Fort Carson Battery Energy Storage System

Michael Belles, Sr. Project Manager, AECOM

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Introduction

• What is a BESS?
• Demand Savings
• Why Fort Carson?
• Considerations for Design
• Project Economics
• Utility Impacts and Teaming
• Construction
• Things to Consider
• Other Use Cases
Battery Energy Storage System

• What is a BESS?
  – Battery: Cells – Modules – Racks – Enclosure
  – Battery control systems, safety devices, system cooling and support
  – Inverters, bi-directional transformers, protective devices, point of common connection
  – Charge/discharge control, communications

• Resilience Benefits
Using A BESS for Peak Shaving
(Demand Charge Management)

- Demand based on monthly maximum
- Tariff supports opportunity for savings
- Demand profile is shave-able
- Consider both Power and Energy
  - Maximum discharge rate (in kW) – determines max savings
  - Total battery capacity (in kWh) – enough to achieve savings
- Capacity must last through the entire peak
  - Savings most often capacity limited
Using A BESS for Peak Shaving (Demand Charge Management)

- **Dumb Battery** – no discharge control
  - Low power (savings) to energy (cost) ratio
  - Not economically viable

- **Smart Battery**
  - Decrease capacity, increase discharge rate
  - Requires predictive control for real time use
  - Increases savings risk
Fort Carson was a Good Candidate

- Large demand charge
- Tariff support peak shaving
- Peak is shave-able
- Customer was interested in a BESS
- Customer understood the associated risks
- Good relationship with serving utility
- Interconnection Agreement changes not required
Fort Carson was a Good Candidate Cont’d

• Also
  – Fort Carson DPW has an appetite for innovative projects
  – 8 MW of existing Solar PV, going to 15 MW
  – Existing infrastructure capacity
Challenges

• Must be a smart battery
• 6 separate meters aggregated to 1 bill
  – Must monitor all 6 in real time
• Contribution from external supply (WAPA)
• Seasonal Impacts
• Solar introduces profile variability
System Design Considerations

• Detailed analysis of historical data
• Survey of market participants
  – Offerings must match project needs
• Communications between components
• Redundancy, limit single points of failure
  – Risk mitigation
• No export to utility
• Remote substations
Economics

• Demand is 55% of Fort Carson’s electric Bill
  – Need to capture about 3,200 kW a month

• DCM will result in $525K in annual savings
  – ESUs 70% of cost, BOS and installation made up remaining 30%

• ~90% efficient

• No time of use shifting opportunity

• Complete package payback under 20 years
  – Includes performance period costs and financing
Utility Interest in Behind-the-Meter BESS

Support Customer Goals

- Regulatory Mandates
- Investment Deferral
- Demand Response
- Experience

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way
Fort Carson BESS Installation
Fort Carson BESS Installation
Things to consider

- Application very specific to situation
- Importance of historical data
  - Analysis & design
  - Power & energy requirements
  - Duty cycle (impact to system degradation)
- Tariff/savings methodology
- Match use case to economics
- Existing/planned distributed generation resources
- Interconnection agreement
- Cyber security
Things to consider, continued

- Stakeholder engagement
- Understand/share the risk
  - Customer must understand risks
- Details
  - Understand how savings will be achieved
  - Understand impacts to load profile
  - M&V (Demand reduction guarantee)
Other Economic Use Cases

• Equipment upgrade deferral
• Power factor correction (VAR support)
• Equipment substitution
  – Frequency control
  – Solar firming/ramp rate control
  – Voltage regulation
• Demand response
• Time-of-use shifting
Questions?