Deploying Solar+Storage for Emergency Power in a Disaster

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• Increase investment in clean, resilient power systems
• Engage policymakers to develop resilient power policies & programs
• Protect low-income and vulnerable communities
• Focus on affordable housing and critical public facilities
• Technical assistance for pre-development costs
• See resilient-power.org for reports, newsletters, webinar recordings
Resilient Solar+Storage: 2 Projects

Utility scale:
Stafford Hill Solar Farm
Rutland, VT

Building scale:
Hartley Nature Center
Duluth, MN
Stafford Hill Solar Farm
Stafford Hill Solar Farm

Solar:
2.5 MW capacity
7,700 solar panels covering 15 acres
power 2,000 homes

First U.S. solar+storage project sited on brownfield land (former city landfill)
Stafford Hill Solar Farm

Storage:
4 MW / 3.4 MWh
(4) 500 kW / 250 kWh lithium-ion containers
(4) 500 kW / 600 kWh advanced lead acid containers

First U.S. microgrid power by solar+storage with no additional backup fuel source
Resiliency:
Rutland City High School
Red Cross Disaster Center

Economically challenged, urban community

Frequent power outages due to severe weather

Tropical Storm Irene (2011): massive flood damage, families were displaced for extended periods of time
Stafford Hill Solar Farm

**Economic Value:**

Owned and operated by utility: Green Mountain Power

- Reduced capacity payments to regional grid operator
- Avoided regional network service charges
- Frequency regulation
- Instantaneous voltage regulation
- Solar smoothing
- Energy arbitrage

**ISO New England Load Duration Curve**

Hartley Nature Center
Solar:
11.3 kW rooftop array
1.8 kW ground mount dual-axis tracker
Installed in 2003

Original inverters began to fail in 2016
Explored storage along with inverter replacement
Hartley Nature Center

Storage:
6 kW / 14.2 kWh lithium-ion (Sunverge)
6 kW of rooftop array DC coupled with storage
Remaining rooftop capacity grid-tied through SPS inverter

First resilient solar+storage system in state of Minnesota
Resiliency:
Community Shelter
City Emergency Base of Operations
Backup strategies:
short-term operations, long-term community disaster

Extreme flooding (2012)
Severe summer storm resulted in 6-day outage, ending 2 hours before battery delivery
Hartley Nature Center

Economic Value:
City-owned property, interested in reducing operating expenses

*Manage demand spikes due to ground-source heat pump*

Hartley Nature Center Daily Load Profile
Difficult to monetize resiliency: projects sized for economic return, not resilience results in oversized or undersized installations

Long-term storage options still emerging: lithium-ion leads market, but ideal for mid-range duration, not long-term (>4 hours) flow batteries, compressed-air, hydrogen = promising but largely unproven or not cost-competitive
Contact Information

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