Microgrids as a Service

A New Approach to Unlock More Efficiency, Better Sustainability, and Higher Resiliency

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More ELECTRIC

2X faster growth of electricity demand compared to energy demand by 2040

Source: IEA WEO 2014

DIGITIZATION

10X more incremental connected devices than connected people by 2020

Source: Cisco, Internet World Statistics

DECARBONIZATION

82% of the economic potential of energy efficiency in buildings and more than half in industry, remains untapped

Source: World Energy Outlook 2012, Internal Analysis

DECENTRALIZATION

70% of new capacity additions will be in Renewables by 2040

Source: BNEF
Historically Passive Energy Consumers are thinking about Energy in a New Way

- Reduce energy consumption
- Improve and monetize flexibility
- Energy / Fuel source arbitrage

**Efficiency**

- Innovative Product and Hedge Structures
- Global Program
- Real-time-price forecasting
- Portfolio Risk Management

**Supply**

- Reduce Greenhouse Gasses
- Minimize carbon footprint
- Improve LEED

**Sustainability**

- Service site loads during times of grid instability
- Protect assets against harmful effects of poor power quality

**Resiliency**

- Reduce energy consumption
- Improve and monetize flexibility
- Energy / Fuel source arbitrage
…and taking control of their energy spend
Each path to Active Energy Management is Unique

- Strategically procure energy in deregulated markets: 3%-5% savings/year
- Sell energy back to grid reducing exposure to volatile energy prices: 3%-5% savings/year
- Define energy consumption flexibility both at site level and globally: $7MM+ per year
- Evaluate and install renewable energy production + Storage: ~$4MM per year
- Meet global sustainability targets by increasing renewable energy use

- 1MW Fuel Cell (CA) to drive energy reliability: $200K/year
- 150 MW+ PPA for wind generation: ~$3MM per year
- Structure PPAs in emerging markets: ~10%-20% YOY savings
1. Levelized Cost of Energy at or below Grid Parity (Deutsche Bank)
2. Credits for Net Excess Generation – Net Metering (DSIREUSA)
3. Aggregated, Virtual, or Community Net Metering (NCSL.org)
4. Prone to Power Outages / Severe Weather (US Blackout Tracker)
5. High MWs per Net Meter (EIA-826)
6. Forecasted Growth in non-Resi Solar PV systems (GTM)
7. Potential for Self-Supply (ScottMadden Mgmt Consultants)
Crossing the Chasm in the New Energy Landscape

The offer required to cross the chasm:

- Allows consumers to co-optimize for energy and process
- Aligns ownership of assets to those with a prospectus based upon long term stable returns.
- Delivers an enduring outcome for the economic useful life of the asset
- Shields consumers from technical risk of emerging technology

Early market participants are advanced energy prosumers who can quantify the value of improved reliability, flexibility, sustainability, and security to their corporate mission.

Reaching the larger market now requires overcoming high barriers to entry:

- Microgrids are expensive to deploy and require extensive engineering to implement.
- Optimized operation requires insight into:
  - Utility rate structures
  - Commodity energy trends
  - Weather and other correlated variables.
  - Analytics and Sophisticated Controls
Montgomery County Maryland

Office Of Energy and Sustainability

About Montgomery County

- Approximately 1 million people
- High tech knowledge based economy
- 400+ facilities
- Leader in Advanced Energy
  - 11 megawatts of solar across 18 sites
  - Procure 100 percent clean energy for County facilities
  - Inaugural Partner in the U.S. DOE’s Combined Heat and Power for Resiliency Accelerator
  - First CHP system installed in 2016
Montgomery County Maryland

Project Objectives

- Improve resiliency of county operations
  - Upgrade existing aging electrical distribution infrastructure
  - Ability to island operations for >7 days without grid support
- Mitigate risk of escalating energy price over 15 years.
- Upgrade infrastructure without capex
- Reduce greenhouse gas and other emissions
- Create replicable models for other facilities and governments

Public Safety Headquarters
- Large electrical upgrades
- New 2 MW Solar
- Load management with BAS
- New Cogen
- Integrate Existing gas generator

Correctional Facility
- Minor Electrical Upgrades
- New 250 kW Cogen
- Integrate existing Diesel
Microgrid as a Service

Value Proposition

- No Upfront Capital
- Infrastructure Improvements
- More predictable energy costs
- Higher reliability
- Better sustainability
- PPP Business Model

Investor / Owner
- Duke Energy
- Montgomery County

Partners
- REC Solar
- CHP Provider
- Schneider Electric

Partner

Host Site

PPA
Partnering in the New Energy Landscape

Utility 2.0
Load Centric Energy Management

Originate
Design & Construct
Procure
Finance
Own
Operation
Optimize
Maintain

OP CO
Performance Risk

EPC
Design Risk
Construction Risk
Warranty Risk

DEV CO
SFC Risk

ASSET CO
Credit Risk
Regulatory Risk

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