Evolution of Microgrid and Battery Storage to Produce Reliable Power More Efficiently

Nate Allen, Department of Energy
Grace Whitney, Montefiore Medical Center
Arnulfo Murietta, Welltower
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Better Buildings

Better Buildings is an initiative of the U.S. Department of Energy (DOE) designed to improve the lives of the American people by driving leadership in energy innovation. Through Better Buildings, we work with leaders in the public and private sectors to make the nation’s homes, commercial buildings and industrial plants 20% more energy efficient by accelerating investment and sharing of successful best practices.
Join the Alliance; Step up to the Challenge

STEP UP TO THE BETTER BUILDINGS CHALLENGE

- Earn national recognition for energy efficiency leadership
- Join DOE in media events spotlighting your energy efficiency achievements
- Access technical assistance to analyze your portfolio energy use

PARTICIPATE IN THE BETTER BUILDINGS ALLIANCE

- Participate in peer-to-peer networking opportunities addressing sector specific energy topics
- Tap into expert-led technology and market solutions teams
- Access technology demonstration opportunities
- Develop public resources such as technical performance specifications and sample lease clauses
Results to Date

Better Buildings Healthcare Sector
2018 by the Numbers

- 43 Unique Sector Partners
- 34 Alliance Partners
- 9 Challenge Partners
- 490 Million Square Feet
- $119 Million Saved Since 2011
- 12 Trillion BTU Energy Savings Since 2011
Better Buildings Solution Center

- Features 1,000+ partner solutions, interactive resources and toolkits, and proven and cost-effective best practice models

- Check out the latest resiliency page!

https://betterbuildingsinitiative.energy.gov/resilience
2019 Better Buildings and Better Plants Summit

REGISTER NOW

2019 SUMMIT

JULY 10-11 | ARLINGTON, VA

IMPROVING AMERICA'S BUILDINGS THROUGH LEADERSHIP AND INNOVATION

BETTERBUILDINGSINITIATIVE.ENERGY.GOV/SUMMIT
NYPrize Community Microgrid Competition
Grace Whitney
Energy & Sustainability Manager
Montefiore Health System
Agenda

• Background
• Funding
• Proposed Project
• Project Evolution
• Current Status
Montefiore Medicine Academic Health System

• “To heal, to teach, to discover, and to **advance the health** of the communities we serve”

• Commitment to Energy Efficiency & Resiliency
  – CHP – 1993
  – NYC Carbon Challenge (50x25)
  – BBC (20x23)
  – Energy Management Committee
Jack D. Weiler Hospital

- 2013 to 2018 ↓ 22% kBTU/sq ft
  - BMS / VFDs / Setbacks (exhaust fans, ACs, AHUs)
    - 2016 – saved 83k kWh/year
    - 2017 – saved 3.3m kWh/year
  - LED Lighting & Controls
    - 2016 – saved 56k kWh/year (ORs)
    - 2019 – 673k kWh/year projected savings
Funding - NYPrize Community Microgrid Competition

- NY State Energy Research & Development Authority
- Purpose
  - Efficiency & Cost Savings
  - Resiliency
    - Flood zone
    - Future weather events (Sandy)
- 3 Phases
  - Phase I: Feasibility Study ($100k)
  - Phase II: Design ($1m)
  - Phase III: Build ($?)
Proposal

• East Bronx Microgrid Project
  — “…a privately owned and operated district energy system that will provide utilities to all partner organizations, enhancing the reliability of each, and greatly reducing operating costs”.

• Partner Organizations
  — Jacobi Medical Center
  — Calvary Hospital
  — Jack D. Weiler Hospital (Montefiore)
  — Albert Einstein College of Medicine (Montefiore)
Awards & Next Steps

• Phase I & Phase II awarded
  – $100k for feasibility study
    • Conducted by energy consultant
  – $1m for design – 11 of 83 submissions selected

• Gather Stakeholders
  – Jack D. Weiler Hospital (Montefiore)
  – Albert Einstein College of Medicine (Montefiore)
  – Jacobi Medical Center
  – Calvary Hospital
  – Energy Consultants
  – Design Firm
Project Evolution

- Partnerships - Calvary & Jacobi
  - Unfavorable cost/benefit analyses
- Reframing
  - Montefiore / AECOM
  - Capability to interconnect with other entities in the future.
- Decision-Making Hurdles
  - Design dictated by cost/benefit analyses
  - Complexities of NYC utility grid
    - Tariffs, taxes, credits, rate classes, etc.
Current Status

- Design
  - Combined Heat & Power (CHP) Plant
    - 1 or 2 gas-fired turbine(s) – question of resiliency
    - New network connectivity
  - Conclusion?
    - Traditional microgrid not cost effective
    - CHP not eligible for Phase III

- Moving Forward
  - Potential to continue CHP project under other NYSERDA funding opportunities.
Santa Anita Medical Plaza, Storage System

Arnulfo Murietta
Assistant Vice President, Capital Planning and Engineering
Welltower
Santa Anita Medical Plaza Storage System

- Arcadia, CA
- Six floor medical office building
- Totaling 86,762 ft²
Santa Anita Medical Plaza Storage System

- Partnered with Stem Energy System.
- We Installed a 315Kw 510Kwh Telsa Battery Storage system.
- No upfront cost means positive net savings from day one.
- Savings increase over time as demand rates rise.
- System was brought online October 2018.
Santa Anita Medical Plaza Storage System

- Savings since activation date $6,576.00
- Estimated yearly savings $18,655.00
- Next step combining solar with storage system.
Richmond, CA Renewable Microgrid

Gary Mullaney
Senior Energy Consultant
Kaiser Permanente
KP 2025 Environmental Stewardship Goals

Climate Action
Carbon neutral by 2020. **Become “carbon net positive” by 2025**, buying enough clean energy and carbon offsets to remove more greenhouse gases from the atmosphere than we emit.

Sustainable Food
Buy all of our food locally or from farms and producers that use sustainable practices, including using antibiotics responsibly.

Waste Reduction
Recycle, reuse or compost 100% of our non-hazardous waste.

Water Conservation
Reduce the amount of water we use by 25% per square foot of buildings.

Safer Products
Increase our purchase of products and materials that meet environmental standards to 50%.

Sustaining Sustainability
Meet international standards for environmental management at all of our hospitals.

Collaboration
Pursue new collaborations to reduce environmental risks to foodsheds, watersheds and air basins supplying our communities.
Health Effects of Climate Change

- Allergies
- Infectious Disease
- Asthma
- Toxic Red Tides
- Extreme Weather
- Heat Stress
- Weather-Related Injuries
Efforts to Date: 153 MW Off-Site Renewables, soon to be more than doubled

Golden Hills

Blythe
On-Site Solar Program (65+ MW)

Martinez

SF/Mission Bay

Santa Rosa
Richmond Microgrid Overview

• Funded through a $4.7 million grant from the California Energy Commission
• KP worked with grant awardee, Charge Bliss, to identify the right site
• Richmond chosen in part because of the strong economic benefits and previous power reliability problems
• Installation of solar arrays and battery storage, with the capacity to island the life-safety load
• First time this has been done at a California hospital
• Unlike backup generators, battery storage can be used all the time for peak demand management (ie: the equipment doesn’t just sit there)
• Goal is to improve resiliency if grid and backup generators are not available, or in the case of an extended emergency where diesel supply is interrupted
• Long-term vision is to increase the amount of critical care load that can be “islanded” and bring the model at MOBs as well
Richmond Microgrid

250 kW Solar PV

1 MWh Battery System

Normally interconnect with the grid but can island part of the facility in cases of a grid outage.
Solar Canopy (250kW)
Battery Room (1 MWH)
Where are the Economic Benefits?

Peak demand reduction opportunity
Summer Load Profile at Richmond

Note: Up to 45% of electricity cost comes from demand charges with the rest coming from usage and fixed charges
Performance – 24 Hours

PCC Power [KW]

Controlled
Uncontrolled

Anticipated Savings
Peak Reduction
163 KW

CleanMed
NASHVILLE 2019
MAY 7-9
Performance – Grid Demand

Peak Demand (kW)

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

2016  2017  2018  2019
Economic Benefits So Far

Total Utility Cost ($)
Next Stage in the Evolution

Generators

Option 1

Manual transfer switch

ATS 1
ATS 2
ATS 3
ATS 4
ATS 5
ATS 6

Emergency room
Other Loads
Other Loads
Other Loads
Other Loads
Lights, alarms, exit signs, etc.

Need Further OSHPD approval

Option 2

Microgrid

What OSHPD has allowed
Lessons Learned and Roll Out

• The microgrid project has generated interest across Kaiser Permanente
• Utility wildfire protection measures one of several resiliency drivers
• More and more facilities, particularly MOBs, are interested in backup, but each facility’s interest and needs are different
• One site wants to back up procedure rooms for 30 minutes; others want back up all refrigeration for 12 hours. Some want it all.
• Need to balance backup capabilities with economic benefits of the systems
• And in many cases, backing up loads connected to different panels requires extensive rewiring
• Best to consider these needs during design and construction – this will reduce cost
• As we move to the next stage in the evolution of microgrids, we will continue to work closely with OSHPD – their partnership with Richmond was an important ingredient to success
Thank you

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