Battery Storage and the Distribution Cooperative Energy Storage Summit

Steve Nisbet – Wright-Hennepin Electric
July 15, 2015
WH Background

- One of 44 distribution electric cooperatives in MN
- 49,000 consumers, 62,000+ meters, 72,000+ AMI endpoints
- Suburban/rural customer mix
- Purchase all power from two wholesale suppliers
  - Great River Energy (fixed)
  - Basin Electric (growth)

*Member-owned and regulated by WH Board of Directors*
LM Product Development

- Water & Space Heating and Cycled A/C
- Interruptible Generation
- Battery Storage

Over 60% of members on load management programs
Demand Response – Widely deployed

Wright-Hennepin Example

Peak Demand Load – no control 225 MW

Demand Response Assets
- Diesel Generators 30 MW installed capacity
  (effective load reduction) (20 MW summer/15 MW winter)
- Air Conditioning Cycling 15 MW - summer
- Dual Fuel Building Heating 7 MW - winter

Total 35 MW summer / 22 MW winter

Demand Response Assets represent 15% of Peak Demand Load
The battery storage solution...

**Utility Goals**

- Need ability for utility control
  - Real time knowledge of system load
- Store surplus mid-day solar energy for evening peak
  - Reduce evening peak demand
  - Minimal impact on customers

“Surgical Precision” load management
SOLUTION: Store & Deploy

Excess PV when house load is low charges batteries.

Batteries discharged during peak reduces total system demand.
<table>
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<tbody>
<tr>
<td><strong>Storage: 2010</strong></td>
<td><strong>Tesla Storage: 2015</strong></td>
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<tr>
<td>• 10 KWH of energy</td>
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<tr>
<td>• Lithium Ion batteries</td>
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<tr>
<td>• Includes Inverter</td>
<td>• <strong>$3,500 per unit</strong></td>
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<td>• <strong>$25,000 per unit</strong></td>
<td>Optional inverter (if required)</td>
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<td>• $5,000 for an inverter</td>
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<td>• <strong>$8,500 total cost</strong></td>
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Conclusions

• Need costs below $8,000 for LM solution
  – Powerwall, Samsung now?
• Lithium Ion preferred over lead acid
  – Better performance, more options
• Ideal Pairing
  – Community Solar with the battery storage located at the home or business
  – Utility-control of storage avoids unintended consequences to the distribution grid
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