Introduction

Energy Planning for Resilient Military Installations Workshop

December 2017
LOCKHEED MARTIN ENERGY

WE’RE ENGINEERING A BETTER TOMORROW™

LOCKHEED MARTIN ENERGY

DISTRIBUTED ENERGY SOLUTIONS

MARINE TURBINE

NUCLEAR SYSTEMS

STORAGE

WASTE-TO-ENERGY
LOCKHEED MARTIN
GRIDSTAR™ ENERGY STORAGE

Turnkey energy storage systems for commercial, industrial, and utility applications.

Enabling a more efficient, secure and sustainable electricity grid.
GridStar™ Flow

- Large-scale renewables integration
- Transmission and distribution asset deferral
- Large-scale industrial energy management
- Utility reserve capacity and peak power

GridStar™ Lithium

- Energy management
- Solar plus storage integration
- Power reliability
- Power quality

Commercial / Industrial (Behind-the-Meter)

Utility (Front-of-Meter)
TURNKEY ENERGY STORAGE SOLUTIONS

EVALUATION, ANALYTICS & DESIGN

CONFIGURATION & LAYOUT

GRIDSTAR™ ENERGY STORAGE

GRIDSTAR™ SITE CONTROLLER

MAINTENANCE

WARRANTY
IT’S ALL IN THE BOX.


• Up to 500 kW\textsubscript{AC} and up to 950 kWh\textsubscript{AC}.

• 30 power and energy combinations.

• Outdoor rated design. UL certified.

• Lockheed Martin warranty and long term maintenance options.
GRIDSTAR™ FLOW SYSTEMS

Pioneering long-duration flow battery for utility-scale projects.


Proprietary battery with metal ligand coordination compound chemistry.
## ADVANTAGES OF GRIDSTAR™ FLOW

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<th><strong>Long Duration</strong></th>
<th>• 6 to &gt;12 hours duration</th>
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| **Durable**       | • Able to do multiple daily deep-discharge cycles  
|                   | • Long useful life         |
| **Flexible**      | • Freedom to operate in future differently than originally planned  
|                   | • Energy and power can be sized independently  
|                   | • Can add additional energy in future, as required. |
| **Cost Competitive** | • Low total cost of ownership |
| **Safe**          | • Designed for system-level safety and siteability  
|                   | • Non-flammable battery chemistry |

**Lockheed Martin Warranty**
ANATOMY OF A FLOW BATTERY

Flow batteries decouple power and energy, lowering marginal cost of multi-hour storage.
We have developed our proprietary GridStar™ Flow technology to optimize battery performance and affordability.
GRIDSTAR™ FLOW: 1MW|6MWh
LOCKHEED MARTIN ENERGY STORAGE DEVELOPMENT NETWORK

Located in Massachusetts, Texas, and California
## PROJECT EXAMPLE: COMMERCIAL/INDUSTRIAL

### LOCATION
Syracuse, New York
Manufacturing facility with 5MW of peak load

### APPLICATION
Demand charge reduction & ancillary services

### SYSTEM SIZE
1MW, 1.4MWh

### CUSTOMER BENEFITS
- Reduced electricity costs from capacity charges
- Revenue from services to the New York Independent System Operator (NY ISO) to maintain grid reliability

Project provides both behind-the-meter demand charge reduction and ancillary services.
SYRACUSE, NY: VALUE STREAMS STACKING DEMAND MANAGEMENT + ANCILLARY SERVICES

VALUE STREAMS

• Unforced Capacity Charge Reduction
• NYISO Frequency Regulation

DEPLOYMENT STRATEGY

• Reduce facility demand during historic incident peak window (~3-5pm, weekdays, June–Sept.)
• Participate in NYISO frequency regulation market when the system is not needed for incident peak shaving

Weekly ESS Deployment Profile

**Based on simulation off of June 14 – June 20, 2015 facility demand profile.