NorthWestern Energy Public Meeting

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Electric Provider
MONTANA:
• 353,600 customers in 187 communities

SOUTH DAKOTA:
• 62,500 customers in 110 communities

Natural Gas Provider
MONTANA:
• 189,000 customers in 105 communities

NEBRASKA:
• 42,000 customers in 4 communities

SOUTH DAKOTA:
• 45,500 customers in 60 communities

Forecast supply need
Plan for new gas & electric resources
Acquire new supply, balance system
Operate & maintain generation fleet
Operate electric trading floor
Primary purpose of today’s public forum is to discuss

- Resource needs of NorthWestern’s retail customers.
- Identify resources to be evaluated in NorthWestern’s 2018 Resource Plan.
- The development of the emerging electricity market in the West.
• Resource planning process is defined by law
  – “A utility should routinely communicate with the commission and stakeholders regarding portfolio planning and resource procurement activities”
  – “A utility should use an independent advisory committee of respected technical and public policy experts as a source of upfront, substantive input to mitigate risk and optimize resource procurement outcomes in a manner consistent with these guidelines.”
  – “Provide customers adequate and reliable electricity supply services, stably and reasonably priced, at the lowest long-term total cost.”

• Resource planning process (greatly simplified)
  – Identify resource needs
  – Identify resource alternatives
  – Optimize resource additions to achieve objectives
Residential and GS-1 Secondary account for approximately 86% of energy supply load serving obligation.
Retail Load Forecast

Forecast load growth for base case is 0.4%, before losses and net of DSM and NEM (dashed line).
2017 Retail Load Shape (MW) Including losses

Heavy Load Hours: Hour Ending 7 through 22 (Pacific Prevailing Time) Monday through Saturday excluding NERC Holidays
Variations in Loads and Resources Over a Two Day Period (modeled)
Energy Balance – Heavy Load Hours

NorthWestern Energy
Supply Portfolio HL Hours
Generation Actual to 2017 Forecast to 2023

Gen. above load is sold into the market and purchases are made to meet load.

Includes MPSC Order QF facilities.

- Hydro Rate Based Assets
- DGGS (Optimized)
- DSM
- Small QF-1 (no wind)
- Colstrip Unit 4
- RFP/PPA (Morgan, PPL, Transalta)
- Distributed Gen. (net meter)
- Wind (RBA, PPA, QF)
- Basin Creek
- Small Hydro (PPA)
- Tier II QF (No Wind)
- Retail Load

Includes MPSC Order QF facilities.
NorthWestern Energy
Supply Portfolio LL Hours
Generation Actual to 2017 Forecast to 2023

Hydro Rate Based Assets
Colstrip Unit 4
Basin Creek
RFP (Morgan, PPL, Transalta)
DGGS (Optimized)
Small Hydro (PPA)
DSM
Small QF-1 (no wind)
Wind (RBA, PPA, QF)
Distributed Gen. (net meter)
Retail Load

Gen. above load is sold into the market and purchases are made to meet load. Includes MPSC Order QF facilities.
Energy Balance – Non-Carbon / Carbon

NorthWestern Energy Supply Portfolio
Light Load Carbon vs Non-Carbon

NorthWestern Energy
Delivering a Bright Future
NWE's Capacity deficits are very large and grow over time.
Physical Resources: Name Plate vs. Capacity Contribution

NorthWestern Energy
2017 Resource Mix
(INCLUDING CONTRACTED AND ORDERED)

- **Wind**: 448 MW (4.7%), 93% Capacity Contribution
- **Hydro**: 466 MW (51%), 93% Capacity Contribution
- **Coal**: 222 MW (93%), 95% Capacity Contribution
- **Natural Gas**: 202 MW (95%), 58% Capacity Contribution
- **Thermal QF**: 87 MW (58%), 6.1% Capacity Contribution
- **Solar**: 97 MW (6.1%)
Last 4 Years - Summer Peak

2012 Retail Load Shape (MW) (Including losses)
Heavy Load Hours: Hour Ending 7 through 22 (Pacific Prevailing Time)
Monday through Saturday excluding NEIC Holidays

2013 Retail Load Shape (MW) (Including losses)
Heavy Load Hours: Hour Ending 7 through 22 (Pacific Prevailing Time)
Monday through Saturday excluding NEIC Holidays

2014 Retail Load Shape (MW) (including losses)
Heavy Load Hours: Hour Ending 7 through 22 (Pacific Prevailing Time)
Monday through Saturday excluding NEIC Holidays

2015 Retail Load Shape (MW) (including losses)
Heavy Load Hours: Hour Ending 7 through 22 (Pacific Prevailing Time)
Monday through Saturday excluding NEIC Holidays

Summer Peak Day (Load)  
80 MW Solar Summer Peak Day  
MT Wind 145 MW Summer Peak Day  
MT Wind 224 MW Summer Peak Day  
MT Wind 223 MW Summer Peak Day
Flexible Capacity Need vs. Resources

Flexible Capacity Need and Resources

Within-hour INC, 150
Contingency Reserves, 65
Regulation, 50

Total: 271
DGGS, 150
Basin Creek, 52
Hydro, 45
Colstrip 4, 24

Total: 265

Within-hour INC
Contingency Reserves
Regulation
DGGS
Basin Creek
Hydro
Colstrip 4

MW
Potential Resources for Inclusion in Resource Portfolio.

- **Thermal Generation**
  - 11x0 SCCT 50 MW Aeroderivative
  - 1x0 SCCT 50 MW Frame/Industrial
  - 1x0 RICE – 18 MW
  - 1x0 RICE – 9 MW
  - 2x1 nominal 150 MW CCCT (small CCCT option)
  - 1x1 F-Class CCCT (with ACC or wet cooling)
  - 1x1 CCCT duct firing (generic)

- **Renewables**
  - Geothermal
  - Solar PV
  - Wind
  - Hydro Upgrades

- **Storage**
  - Pumped Hydroelectric
  - Compressed Air Energy Storage
  - Lithium Ion Battery
  - Vanadium Flow Battery
2018 Resource Planning Process

• 2018 resource planning process is well underway.
• 2018 Resource Plan to be filed by December 15, 2018.
• NorthWestern plans to hold at least one additional public meeting.
Delivering a bright future