recovery mechanism for the costs associated with microgrid service. The microgrid charge would be included in the volumetric distribution rate appearing on a customer's bill.

Following Commission approval of Rider 12, the following rate schedules would pay the corresponding monthly charges in the first year as detailed in the table below:

Rate Schedule	Rate	Unit(s)
R/EV	\$0.00004	Per kWh
RL	\$0.00004	Per kWh
G/GU	\$0.00004	Per kWh
GS	\$0.00003	Per kWh
GL	\$0.00003	Per kWh
P	\$0.00001	Per kWh
T	\$0.00000	Per kWh

The monthly charges are calculated based on the first year's revenue requirement of \$1.0 million, which is based on the forecasted costs incurred by BGE for the initial year of the public purpose microgrid project. In the first year, the estimated monthly and annual charge for a residential customer using 930 kWh of electricity each month would be approximately \$0.04 and \$0.48 respectively. In the second year, the residential monthly and annual charge is expected to increase to approximately \$0.13 and \$1.56 respectively, if no additional microgrids are added. Cost recovery includes a) depreciation and amortization; b) fuel costs; c) operation and maintenance costs; d) earnings on the net investment as determined by applying the Company's most recent electric authorized rate of return, adjusted for taxes, to the average investment balance net of deferred taxes; and e) applicable taxes. Customers connected to the microgrid and receiving their energy from a competitive supplier may remain with that supplier. However, all customers receiving energy supply from one of the microgrids as they operate in an islanded configuration will be billed their applicable Standard Offer Service rate for the energy supplied, which will also be applied to offset the revenue requirement. Attached as Exhibit C to this Microgrid Proposal are (1) detailed calculations for the first and second year revenue requirements and (2) detailed calculations for the first and second year volumetric rates for each customer class. Attached as Exhibit D is the proposed Supplement 575 to P.S.C. Md. E-6, Rider 12 – Microgrid Service Pilot ("Supplement 575") in both clean and redlined versions. Upon Commission approval of Supplement 575, BGE will submit in a compliance filing all necessary tariff schedules.

9. PJM Market Participation

BGE proposes to offset customer costs associated with the public purpose microgrids by using the generation and load reduction components during periods of time when the microgrids are synchronized with the larger electric distribution system. BGE can bid the generation resources into PJM's wholesale energy, capacity and ancillary services markets. Additionally, the load reduction benefits of the microgrids may be monetized through PJM's demand response markets, depending on applicable PJM market rules. BGE can receive benefits in microgrid activation, while bidding the net load-reducing capacity during high wholesale energy market

prices, or when the reliability of the larger electric grid is at risk. Any revenues received through the PJM markets would go to customers through the new Rider 12 - Microgrid Service Pilot.

In addition to the ability to participate in the PJM markets, BGE's public purpose microgrids potentially offer other benefits, including normalization of the market peak energy process and the support of energy savings and demand reduction plans through EmPOWER Maryland.

Generation on the microgrid configured with advanced switching, communication and controls could be tasked with providing load relief to the connected circuit to mitigate peak load concerns. Furthermore, the generation could possibly derive capacity and in some cases energy value from the PJM energy markets. In order to consider participation in the markets, the generation units must be permanently connected at an identifiable PJM node, and PJM must be able to communicate with BGE staff 24 hours a day, 7 days a week. When energy storage is incorporated in the future, added benefits from the ancillary markets may be identified and considered.

A review of historical PJM values for capacity and energy show a potential benefit of as much as \$10,000 per month for 2 MW of firm capacity, and more nominal energy values from dispatching the units at periods of high LMP. These values may be different in future market years.

10. Conclusion

BGE recognizes the value that public purpose microgrids can provide to BGE's customers and others who may be in the service area supported by a microgrid during times of extended outages. The services supported by the proposed microgrids will serve a large number of residents and customers in and around the microgrid locations, well beyond those included in the islanded circuits. The microgrid operations are intended to ease the difficulty experienced during extended outages and allow responders to concentrate on restoring the systems as effectively as possible. BGE's proposal seeks to provide the level of services desired at a fair and reasonable cost to all customers. Accordingly, BGE respectfully requests that the Commission approve BGE's Microgrid Proposal as soon as possible and consider this matter at the January 27, 2016 administrative meeting.

The Company will hand deliver an original and 17 copies by noon on the next business day in accordance with Commission guidelines for electronic filing. The Maillog number assigned to this filing will be indicated above for your reference.

Sincerely,

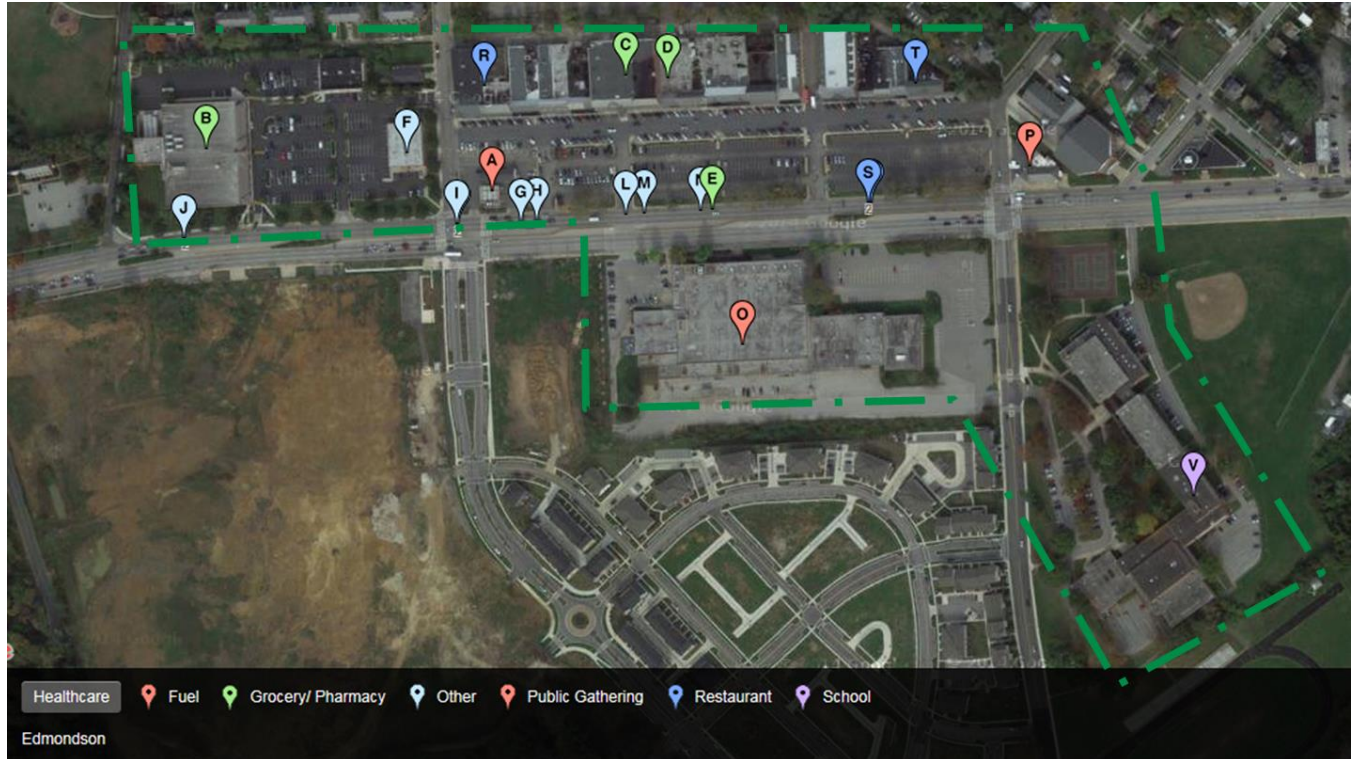
A handwritten signature in blue ink, appearing to read "Daniel W. Hurson", with a stylized, flowing script.

Daniel W. Hurson

Attachments

cc: Leslie M. Romine, Staff Counsel, Maryland Public Service Commission
Paula M. Carmody, People's Counsel, Maryland Office of People's Counsel

Edmondson Village Microgrid Site



Kings Contrivance Microgrid Site

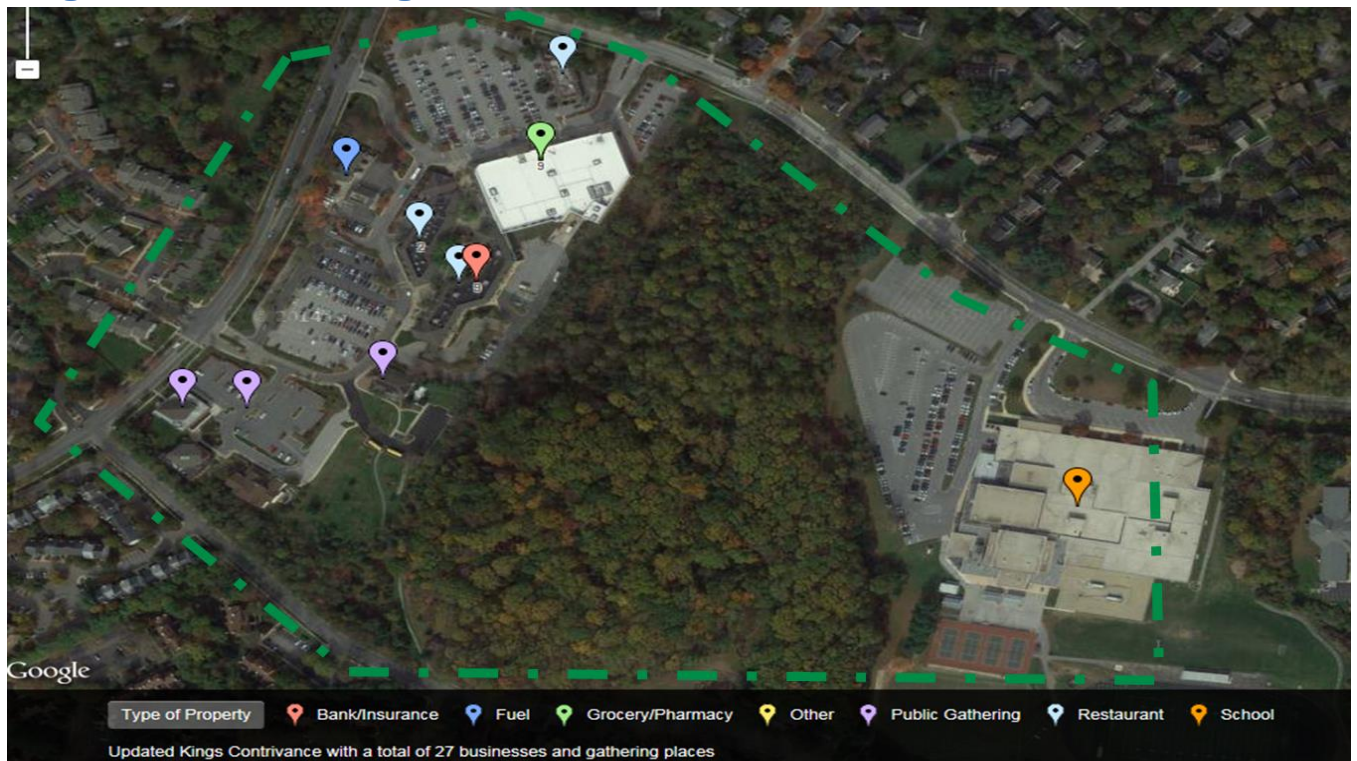


EXHIBIT B

EDMONDSON VILLAGE COST ESTIMATE

ADVANCED CASE - COST ESTIMATE						
DESCRIPTION	UNIT	QUANTITY	MATERIAL COST	LABOR & MARKUP	TOTAL	
2 MW GENERATORS @ 13.8 kV WITH SCR EMISSIONS SYSTEM	EA	1	\$1,848,000.00	\$924,000.00	\$2,772,000.00	
1 MW GENERATOR @ 480V WITH SCR EMISSIONS SYSTEM	EA	1	\$980,000.00	\$490,000.00	\$1,470,000.00	
1000 KVA STEP UP TRANSFORMER	LS	2	\$24,000.00		\$48,000.00	
3-WAY REMOTE SUPERVISORY, PAD-MOUNTED SWITCH	EA	7	\$74,000.00	\$35,000.00	\$763,000.00	
3 PHASE, SCADA OPERATED, OVERHEAD RECLOSER	LS	7	\$60,000.00	\$0.00	\$420,000.00	
NEW UG MANHOLE	EA	3	\$2,000.00	\$11,000.00	\$39,000.00	
55' CLASS 1 WOODEN POLE	EA	8	\$1,000.00	\$10,000.00	\$88,000.00	
500 KCMIL URD, DIRECT BORED	LF	2000	\$13.25	\$26.50	\$79,500.00	
500 KCMIL OH ACSR	LF	1000	\$7.00	\$11.90	\$18,900.00	
SCADA AND CONTROL SOFTWARE	LS				\$1,400,000.00	
GAS EXTENSION	LS				\$1,600,000.00	
MISCELLANEOUS					\$500,000.00	
				TOTAL	\$9,198,400.00	
					or approximately	
					\$3,537,846.15	per MW
EA = EACH						
LF = LINEAR FOOT						
LS = LUMP SUM						
ADVANCED CASE: AUTOMATION, NO BATTERIES, STATIONARY NATURAL GAS						
LUMP SUM VALUES INCLUDE LABOR AND MARKUP IN MATERIAL COST/TOTAL						

KING'S CONTRIVANCE VILLAGE CENTER COST ESTIMATE

ADVANCED CASE - COST ESTIMATE						
DESCRIPTION	UNIT	QUANTITY	MATERIAL COST	LABOR & MARKUP	TOTAL	
2 MW GENERATORS @ 13.8 kV WITH SCR EMISSIONS SYSTEM	EA	1	\$1,848,000.00	\$924,000.00	\$2,772,000.00	
3-WAY REMOTE SUPERVISORY, PAD-MOUNTED SWITCH	EA	8	\$74,000.00	\$35,000.00	\$872,000.00	
4-WAY REMOTE SUPERVISORY, PAD-MOUNTED SWITCH	EA	4	\$89,000.00	\$40,000.00	\$516,000.00	
6-WAY REMOTE SUPERVISORY, PAD-MOUNTED SWITCH	EA	6	\$120,000.00	\$70,000.00	\$1,140,000.00	
500 KCMIL URD, DIRECT BORED	LF	2000	\$13.25	\$26.50	\$79,500.00	
SCADA AND CONTROL SOFTWARE	LS				\$1,400,000.00	
GAS EXTENSION	LS				\$150,000.00	
MISCELLANEOUS					\$500,000.00	
				SUBTOTAL	\$7,429,500.00	
					or approximately	
					\$3,537,857.14	per MW
EA = EACH						
LF = LINEAR FOOT						
LS = LUMP SUM						
ADVANCED CASE: AUTOMATION, NO BATTERIES, STATIONARY NATURAL GAS						
LUMP SUM VALUES INCLUDE LABOR AND MARKUP IN MATERIAL COST/TOTAL						

Microgrid Pilot
Step 1. Revenue Requirement
(\$ in millions)

<u>YEAR 1</u>	<u>YEAR 2</u>
\$ 1.0	\$ 3.4

Step 2. Basis for Allocating Revenue Requirement to Customer Classes

	<u>Distribution Revenue</u>	<u>Percent of Total</u>
1. Schedule R	\$ 491,382,825	52.7%
2. Schedule RL	41,614,503	4.5%
3. Schedule G/GU	101,971,525	10.9%
4. Schedule GS	4,455,873	0.5%
5. Schedule GL/GLP	220,958,021	23.7%
6. Schedule P	69,069,963	7.4%
7. Schedule T	2,380,841	0.3%
Total	\$ 931,833,551	100.0%

Step 3. Allocation of Revenue Requirement to Customer Classes (Multiply Step 1 X Step 2)

	<u>YEAR 1</u>	<u>YEAR 2</u>
1. Schedule R	\$ 527,568	\$ 1,770,585
2. Schedule RL	44,679	149,948
3. Schedule G/GU/GP	109,481	367,431
4. Schedule GS	4,784	16,056
5. Schedule GL/GLP	237,229	796,171
6. Schedule P	74,156	248,878
7. Schedule T	2,556	8,579
	\$ 1,000,453	\$ 3,357,648

Step 4. Determination of Billing Determinants

	<u>Billing Unit</u>	<u>YEAR 1</u>	<u>YEAR 2</u>
1. Schedule R/EV	MWh	12,215,087	12,251,826
2. Schedule RL	MWh	1,000,761	1,014,599
3. Schedule G/GU	MWh	2,838,742	2,856,838
4. Schedule GS	MWh	183,471	180,715
5. Schedule GL/GLP	MWh	8,455,411	8,532,458
6. Schedule P	MWh	5,395,557	5,346,241
7. Schedule T	MWh	714,449	714,444

Step 5. Monthly Surcharge Calculation (Divide Step 3 by Step 4)

	<u>Billing Basis</u>	<u>YEAR 1</u>	<u>YEAR 2</u>
1. Schedule R/EV	per kWh	\$ 0.00004	\$ 0.00014
2. Schedule RL	per kWh	0.00004	0.00015
3. Schedule G/GU	per kWh	0.00004	0.00013
4. Schedule GS	per kWh	0.00003	0.00009
5. Schedule GL/GLP	per kWh	0.00003	0.00009
6. Schedule P	per kWh	0.00001	0.00005
7. Schedule T	per kWh	0.00000	0.00001

BALTIMORE GAS AND ELECTRIC PUBLIC PURPOSE MICROGRID PROPOSAL ESTIMATED REVENUE REQUIREMENT

YEAR 1:

RATE BASE:

		Kings Contrivance	Edmondson	Total
<i>A</i>	Capital Expenditures Current Year	\$7,429,500	\$9,198,400	16,627,900
<i>B</i>	Capital Expenditures- Cumulative	7,429,500	9,198,400	16,627,900
<i>C</i>	Depreciation Expense- Book	28,172	31,137	59,308
<i>D = C * -I</i>	Depreciation Reserve- Book	-28,172	-31,137	-59,308
<i>E = B + D</i>	Book Basis	7,401,328	9,167,263	16,568,592
<i>F</i>	Deferred Income Tax	-4,083	-5,117	-9,200
<i>G = (E + F)</i>	Rate Base	7,397,246	9,162,146	16,559,392
<i>H = G / 2</i>	Average Rate Base	3,698,623	4,581,073	8,279,696
<i>I</i>	ROR (After Tax)	6.62%	6.62%	
<i>J = H * I</i>	Return on Rate Base	244,849	303,267	548,116
<i>K</i>	Conversion Factor	0.5832	0.5832	
<i>L = J / K</i>	Initial Revenue Requirement	419,837	520,005	939,842

COSTS TO RECOVER:

<i>M</i>	Operating Income Need	28,790	31,820	60,611
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REVENUE REQUIREMENTS:

<i>N = (L + M)</i>	Revenue Requirement	448,627	551,825	1,000,453
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YEAR 2:

RATE BASE:

		Kings Contrivance	Edmondson	Total
<i>A</i>	Capital Expenditures Current Year	\$0	\$0	0
<i>B</i>	Capital Expenditures- Cumulative	7,429,500	9,198,400	16,627,900
<i>C</i>	Depreciation Expense- Book	676,123	747,276	1,423,400
<i>D = C * -I</i>	Depreciation Reserve- Book	-704,295	-778,413	-1,482,708
<i>E = B + D</i>	Book Basis	6,725,205	8,419,987	15,145,192
<i>F</i>	Deferred Income Tax	-95,226	-119,083	-214,309
<i>G = (E + F)</i>	Rate Base	6,629,979	8,300,904	14,930,883
<i>H = G / 2</i>	Average Rate Base	7,013,612	8,731,525	15,745,137
<i>I</i>	ROR (After Tax)	6.62%	6.62%	
<i>J = H * I</i>	Return on Rate Base	464,301	578,027	1,042,328
<i>K</i>	Conversion Factor	0.5832	0.5832	
<i>L = J / K</i>	Initial Revenue Requirement	796,127	991,130	1,787,257

COSTS TO RECOVER:

<i>M</i>	Operating Income Need	743,008	827,383	1,570,392
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REVENUE REQUIREMENTS:

<i>N = (L + M)</i>	Revenue Requirement	1,539,135	1,818,513	3,357,648
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10. Administrative Cost Adjustment

The revenues collected in excess of the incremental costs to provide Standard Offer Market-Priced Service under Residential, Types I, II, III and Hourly Service shall be fully credited to all distribution customers eligible for SOS. For each program year, the residual balance shall be determined by deducting the estimated incremental cost from the revenue estimate determined by multiplying the fixed incremental cost adder by the estimated kWh by individual service type for that year. The residual balance will be shared among all non-residential distribution customers eligible for SOS on a per kWh distribution sales service basis. This adjustment will be made in the February, June and October billing months or more frequently, if necessary and will be included in the Delivery Service Energy Charge. The current Administrative Cost Adjustment by SOS Type is available on the BGE website at www.bge.com.

11. Measured Demand

Where service is used in such a manner that the measured demand as defined in the applicable Schedule does not properly reflect the capacity which the Company is required to provide, the demand may be estimated by the Company, so as to reflect such capacity.

Where the power factor is found to be less than 90%, the Company reserves the right to base the demand on 90% of the kilovolt-amperes (kVA) instead of on the kW.

12. ~~Reserved for Future Use~~ Microgrid Service Pilot

Microgrid Service is a generation and distribution service utilizing localized microgrids that BGE will operate and connect Eligible Customers under Schedules G, GU, GP, GS, GL, GLP, or P. The Company's microgrids have the capability to disconnect from the main grid to operate autonomously during extended outages and help mitigate grid disturbances to strengthen grid resilience. Eligible Customers (or "Microgrid Customers") are defined as critical and public benefit service customers (which include, but are not limited to, community centers, commercial retail hubs, emergency service complexes, grocery stores, gas stations, and fire and police stations) located within a BGE microgrid service territory. When the microgrid has been activated, BGE shall meet all or part of the Microgrid Customer's load requirement through the microgrid.

Microgrid Customers shall be billed the Total Generation Rate listed in the Company's Standard Offer Service, Rider 1, for the energy supplied by the microgrid, under the appropriate Standard Offer Market-Priced Service. In addition, Microgrid Customers shall be billed the total metered energy delivered in the billing period for distribution, surcharges, and riders, as stated in the Customer's Controlling Schedule. All Customers served under Schedules R, EV, RL, G, GU, GP, GS, GL, GLP, P, and T including Microgrid Customers, are subject to the Microgrid Service Charge defined below.

Calculation of Microgrid Service Charge

The Microgrid Service Charge is calculated annually and is determined for each rate schedule by first allocating the revenue requirement (calculated using Eligible Costs as defined below) based on the distribution revenue for each Schedule approved in the Company's most recent electric base rate proceeding.

(Continued On Next Page)

Rider 12 continued

Any wholesale capacity and energy revenue received by the Company from PJM in the corresponding year shall reduce the Microgrid Service Charge. The resulting amounts, plus any true-up amounts as determined below, are then divided by the estimated per kilowatt-hour billing determinants for Schedules R/EV, RL, G/ GU/GP, GS, GL/GLP, P and T. Details concerning the calculation of the Microgrid Service Charge are filed with and approved by the Commission prior to their use in billing.

The Delivery Service Price under Schedules R, EV, RL, G, GU, GP, GS, GL, GLP, P and T will be adjusted to include the Microgrid Service Charge.

The Microgrid Service Charges effective with XXXXXXXX billings are as follows:

<u>Rate Schedule</u>	<u>Rate (\$ per kilowatt-hour)</u>
<u>R/EV</u>	<u>\$0.00004</u>
<u>RL</u>	<u>\$0.00004</u>
<u>G/GU/GP</u>	<u>\$0.00004</u>
<u>GS</u>	<u>\$0.00003</u>
<u>GL/GLP</u>	<u>\$0.00003</u>
<u>P</u>	<u>\$0.00001</u>
<u>T</u>	<u>\$0.00000</u>

Eligible Costs

The revenue requirement for the Microgrid Service Charge is based on Eligible Costs incurred by the Company associated solely with Microgrid Service. The Eligible Costs include the following categories:

- a) Depreciation and amortization,
- b) Fuel
- c) Operation and maintenance costs,
- d) Earnings on the net investment as determined by applying the Company's most recent Electric authorized rate of return, adjusted for taxes, to the average investment balance net of deferred taxes, and
- e) Applicable taxes

Any wholesale capacity and energy revenue received by the Company from PJM in the corresponding year shall be credited.

True-up

An annual true-up will be conducted to calculate, by rate schedule, the difference between the revenue requirement eligible for recovery and revenues collected through the Microgrid Service Charge. The true-up includes 9 months of actual data available and 3 months of estimated data. Any estimated data is reconciled in the subsequent filing. The true-up is debited or credited against the revenue requirement eligible for recovery each year. During its disposition, the true-up amount accrues a return at the Company's most recent authorized electric system rate of return. Such rate is adjusted for taxes, when the true-up amount represents an under-collection to the Company.

10. Administrative Cost Adjustment

The revenues collected in excess of the incremental costs to provide Standard Offer Market-Priced Service under Residential, Types I, II, III and Hourly Service shall be fully credited to all distribution customers eligible for SOS. For each program year, the residual balance shall be determined by deducting the estimated incremental cost from the revenue estimate determined by multiplying the fixed incremental cost added by the estimated kWh by individual service type for that year. The residual balance will be shared among all non-residential distribution customers eligible for SOS on a per kWh distribution sales service basis. This adjustment will be made in the February, June and October billing months or more frequently, if necessary and will be included in the Delivery Service Energy Charge. The current Administrative Cost Adjustment by SOS Type is available on the BGE website at www.bge.com.

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(Continued On Next Page)

Rider 12 continued

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G/GU/GP	\$0.00004
GS	\$0.00003
GL/GLP	\$0.00003
P	\$0.00001
T	\$0.00000

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