BRIGHT Battery Pilot Update

Board of Directors Committee Meeting
June 15, 2021
Agenda

• Project Milestones
• Use Case Analysis
• Project Cycles & Sizing Selection
• State Regulatory Approval
• Next Steps
BRIGHT Milestones

- **NET Grant Awarded to OPPD**
  - June 2020

- **Energy Storage RFI**
  - July 2020

- **Storage Vendor Workshops**
  - Fall 2020

- **Owner’s Engineer Evaluation**
  - Jan 2021

- **Draft & Release RFP**
  - Spring 2021

- **Analyze RFP**
  - Summer 2021

- **Contract Award**
  - Summer 2021

- **Anticipated Commercial Operation**
  - 2022

NET – Nebraska Environmental Trust
RFI – Request for Information
RFP – Request for Proposals
Use Case Analysis
Project Analysis

• Evaluation conducted
  – Site analysis
  – Substation feeder analysis
  – Technoeconomic analysis

• Key lessons learned:
  – Batteries provide a range of applications, but they cannot do everything at once
  – Certain use cases must be prioritized over others
  – Successful projects align on scope and sizing up front, then build RFP accordingly
  – Certain applications require extra cost and planning up front (i.e. equipment, design)
### Use Cases Evaluated for BRIGHT Project

Potential use cases consider cost, grant requirements, timeline, location, and organizational learning.

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Description</th>
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<tbody>
<tr>
<td>Energy Shifting</td>
<td>Charging/discharging to move electricity consumption from one time period to another</td>
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<tr>
<td>-Peak Load Reduction</td>
<td>Defer or eliminate future system upgrade costs</td>
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<tr>
<td>-Energy Arbitrage</td>
<td>Provides value by charging during off-peak hours, discharging during peak hours</td>
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<tr>
<td>Voltage Support</td>
<td>Provides reactive power through the inverter</td>
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| Southwest Power Pool Market Participation   | Participates in SPP’s energy and ancillary services market  
  (current services: Real-Time & Day-Ahead Energy, Spinning and Supplemental Reserves, Regulation)                                         |
| Microgrid                                   | Used as a dispatchable distributed generator to temporarily reduce loading                                                                   |
| Blackstart                                  | Provides electricity to the grid without first utilizing outside power from the grid                                                       |
| N-1 Reliability                             | Provides grid support in event of the loss of another component (transformer, breaker, circuit, etc.)                                        |

**Out of Scope for BRIGHT Pilot:** Microgrid, Blackstart, N-1 Reliability due to significant additional cost and project scope for added equipment and substation redesign; requires prioritization over other applications.
Selected Use Cases & Other Project Benefits

Use Cases
- Energy Shifting
- Peak Load Reduction
- Energy Arbitrage
- Voltage Support

Inherent Benefits
- Increased Reliability
- Organizational Learning
- Stakeholder Outreach
- Safety

Future Testing Opportunities
- Market Participation
- 10-minute Spinning Reserve
- Regulation
- Energy Shifting
- Intra-Hour Arbitrage
Battery Cycling & Sizing
Battery Design: Capacity, Duration & Cycling

**Capacity** – the measure of the energy stored in the battery in megawatts (MW)

- Grant application defines 1MW capacity

**Duration** – the run time of the battery on a full charge measured in hours (hrs)

- 2-hr and 4-hr evaluated based on supporting project use cases; defined in RFP

**Cycle** – a full charge/discharge, or the equivalent, of the rated capacity

- Number of cycles defined in the RFP; does not affect the selection of use cases
- More cycles require larger capital cost to oversize the battery; increased flexibility for testing
Size & Cycling Options

**Option A:** 1 MW 2-hr, 365 cycles:
- ~40% lower cost than 4 hour duration
- Increased testing flexibility
- Similar learning opportunities

**Option B:** 1 MW 4-hr, 365 cycles:
- Significant cost increase for longer duration (~40%)
- Increased testing flexibility
- Similar learning opportunities

**Option C:** 1 MW 2-hr, 250 cycles:
- Lowest cost given short duration and lower cycles
- Reduced testing flexibility
- Similar learning opportunities
State Regulatory Approval
State Regulatory Approval

• Generation Application

• Timeline
  – June 15: Submit PRB application
  – July 12: PRB hearing/approval

• Uncertainties
  – Battery storage is not expressly addressed in Nebraska statutes
Next Steps

- Nebraska Power Review Board
  - Summer 2021

- Analyze RFP & Select Technology
  - Summer 2021

- Contract Award
  - Summer 2021

- Site Preparation & Construction
  - 2021 - 2022

- Anticipated Commercial Operation
  - 2022*

*RFP responses will clarify timing of Commercial Operation Date