



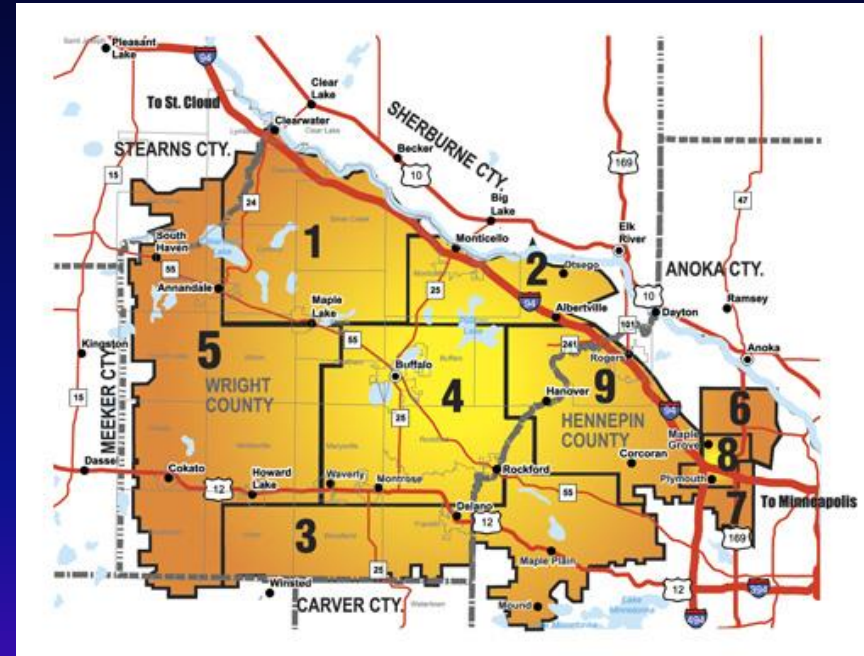
Battery Storage and the Distribution Cooperative Energy Storage Summit

Steve Nisbet – Wright-Hennepin Electric

July 15, 2015

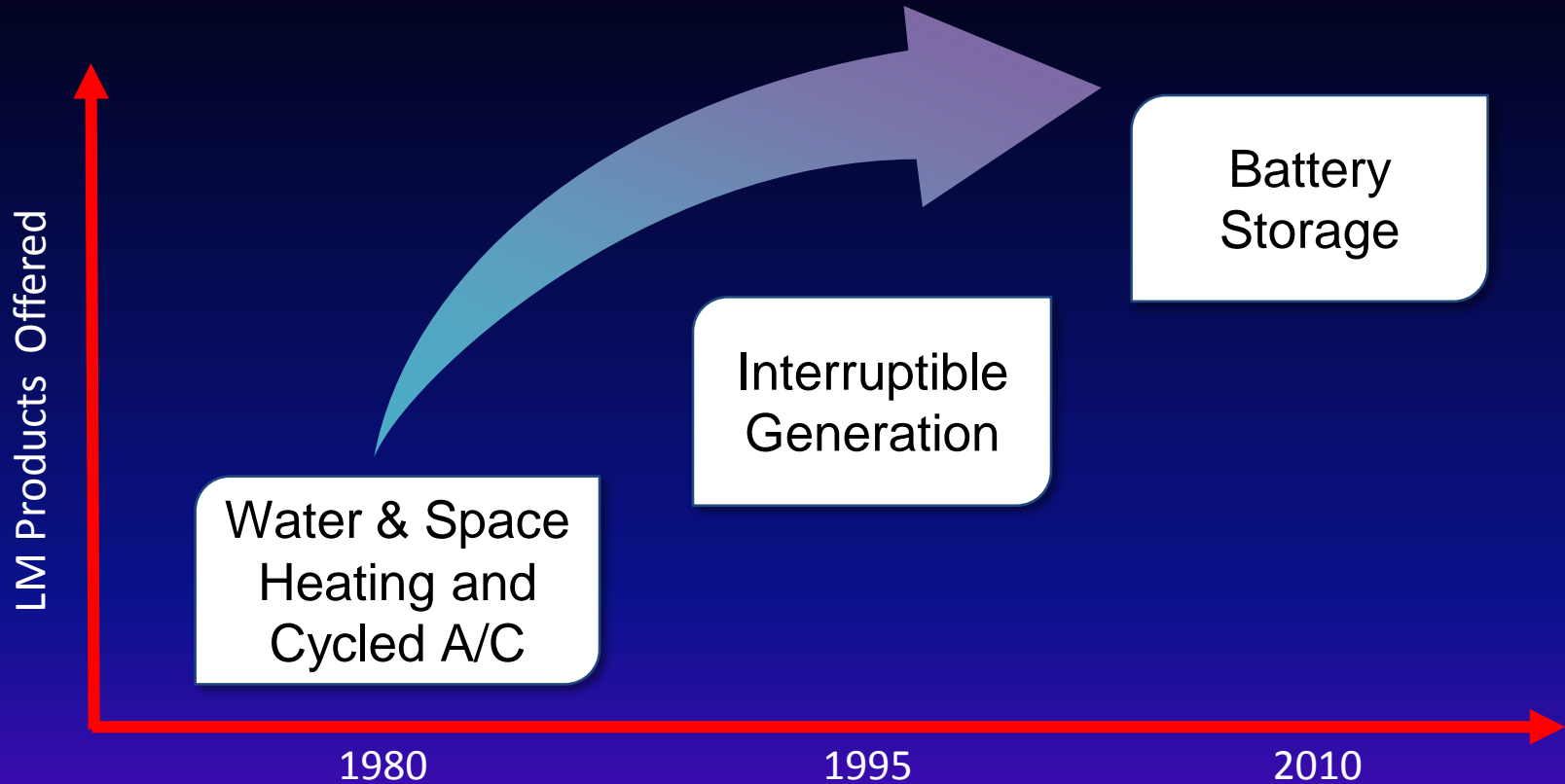
WH Background

- 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



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
(effective load reduction)
- Air Conditioning Cycling
- Dual Fuel Building Heating

30 MW installed capacity
(20 MW summer/15 MW winter)

15 MW - summer

7 MW - winter

Total

35 MW summer / 22 MW winter

Demand Response Assets represent 15% of Peak Demand Load

The battery storage solution...

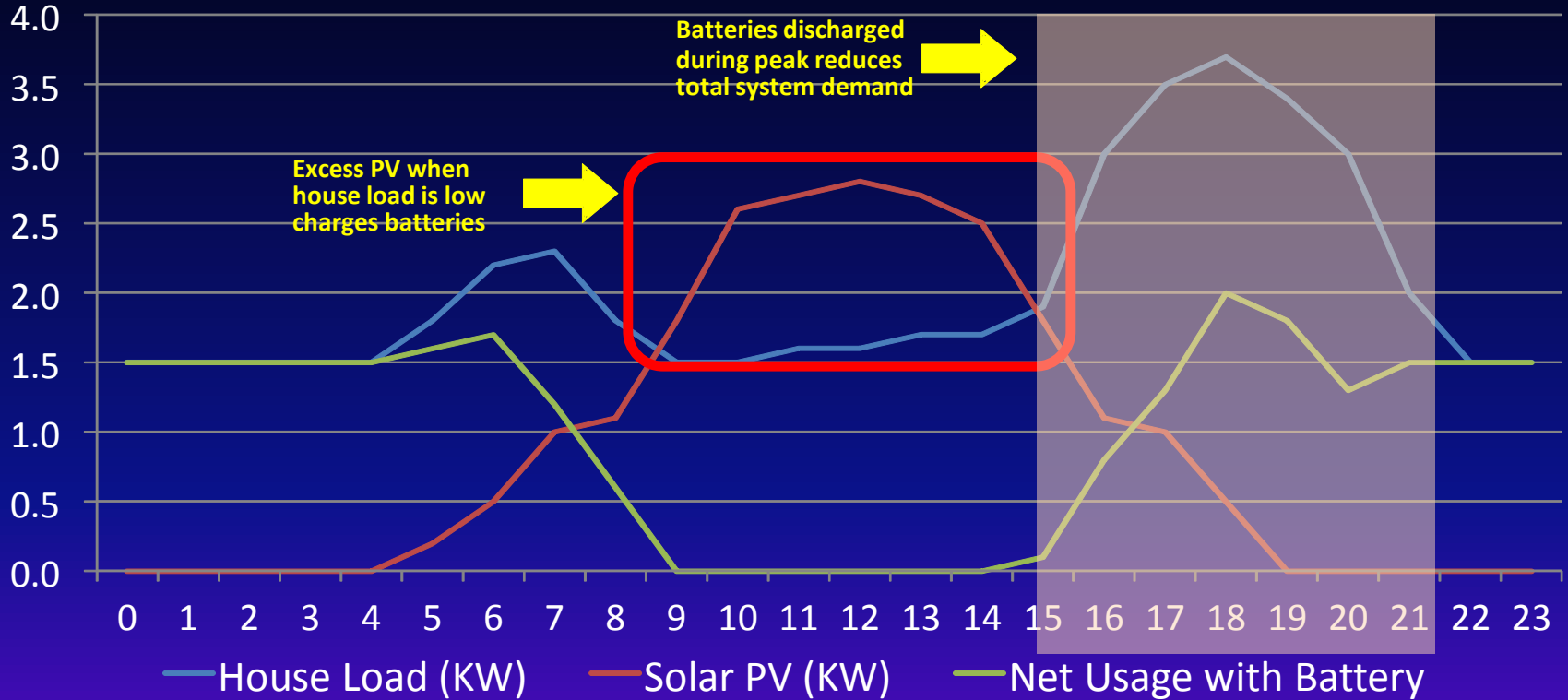
Utility Goals

- 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



Technology: 2010 vs. 2015

Storage: 2010

- 10 KWH of energy
- Lithium Ion batteries
- Includes Inverter
- **\$25,000 per unit**

Tesla Storage: 2015

- 10 KWH of energy
- Lithium Ion batteries
- **\$3,500 per unit**

Optional inverter (if required)

- **\$5,000 for an inverter**
- **\$8,500 total cost**

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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