

Introduction to ENGIE

A global and local leader...

- **No. 1** supplier of energy services globally
- **\$73B** in revenue (2017) and **\$16.2B** net investments (2016-2018)
- **12 GW** of renewable wind & solar power deployed or under mgmt in North America
- **No. 1** distributed energy storage company in North America with over **100 energy storage projects** deployed to date
- **Largest solar & storage facility** in MA, TE financed in SMART predecessor program
- **First BTM Storage** contracted in MA for **peak shaving and ISO-NE participation**

... and a high-value partner to muni/co-op/public power utilities

- Expand existing **trusted relationship** bringing complementary roles & responsibilities
- Leverage ENGIE's storage-related development, financing, and operational experience and expertise to **reduce project development and execution risk**
- **Complete storage PPA** bundles in-house technical/financial expertise, existing supply agreements, and high-value operating partnerships

Distributed Standalone Storage

Value Proposition	Evaluating Potential
Demand Charge Reduction / Capacity Value	What do you pay for coincident / non-coincident peaks? Do you have a local capacity need?
Demand / Load Response	Do you currently have a demand or load response program for customers / members?
Customer Partnerships & Virtual Power Plants	Are there customers / members of the distribution system with unique challenges addressable by storage? Utility as a trusted reliability / service provider.
Voltage Regulation (VAR Support)	Are there voltage or power factor issues on feeder?
Distribution & Transmission Costs Deferred	What are proposed distribution and/or transmission augmentation plans?
Distribution Line “Black Start”	Can the feeder be sectionalized?
24-Hour Microgrid Capability	What fuel, maintenance, and other costs deferred?

Municipal, Cooperative, and Public Power utilities are uniquely positioned to capture multiple value streams from distributed energy storage.

Case Study: United Power Cooperative Brighton, CO | “Community Battery”

Use Case:

- Analysis showed 25 MW (on a 450 MW peak) could be shaved over each of the 12 months with a duration of 4 hours
- Deploy stand-alone 4 MW / 16 MWh battery storage system; tied to MV distribution grid
- Dispatch <100 times per year to mitigate peak demand charges
- 15-year overall wrapped warranty

Project Highlight:

- United’s members cannot reduce their peak (kW) charges very effectively, especially those with high load factor
- United structured a **community battery** program (like community solar): members can purchase a “share” of kW reduction from the BESS which will turn into a reduction on their retail kW charges
- Allows United to partner with members for BESS savings without restructuring demand response programs or waiting for significant BTM “peak shaving” penetration against their tariffs – overall, a more economic and effective approach

Distributed Solar + Storage

Value Proposition	Evaluating Potential
Increase Energy & Capacity Value of PV	Energy and capacity value of PV in many markets is time-dependent; use storage to shift PV generation to more valuable hours.
Address “duck curve”	Do you have high PV penetration causing a shifted system peak?
Increase PV penetration on smaller feeders	Is substation minimum daytime load limiting PV generation potential? Use storage to capture PV generation above real-time system demand, increase PV build-out on feeders.
PV Ramp-rate / Firming	Do you experience challenges integrating PV on the distribution system? Use storage to firm intermittency and smooth ramp rate.
Monetize the Federal ITC	Energy storage qualifies for the Federal Investment Tax Credit (ITC) if charged >75% from renewables. To fully monetize the ITC, you must charge 100%.

Integrating BESS with renewables can unlock several benefits for projects owners and off-takers alike.

Case Study: Holyoke Gas & Electric Holyoke, MA | Solar plus Storage PPA

Use Case:

- High annual coincident peak demand charges
- Co-located PV system (5.7 MWdc) already under PPA
- Deploy AC-coupled 3 MW / 6 MWh battery storage system, charge from PV generation
- Dispatch for peak reduction, solar firming, and capacity
- 20-year PPA: commitment to operate system and integrate controls with HG&E’s asset control and monitoring system



Pricing & Financing Distributed Storage

Example Contract Structures

Standalone Storage		
Structure	Price structure	Benefits
Turn-key EPC (Build-transfer)	Capex (\$) O&M (\$/year)	<ul style="list-style-type: none"> Developer assists with product selection, site evaluation, controls implementation Utility ownership
Storage Services Agreement (SSA)	\$/kW-month or \$/month	<ul style="list-style-type: none"> Developer owns, operates, finances, maintains system No money down

Solar Plus Storage		
Structure	Price structure	Benefits
PPA "Plus"	\$/kWh (of PV generation)	<ul style="list-style-type: none"> Developer as owner-operator of total plant (PV + ESS) Simple structure (amortize cost of ESS over PV PPA) Third-party tax equity financing (monetize ITC)
Storage Services Agreement (SSA)	\$/kW-month or \$/month	<ul style="list-style-type: none"> Developer as owner-operator of total plant (PV + ESS) Pay for storage capacity & PV generation separately (transparent structure) Third-party tax equity financing (monetize ITC)

Key Considerations:

- **PV charging (ITC)**
 - ESS must be charged >75 % from renewables
 - ITC value = 30% * [% charged by PV]
 - High PV charging requirements can adversely impact the value of the storage system (limitations on availability due to PV intermittency)
- **Control of dispatch (ITC)**
 - Developer (owner/operator) must have ultimate control of dispatch if taking ITC
 - Utility can schedule dispatch via software interface or provide price signals for dispatch
 - Direct control by utility restricted during ITC recapture period
- **Term of agreement**
 - Developer must have sufficient warranty coverage
 - Plan for augmentation / repowering if term exceeds 12-15 years
- **Credit of off-taker**
 - Public power, municipal, and co-operative utilities typically have attractive credit profiles
- **Battery equipment and system integration**
 - Lenders look for bankable, top-tier OEMs and reliable integrators.
 - Utilities should seek similar requirements for systems they plan to own.