Tools For Electrification: Energy Resiliency and Demand Response

A Woman Business Enterprise (WBE)

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Key Learning Objectives

- Demand Response (DR) with batteries is a value-add for energy resiliency

- DR revenues can stack with multiple programs and energy storage incentives for maximum impact

Adoption of Battery Energy Storage

What attracts stakeholders to batteries?

- Energy cost management (peak shaving/arbitrage)
- Useful to reduce grid stress (utilities/ISOs)
- Energy resiliency for critical facilities (off-grid)

Courtesy of NEC Energy Solutions

Electrifying Energy Resiliency with Batteries

- Sophisticated customers are already using batteries for energy cost management
- Utilities and ISOs offer incentives and programs to use the batteries
- What about energy resiliency?
  - The need exists, many examples
  - What holds resiliency consumers back?

COST!

At a Glance: Costs of Energy Resiliency

Batteries can range from $800/kWh to $3,000+/kWh installed

**depending on scale and application

Hidden Costs

- Supervisory controls for off-grid management (islanding)
- Electrical upgrades for integration with building systems and DERs
- Costs Heavily Dependent on Existing site conditions
- Recurring maintenance costs

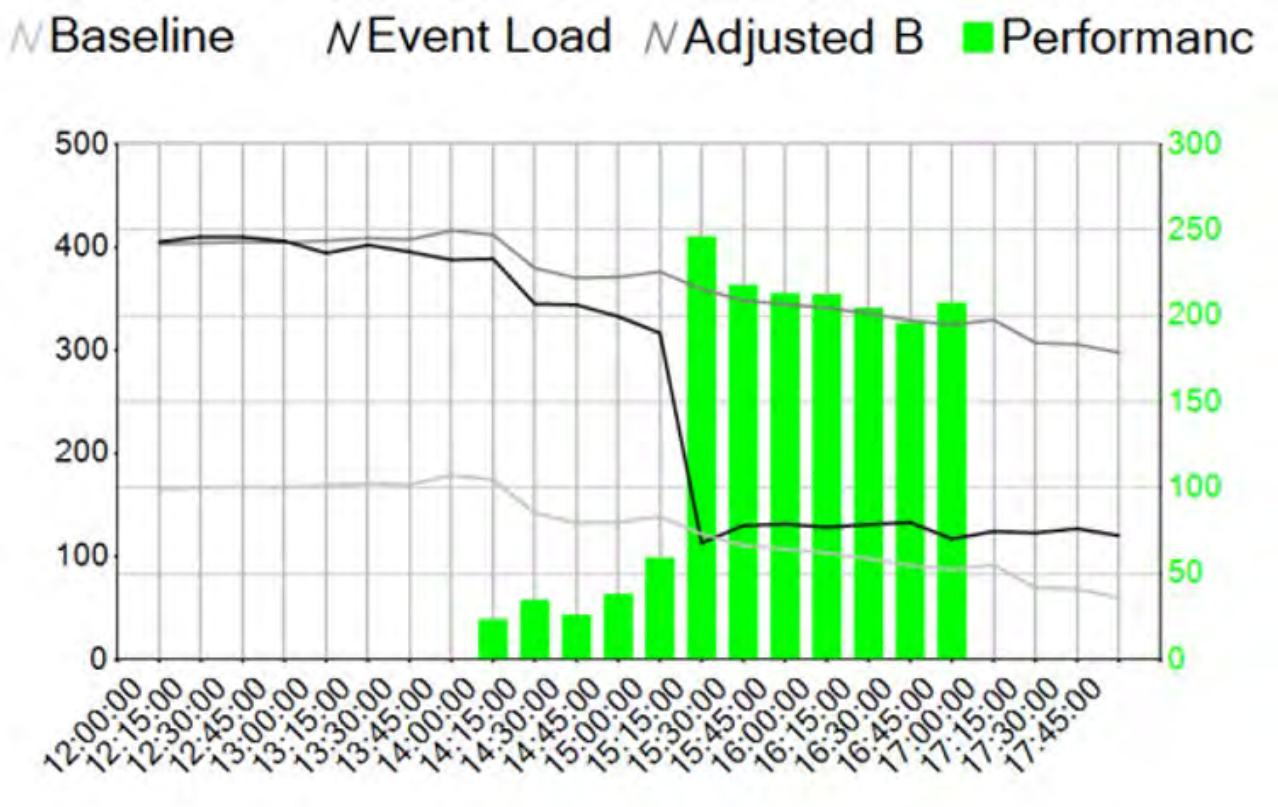
So, how to overcome the cost hurdle? Try DR!

DR and Battery Use Case Example

- 200kW/800kWh battery
- Enrolled in ConEd CSRP + DLRP Scheduled Programs
  - CSRP: $18/kW-month
  - DLRP (Tier 1): $18/kW-month
  - May 1 – Sep 30

Annual Revenue = **$36,000**

New Revenue Stream for Resiliency!



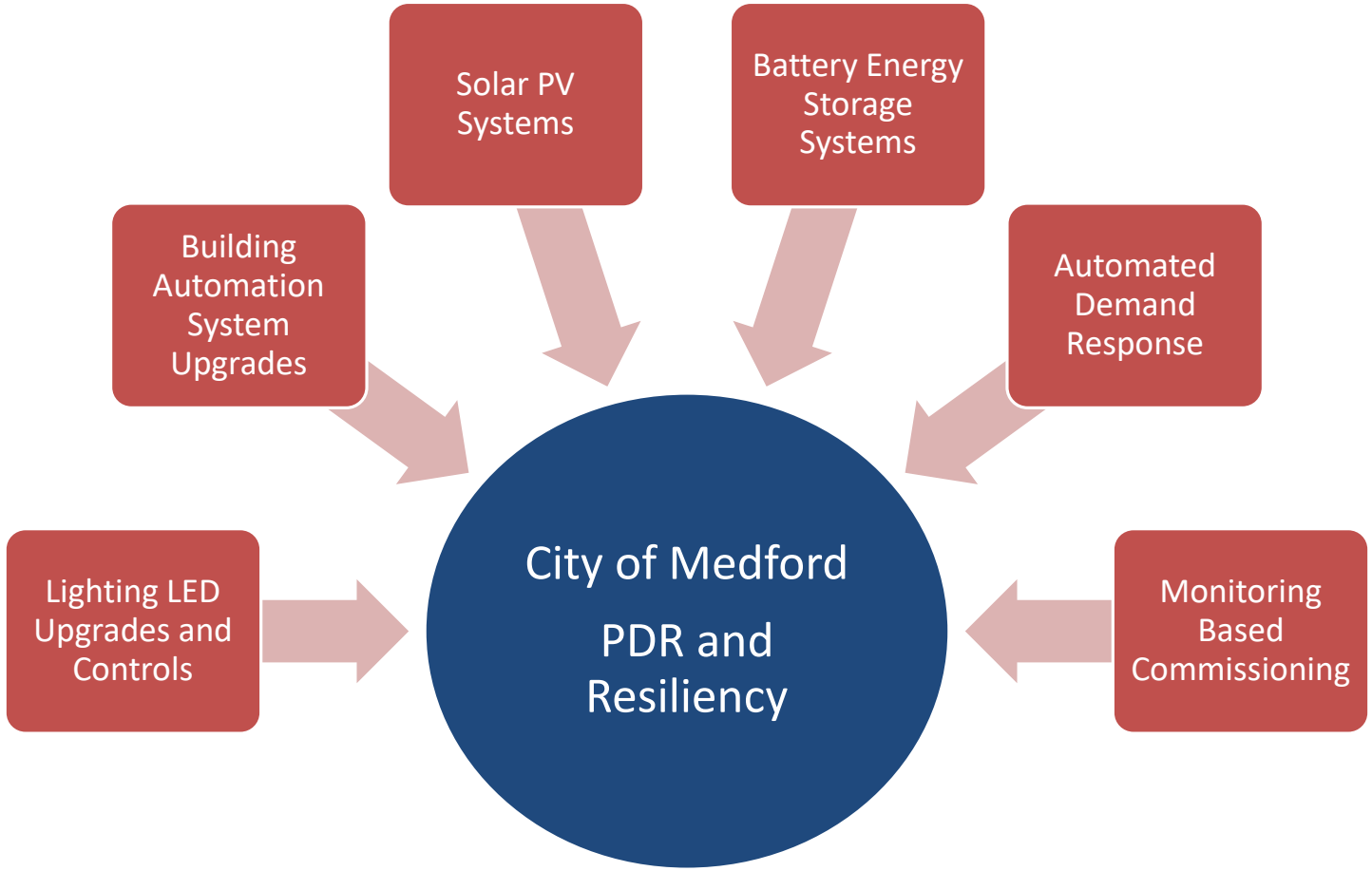
Exploring the Use Case: DR & Energy Resiliency

- Steady continuous battery discharge offsets building load
- Load offset with energy storage doesn't impact building operations
- DR is automated and scheduled by utility / CSP
- Scheduled DR has fewer discharge cycles than peak shaving/arbitrage

- DR is a Value ADD for energy resiliency
  - Funding annual/periodic maintenance
  - Paying back portion of capital installation costs

Case Study – Energy Resiliency & DR in MA

- Pilot project is in construction/procurement
- Leverages existing systems and new technologies for both resiliency and peak demand response
- The systems will operate together for peak demand response and during a resiliency event – capable of 24hr off-grid operation
- 100kW battery for 3 hour DR event
- Plus 30 kW HVAC + lighting DR; reduce load and extend off-grid capabilities
- Approximately **$20,000** annual in DR benefits per site
- On-site Battery & Controls Maintenance Service Contract: **$14,000** annual



Value Proposition of DR Programs

NY

- ConEd, NGRID, O&R, others
  - DLRP/CSRP Stackable Benefits
    - Each $2.75-$25.00/kW-month + performance payments $0.15-$1.00kWh (scheduled)
    - Performance payments up to $10.00/kWh (emergency)
  - Brooklyn-Queens ESI: $1,620/kW installed (ConEd special program, doesn't stack with other DR*)

MA

- National Grid
  - Daily Dispatch Battery Program*: $200/kW (avg over July-Aug); $25/kW-month (winter program)
  - Connected Solutions: up to $35/kW-yr

NYISO/ISO-NE

- Various programs, commodity pricing
- $/MW, $/MWh, and MW commitment

System owners can enroll in multiple programs* Utilities + ISOs

Key Takeaways

- DR can offset some of the costs associated with energy resiliency

- Resiliency use case with batteries can enroll in multiple DR programs to stack benefits