Exelon Utilities

Baltimore Gas and Electric Company
Delmarva Power & Light Company
Potomac Electric Power Company

Maryland Energy Storage Pilot Program

PJM Emerging Technology Forum
January 11, 2020

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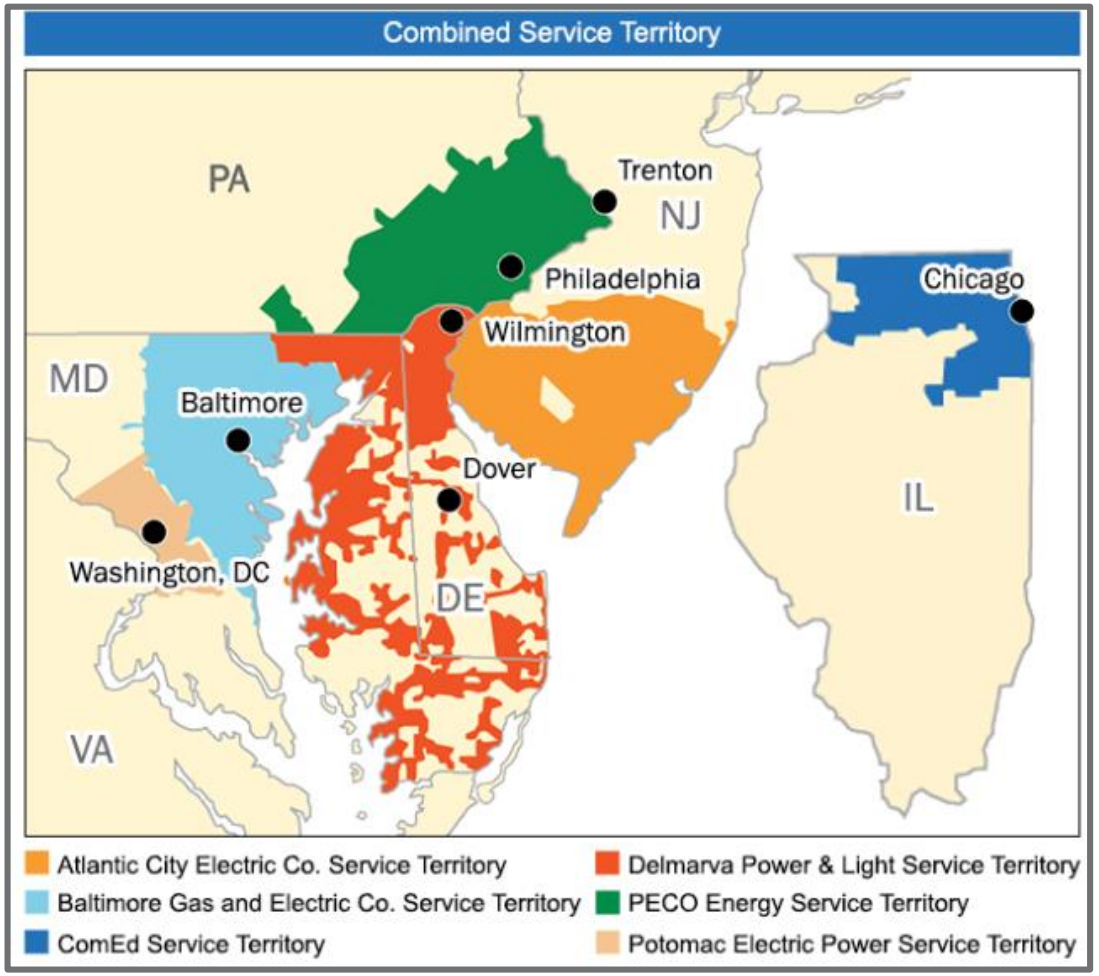
Agenda

1. About Exelon
2. Value Streams
3. Overview of MD Legislation and MD Pilot
4. Overview of Pilot Projects
   a. Fairhaven
   b. Chesapeake Beach
   c. Oxon Hill
   d. Silver Spring
   e. Ocean City
   f. Elk Neck
5. Next Steps

About Exelon

- Fortune 100
- 33,400 Employees
- 10M Electric and Natural Gas Utility Customers
- Utility Operations in 6 states
- 6 Utilities
  - Atlantic City Electric
  - BGE
  - ComEd
  - Delmarva Power
  - PECO
  - Pepco



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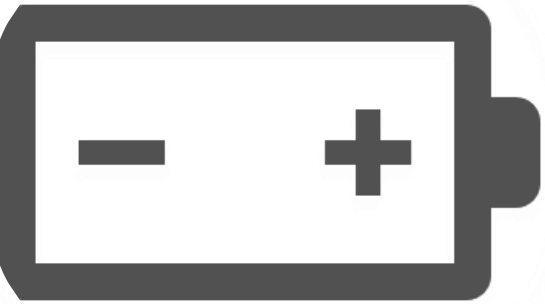
Battery Energy Storage System Benefits



State Policy Goals

- Environmental Objectives
- Electric Vehicle support
- Green House Gas Reductions
- Economic Development
- Land Use

Utility Goals

- Deferral Opportunities
- Hosting Capacity
- Operational Flexibility
- Resiliency
- Reliability
- Service Quality (Voltage/Harmonics)
- Electrification
- Learnings
- PJM Market Participation

Customers Goals

- Resiliency
- Reliability
- Cost Savings
- Market Research
- Innovation
- DER Integration

Legislation and Policy

- Senate Bill 573/House Bill 650 was signed into Law May 13, 2019 and the Commission Order was released on June 1, 2019
- All MD Investor-Owned Utilities ("IOU") required to submit 2 pilots.
- One of the two projects for each utility must be third-party owned.
- Total aggregated program size is 5-10 MW with a minimum of 15 MWh
- Reporting to the Commission annually until 2025.

Models	BTM[1] / FTM[2]	Owner	Grid Reliability Control	Wholesale or Other Application Control
1. Utility Only	FTM	Utility	Utility	Utility
2. Utility and 3rd Party Operation	FTM	Utility	Utility	3rd Party
3. 3rd Party Ownership	Either	3rd Party	Utility contract with 3rd Party	3rd Party
4. Virtual Power Plant (VPP)	BTM	Customer or 3rd Party	Utility or contract with 3rd Party Aggregator	3rd Party, Customer(s) or Utility Aggregation

[1] "BTM" or behind the meter indicates that the storage system is placed behind the customer's revenue style meter

[2] "FTM" or front of the meter indicates that the storage system is in front of the customer's meter or that there is no revenue style meter on site

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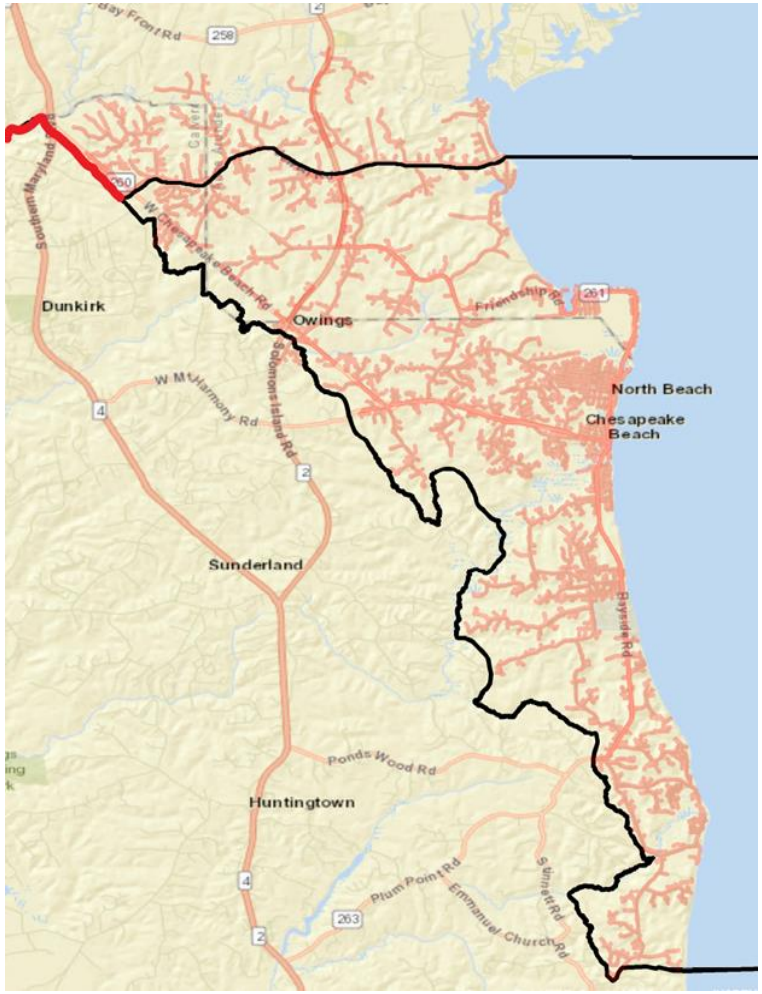
Maryland Exelon Utility Projects

Project Summary

	Delmarva Power		PEPCO		BGE		
Project Description	Elk Neck, Maryland Project	Ocean City, Maryland Project	National Harbor/ Livingston Road Project	Montgomery County Electric Bus Depot Project	Chesapeake Beach Project	BESS at Fairhaven Substation Project	Total
Capacity	0.5 MW	1.0 MW	1.0 MW	1.0 MW	1.0 MW	2.5 MW	7.0 MW
Guaranteed End of Life Usable Capacity	1.5 MWh	3.0 MWh	3.0 MWh	3.0 MWh	1.5MWh	4.0 MWh	16.0 MWh
Initial Usable Capacity	2.2 MWh	3.6 MWh	4.3 MWh	4.3 MWh	2.0 MWh	7.1 MWh	23.5 MWh
Model 1: Utility Owned and Utility Operated		X				X	2
Model 2: Utility Owned and Third Party Operated			X				1
Model 3: Third Party Owned and Third Party Operated				X	X		2
Model 4: Virtual Power Plant	X						1

BGE Identified Area of Need

- BGE reviewed all identified overloads system-wide and compared the costs of a BESS install vs. a traditional project
- Marriott Hill 34 kV post-contingency winter overload showed best opportunity for avoidance of traditional distribution system investment (10 miles of undergrounding)
- Area serves more than 9,000 customers via three substations and ten 13 kV feeders
- Provides opportunity for BGE to leverage two systems working in tandem:
  - Unique learning opportunity
  - Backup benefits from having multiple storage units (e.g., minimize maintenance down time, enhance storm resiliency)
- No utility real property acquisition required; adequate space for third-party project siting



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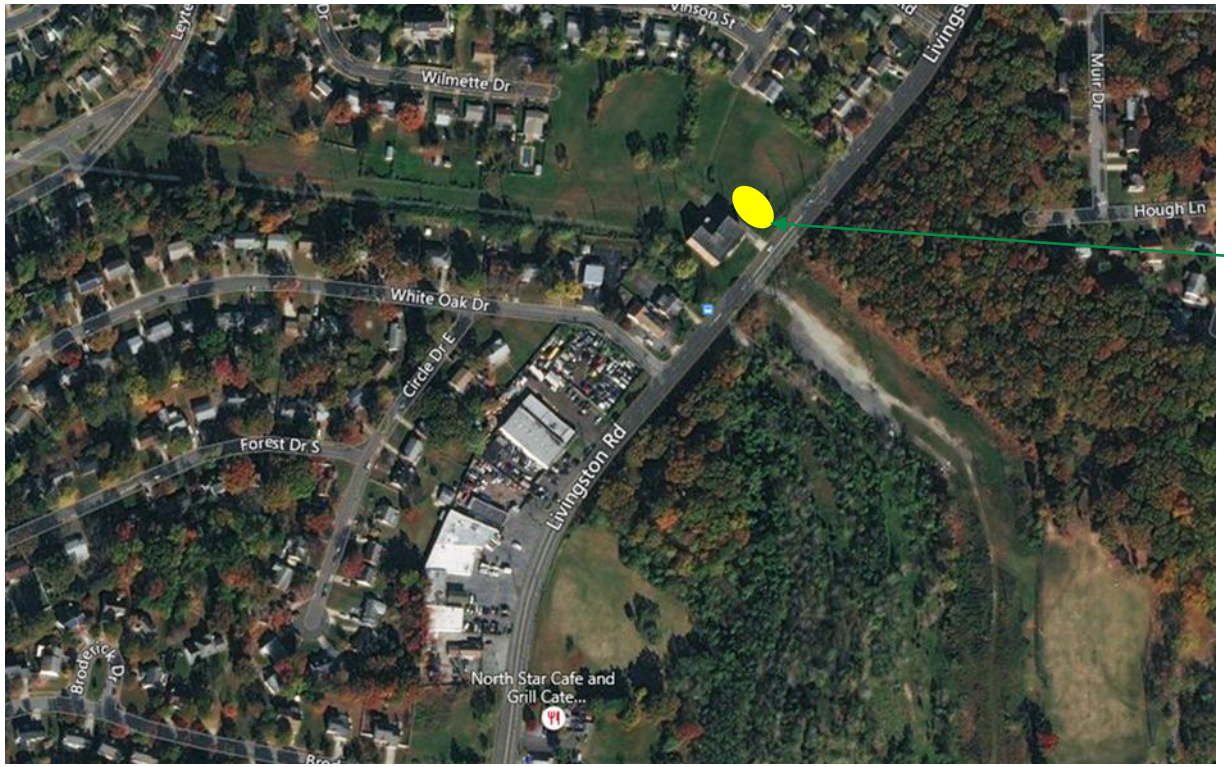
BGE BESS at Fairhaven Project

Category	Project Information
Required Capacity for Grid Reliability through the 10-year project term	2.5 MW/4.0 MWh
Initial Usable Capacity	2.5 MW/7.1 MWh
Business Model	Model 1: Utility Only; BGE operates for grid reliability and in PJM markets, Front-of-the-Meter (FTM)
Project Developer	ABB/Hitachi is the proposed developer
Energy Storage Technology	Lithium-Ion BESS
Primary Application	Grid reliability/distribution infrastructure avoidance
Primary Operation	BESS will provide discharge capacity during winter peak load conditions; BGE will communicate a kW interval signal to the BESS Control system
Secondary Application	PJM Wholesale Market Services (Frequency Regulation)
Primary Location	Fairhaven Substation in Southern Anne Arundel County

BGE Chesapeake Beach Project

Category	Project Information
Required Capacity for Grid Reliability through the 10-year project term	1.0 MW/1.5 MWh
Initial Usable Capacity	1.0 MW/2.0 MWh
Business Model	Model 3: Third-Party Ownership that is Front-of-the-Meter (FTM)
Project Developer	Ameresco is the proposed developer/owner/operator
Energy Storage Technology	Lithium-Ion BESS
Primary Application	Grid reliability/distribution infrastructure avoidance
Primary Operation	BESS will provide discharge capacity during winter peak load conditions; BGE will communicate a kW interval signal to the BESS Control system up to 10 times in a year
Secondary Application	PJM Wholesale Market Services
Primary Location(s)	Multiple locations identified in Northern Calvert County

National Harbor Project Utility Owned/Third Party Operated Model



National Harbor Project: Located in Oxon Hill, Maryland

- Defer construction of a planned Pepco substation
- Peak shaving and grid emergencies
- PJM market participation opportunity – utility/third party revenue sharing
- Expected future expansion of battery storage at site – either utility owned or third party owned

National Harbor Project Summary

Project Category	Project Information
Size	1.0 MW/3.0 MWh
Business Model	Utility Owned/Third Party Operated
Energy Storage Owner	Pepco
Energy Storage - Wholesale Operations	A.F. Mensah (Minority Owned African American Firm)
Project Developer	A.F. Mensah (Minority Owned African American Firm)
Energy Storage Technology	Lithium Iron Phosphate (LFP)
Primary Application	Peak Shaving, Grid Reliability
Secondary Application	PJM Market
Location	Livingston Road, Oxon Hill, MD

Bus Depot Project -- Third Party Owned/Third Party Operated

Draft Site Overview

Confidential Property of AlphaStruxure | Page 2

AlphaStruxure

Montgomery County Electric Transit Bus Depot: Silver Spring, Maryland

- Avoid construction of new Pepco distribution feeder
- Support regional grid reliability
- Support electric transit bus charging during normal grid conditions and grid outages
- Rely primarily on energy from planned photovoltaic array to charge battery

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Electric Bus Depot Project Summary

Project Category	Project Information
Size	1.0 MW/3.0 MWh
Business Model	Third Party Owned/Third Party Operated
Energy Storage Owner/Operator	AlphaStruxure
Project Developer	AlphaStruxure
Energy Storage Technology	Nickle Metal Chloride Lithium-Ion
Primary Application	Peak Shaving, Grid Reliability
Secondary Application	Customer side demand management. Charging during outages. Microgrid integration with photovoltaic array
Location	Brookville Road, Silver Spring, MD (Montgomery County)

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Ocean City Project -- Utility Owned/Utility Operated Model

Ocean City Project: Beach-front Resort Community on a Barrier Island in the Atlantic Ocean

- Reliability improvement support for Automatic Sectionalizing and Restoration (ASR) Scheme
- Resiliency improvement by providing back-up support for adjacent county library and regional electricity grid (increasing storm risk resulting from climate change)
- PJM market participation opportunity
- Selected vendor: Mesa Veterans Power (Service-Disabled Veteran-Owned Firm)

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Ocean City Project Summary

Project Category	Project Information
Size	1.0 MW/3.0 MWh
Business Model	Utility Owned/Utility Operated
Energy Storage Owner/Operator	Delmarva Power
Project Developer	MESA Veterans Power (Service-Disabled Veteran-Owned Firm)
Energy Storage Technology	Nickle Manganese Cobalt Lithium Ion
Primary Application	Peak Shaving, Grid Reliability, Resiliency
Secondary Application	PJM Wholesale Market
Location	Ocean City, MD (Worcester County)

Elk Neck Project -- Virtual Power Plant Business Model

Elk Neck Project: Residential community located in Cecil County on an isolated peninsula in the Chesapeake Bay

- First Exelon Utility Virtual Power Plant and first PJM Market Virtual Power Plant

Reliability/Resiliency Opportunity:

- 300 + residential customers south of Elk Neck State Park fed by a four-mile radial feeder
- Unique Virtual Power Plant Project
- Experienced vendor selection – Sunverge Energy, Inc.

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Elk Neck Project Summary

Project Category	Project Information
Size	0.5 MW/1.5 MWh
Business Model	Virtual Power Plant (VPP) - Aggregated Residential Storage Program
No of Customers in the VPP Program	110 Residential Customers
Energy Storage Developer/Owner	Sunverge Energy, Inc
Energy Storage - Wholesale Operations	PJM Virtual Power Plant Pilot
Energy Storage Technology	LG Electronics 5kW/19.6 kWh
Primary Application	Grid Reliability & Backup Power
Secondary Application	DER-Integration/Possible PJM Market Participation
Location	Elk Neck Peninsula, Cecil County, Maryland

Next Steps

1. Execute contracts with vendors
2. Respond to Commission requirements for emissions modeling, decommissioning and safety
3. Continue to take steps to participate in the PJM market
4. Complete integration plan for utility operation of batteries for grid support
5. Continue to investigate other opportunities for storage