

A Tale of Two Microgrids

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Constellation[®]

An Exelon Company

Define the Problem You are Trying to Solve

- Grid Independence: Improve Reliability or Power Quality
- Optimize Operations: Interconnect and Coordinate (New and Existing) Assets
- Economics: Manage Assets for Efficiencies: Energy and/or Cost Reduction
- New Revenues: Demand Response or Ancillary Services (Synchronized Reserves)

Microgrid Control System

Data Acquisition

Supervisory Control

Communication
Infrastructure

Human Machine
Interface

Subcomponents within in each category

Generation

Grid Sources

Onsite Intermittent

Onsite Dispatchable

Loads

Critical Loads (cyber,
non-cyber)

Non-critical loads

Load Management &
Efficiency

Distribution

Interconnection /
Switchgear

Distribution Network

Transformers,
switches and sensors

Storage

Electrochemical

Fuel storage

Other

Thermal

Water

EVs

Parkville MicroGrid

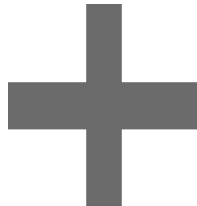
Baseline Concern

- Hartford, CT has major power interruptions caused by storms (Irene, Sandy) resulting in loss of community services even with emergency generators
- Parkville cluster provides essential community services in one and two off-site locations.

Goal

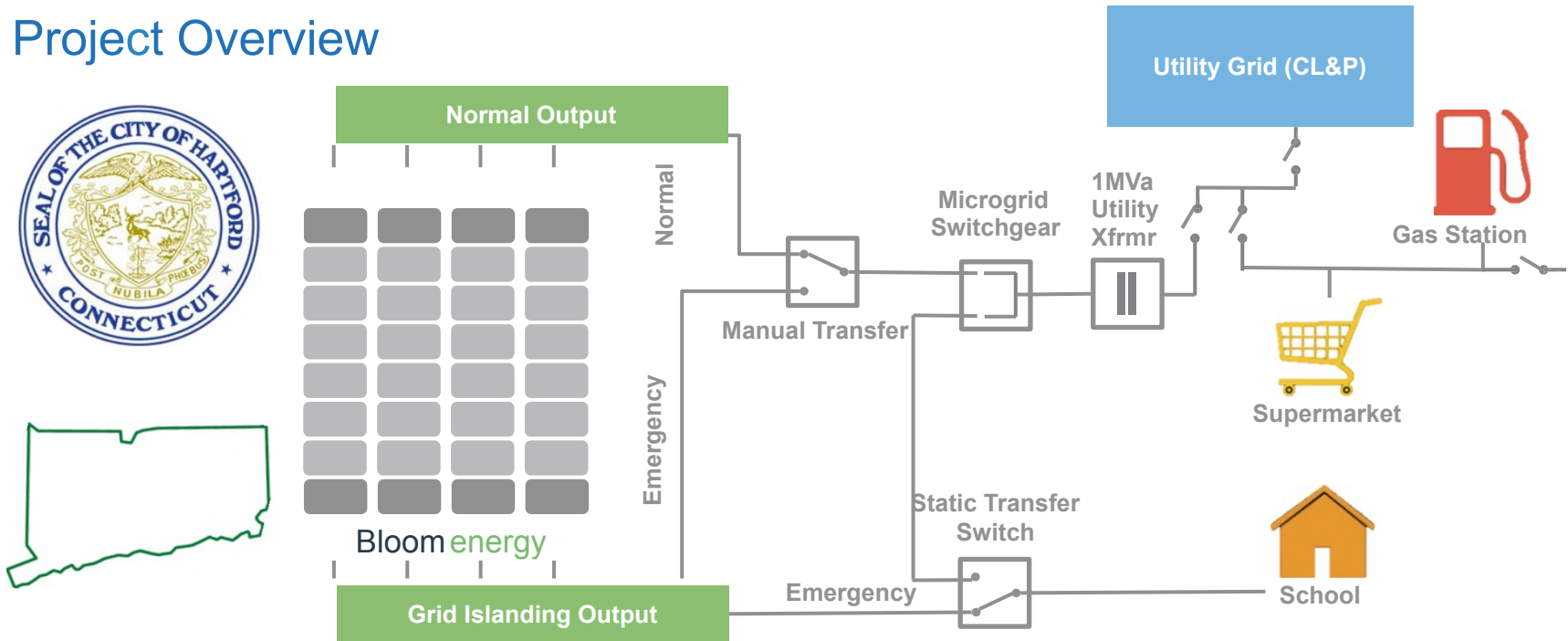
Create a stand-alone MicroGrid that will **link all services through a fuel cell power** source to provide all of their electrical needs at a **10% discount**

Reliability



Economics

Project Overview



Context

- City of Hartford looking for a resilient power solution to serve critical community facilities that could act as a refuge for residents during emergencies or bad weather

Results

- City of Hartford project consists of 800 kW baseload power with 640 kW of grid islanding capability to provide a community MicroGrid.

Customer Value

- Constellation and Bloom Energy were able to provide a PPA to the City of Hartford that had significant cost savings, avoided upfront capital for passive backup equipment, and met sustainability objectives through Bloom's energy solution

Parkville MicroGrid



The Marines on Energy Security

“MCICOM GF-1 is exploring several solutions and areas of research, including the opportunity to deploy microgrids – installation grids **independent of the commercial grid** that utilize power from **renewable energy** or other **on-site distributed energy resource systems** to continue functioning in the case of a **blackout**. The office is also working to identify points of utility and delivery system **vulnerability**.”

From <http://www.mcicom.marines.mil/Units/GF-Facilities/GF-1-Energy/GF-1-Energy-Security/>

MCLBA Specific Goal

MCLBA’s primary mission is to rebuild and repair ground combat and combat support equipment but it has been selected to be the first **“net zero”** Marine Corps installation, where it will **produce more renewable electrons on base than it purchases from the grid**.

Marine Corps Logistics Base Albany MicroGrid

Baseline Concern

- Grid Independence and Enhanced Resiliency
- Coordination of New Renewable and Existing Load and Generation Resources

Goal

Deploy a microgrid to increase **reliability, stability and security** of the electrical production and distribution system on the Base. **Reduce ongoing costs** incurred from having to buy from (and then consequentially to have to produce and **sell back** to) Georgia Power (GP).

Reliability

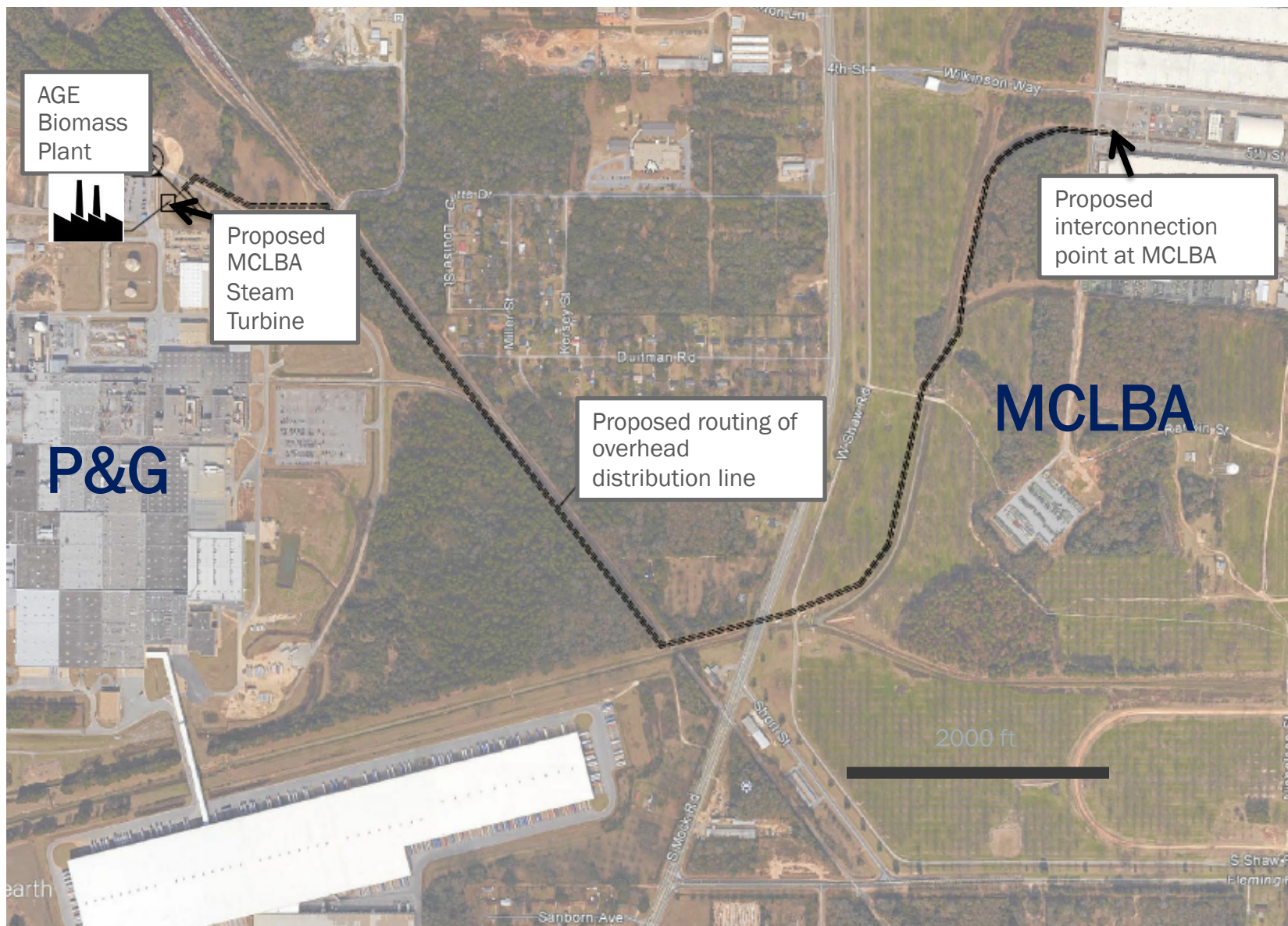


Economics

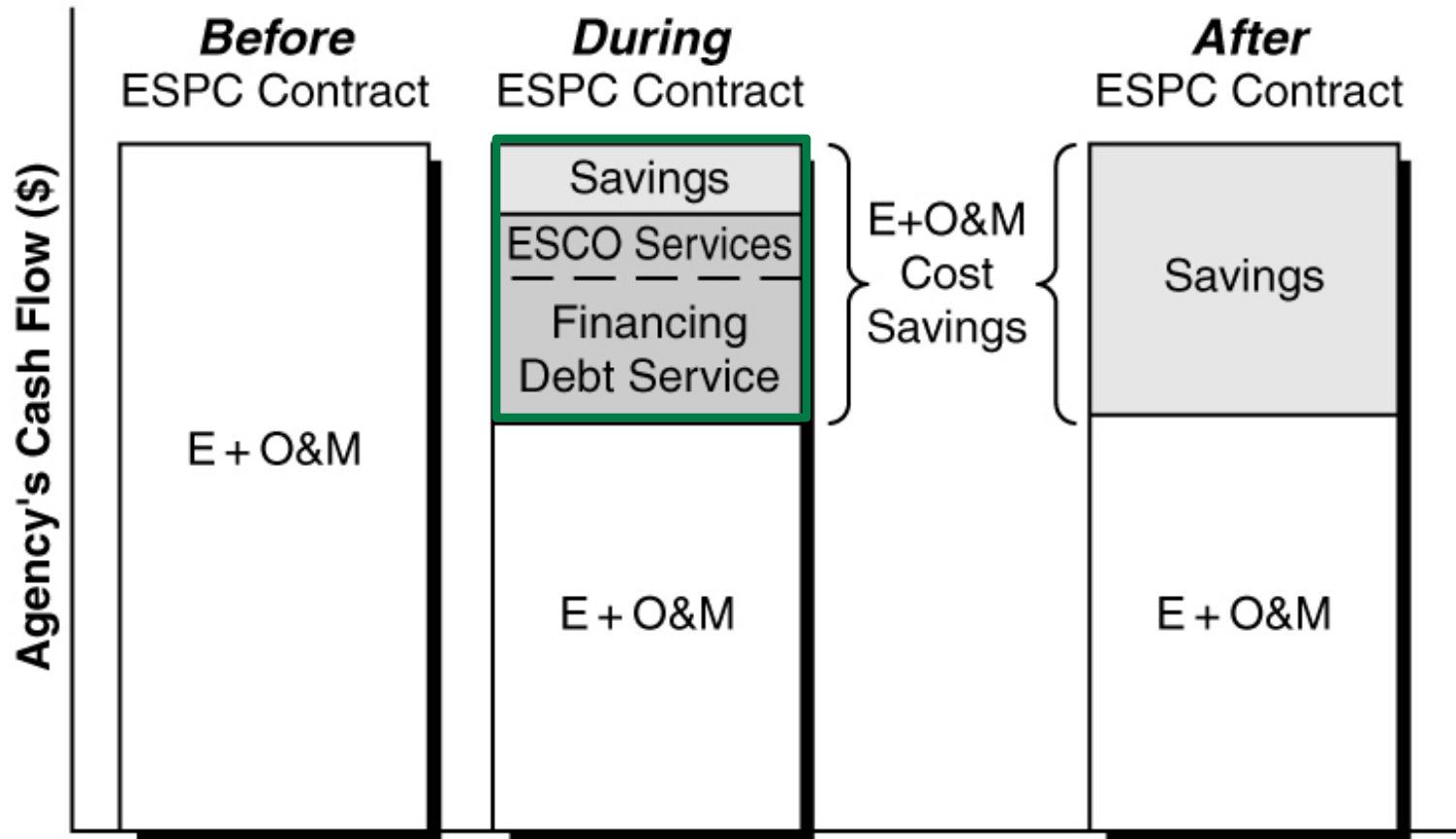


Revenue

MCLBA Project Layout



Traditional Energy Savings Performance Contract



E + O&M = Energy and Operations & Maintenance

MCLB Energy Service Performance Contract

Energy Conservation Measures (ECM)

ECM 1a Steam Turbine – An 8.5 MW steam turbine with electrical distribution will be constructed on a Government leased lot from Proctor and Gamble. Steam for the turbine will be supplied by the neighboring AGE Biomass Plant currently under construction. The steam turbine will supply approximately 44M kwh to MCLBA supporting the achievement of NetZero.

ECM 1b Land Fill Gas Generator #2 Integration – Controls will be integrated with the LFG#2 and become a microgrid asset for electrical generation. During times of excess land fill gas, the LFG will be dispatched to assist in achieving NetZero.

ECM 2b Lighting Retrofit - Approximately 100,000 indoor previously retrofitted fluorescent tubes will be upgraded with Tubular LED bulbs.

ECM 3 Industrial Air Compressor(s) – Replacement of four (4) air compressors with more efficient compressors along with new controls.

ECM 8 High Efficiency Transformers – Change out of old non-efficient transformers to new more efficient transformers.

ECM 10 Boiler Upgrades – New steam coils will be installed in existing boilers, and will utilize waste heat from the LFG generators to maintain the boiler temperature in the standby mode.

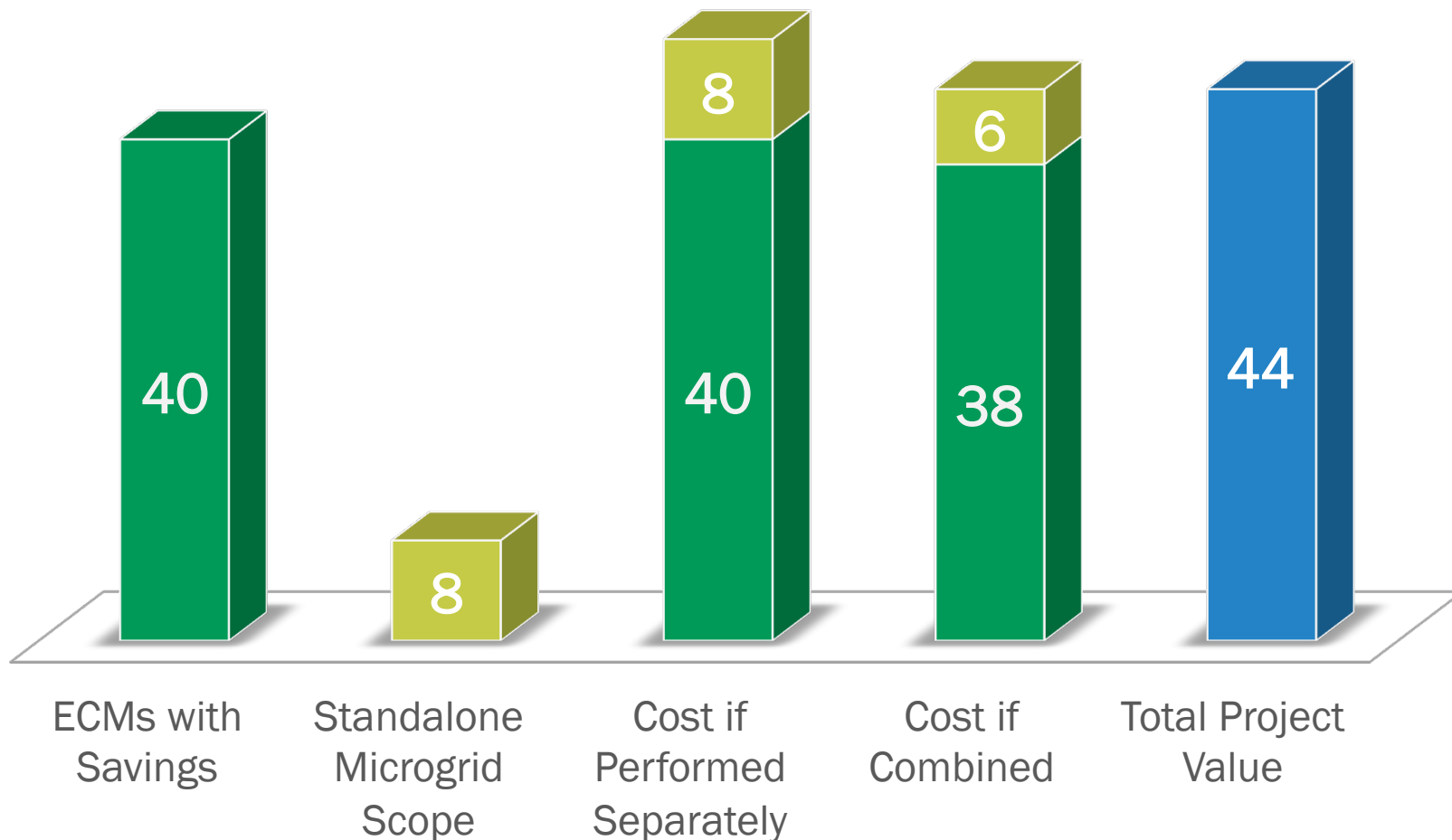
ECM 11 Microgrid – Controls integration of the Steam Turbine Generator (1a) and Landfill Gas Generator (ECM 1b). The microgrid includes a Smart Grid Control System (SGCS), and enhancements to the existing Supervisory Control and Data Acquisition (SCADA) and the Direct Digital Control (DDC) environmental control systems.

These enhancements are intended to increase to reliability, stability and security of the electrical production and distribution system on the Base. It will also reduce ongoing costs incurred from having to buy from (and then consequentially to have to produce and sell back to) Georgia Power (GP).

Economy of Scale – ECMs with Incremental Microgrid Scope

Construction Cost of Energy Conservation Measures (\$M)

■ ECMs Financed by Savings ■ Microgrid Scope ■ Project Value



Questions

YaLonda Lockett

Director, Strategic Projects

Yalonda.lockett@constellation.com

972.813.6111

Pam Maines

Executive Director, Federal Business Development

Pamela.maines@constellation.com

202-804-5000



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