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June 6, 2023

### **MEMORANDUM**

**TO: Council Members**

**FROM: Brian Dekiep, Montana State Staff**

**SUBJECT: NorthWestern Energy Resource Planning**

### **BACKGROUND:**

**Presenters:** Steven Schmitt and Matt Stajcar, NorthWestern Energy (Montana Operations)

**Summary:** NorthWestern Energy submits an electricity supply resource plan to its state regulatory commission every 2 to 3 years. These plans serve to inform and support the resource management decisions necessary to ensure a reliable and affordable supply of electricity for all of their customers.

NorthWestern Energy's 2023 Montana Integrated Resource Plan is an analysis of energy supply conditions. It is used to inform the development of an adequate Montana energy supply portfolio for reliable energy service for their customers' homes and businesses, the state's industries, and critical services, such as healthcare, for the coming years. The plan presents an evaluation of different potential generation resource portfolios that could meet the needs of NWEs Montana electric customers reliably, safely and at reasonable costs over a 20-year horizon.

The 2023 Montana Integrated Resource Plan identifies that the major risk for customers, which is consistent with previous integrated resource plans,

is an overreliance on an uncertain market to address our critical capacity needs. In fact, recent real-world examples indicate that risks to affordable and reliable energy service for our Montana customers are increasing because of an overreliance on the market for capacity needs. In addition, each energy company must have sufficient resources to meet its own customers' peak demands to meet regional reliability requirements. Reliance on short-term market purchases is not sufficient to meet this regional resource adequacy requirement.

More Info: <https://www.northwesternenergy.com/about-us/gas-electric/electric-supply-resource-procurement-plan/montana-integrated-resource-plan-2023>

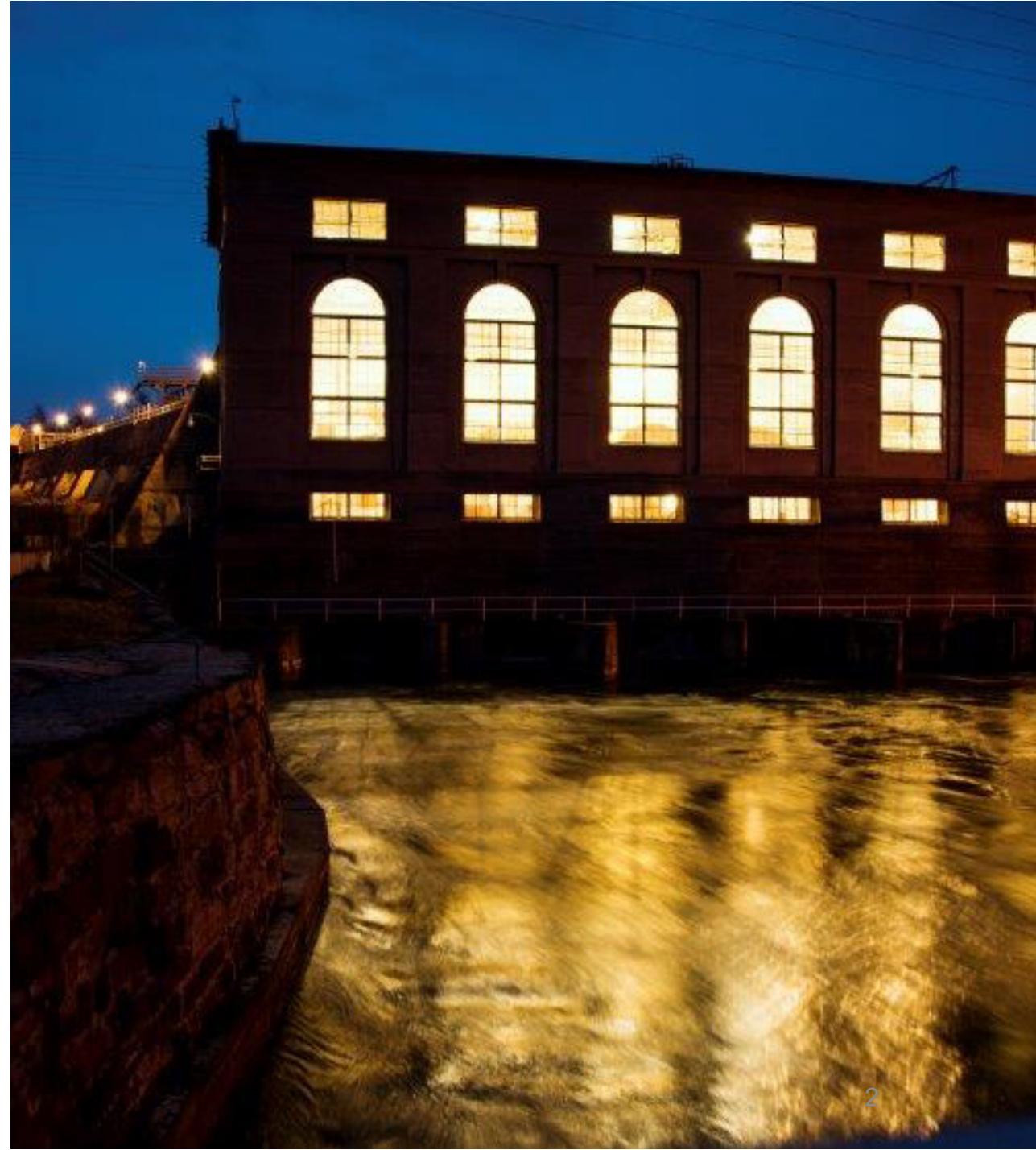


# NorthWestern Energy's 2023 Montana IRP

Northwest Power and Conservation Council  
June 13, 2023

# Agenda

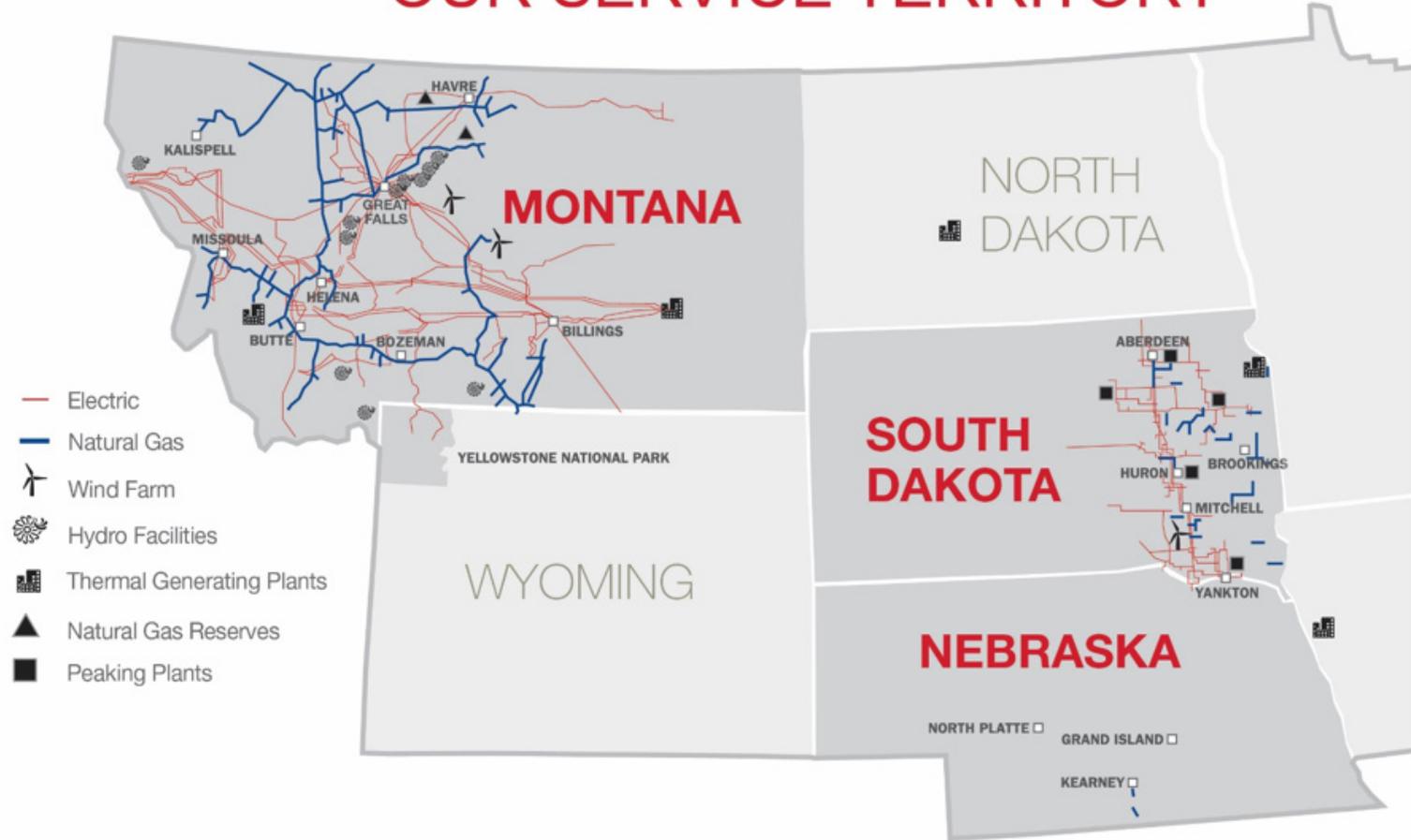
- NorthWestern Energy Background
- Winter Storm Elliot
- Transmission
- Supply Portfolio
- Modeling
  - Constraints
  - Inputs
  - Scenarios and sensitivities
  - Results
  - Additional studies



# About our company

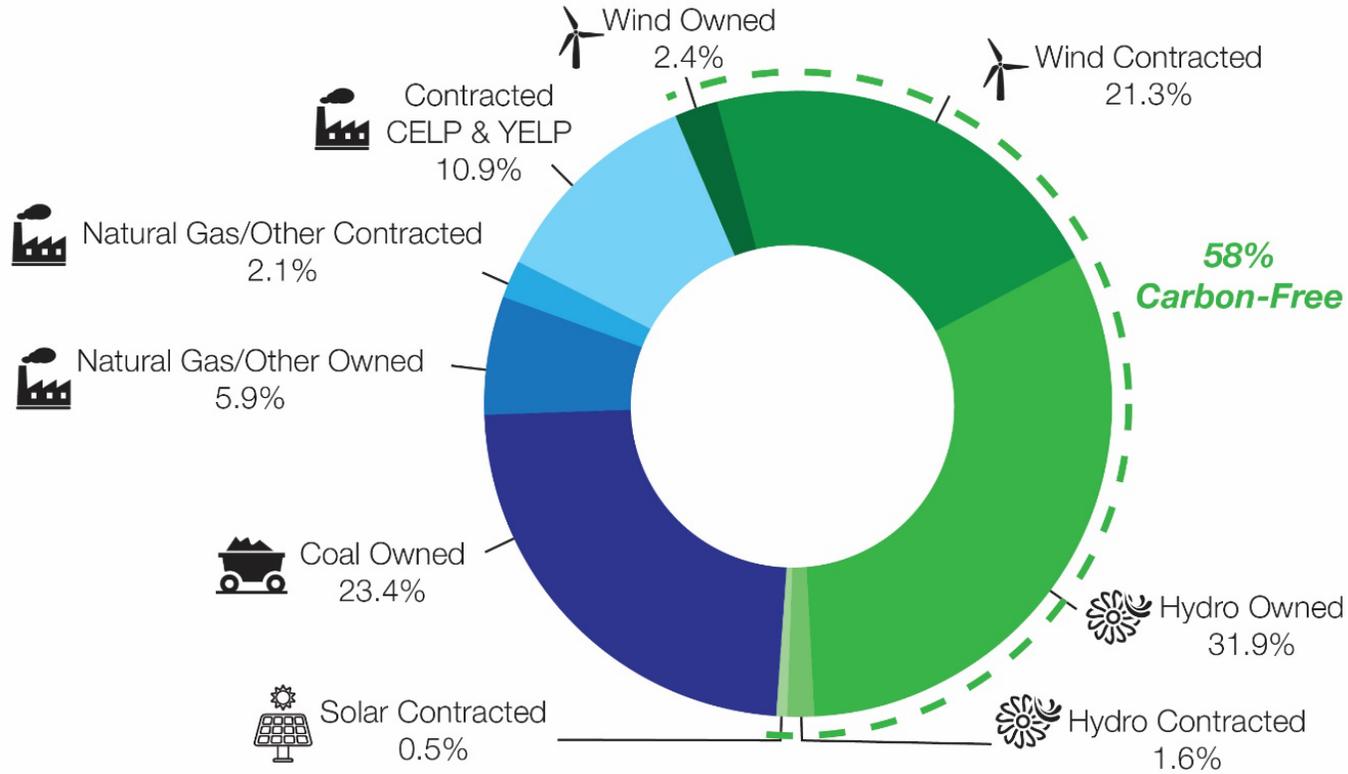


## OUR SERVICE TERRITORY

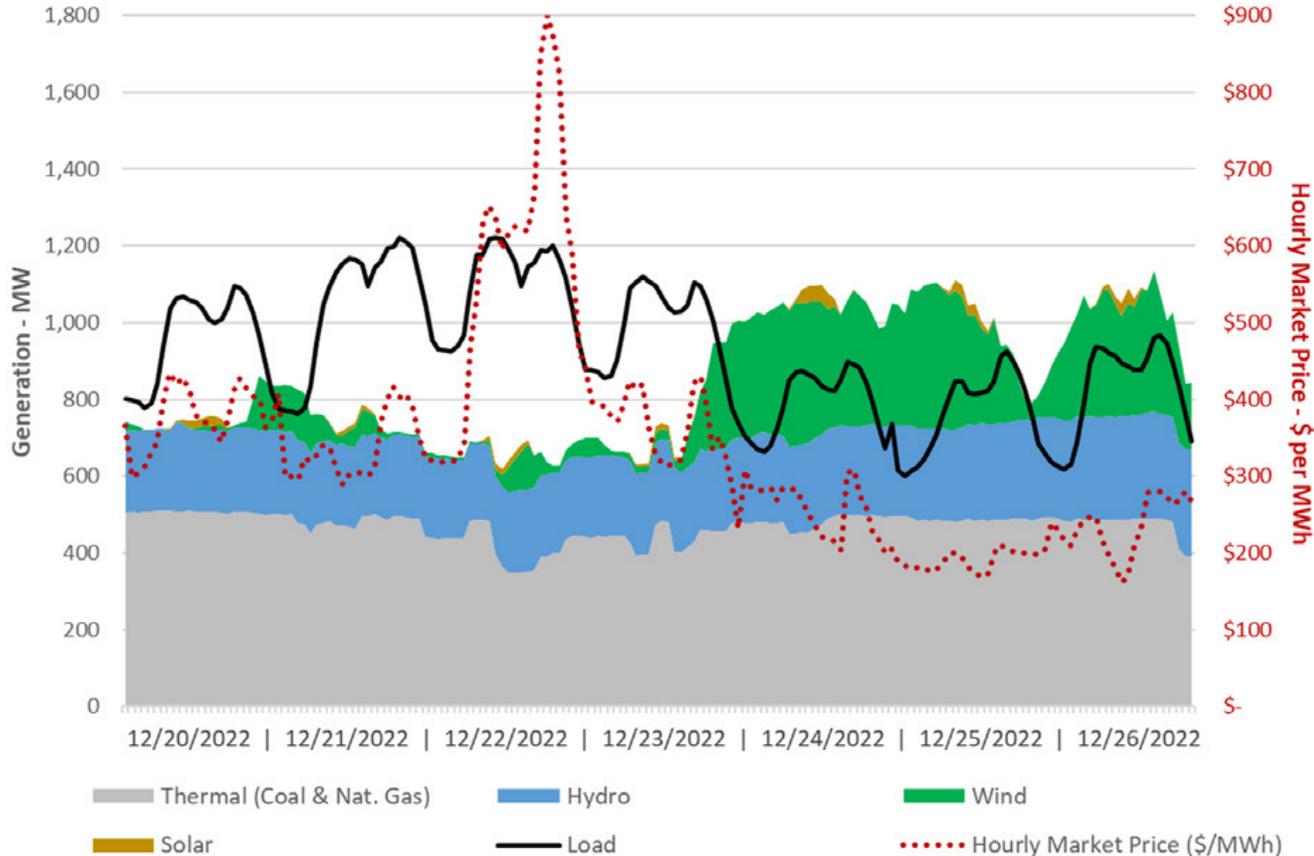


# About our company

## MONTANA 2022 ELECTRIC GENERATION PORTFOLIO BASED ON MWH OF OWNED AND LONG-TERM CONTRACTED RESOURCES

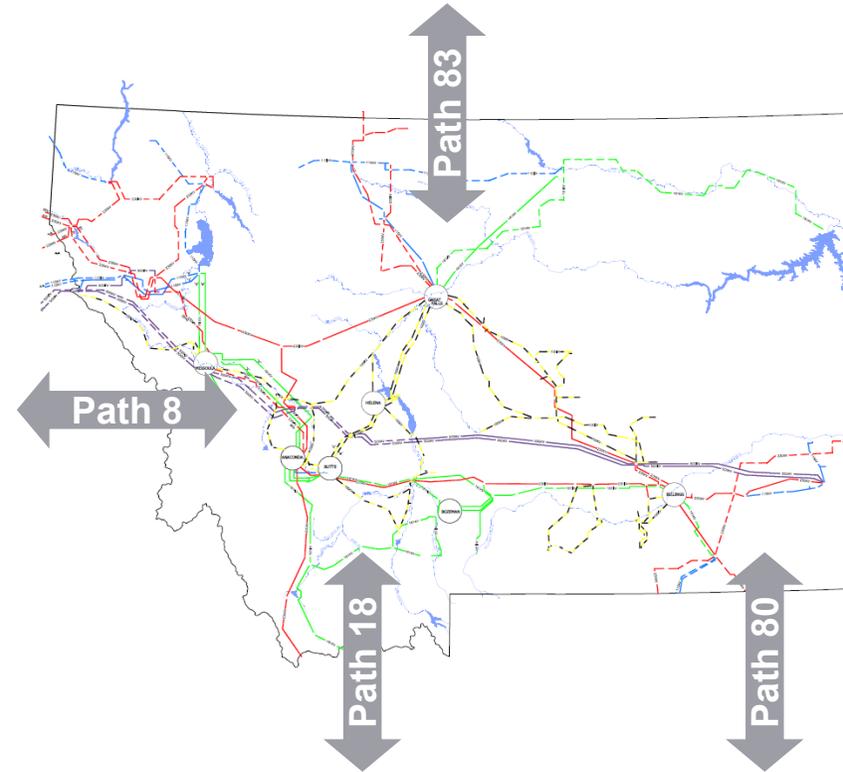


# December 2022 – Winter Storm Elliot

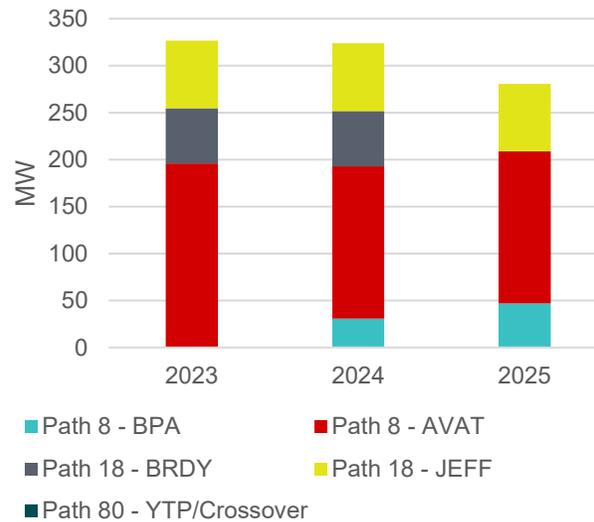


- [NorthWestern Energy Electric Generation](#)
- NorthWestern spent \$17.6M in market purchases to serve our load for December 20-26.
  - For reference, \$8.3M was spent for all of December 2021.
- Market purchases were made for 95 continuous hours from December 20-23.

# Transmission



Yearly Firm ATC for Imports as of 2/23/2023



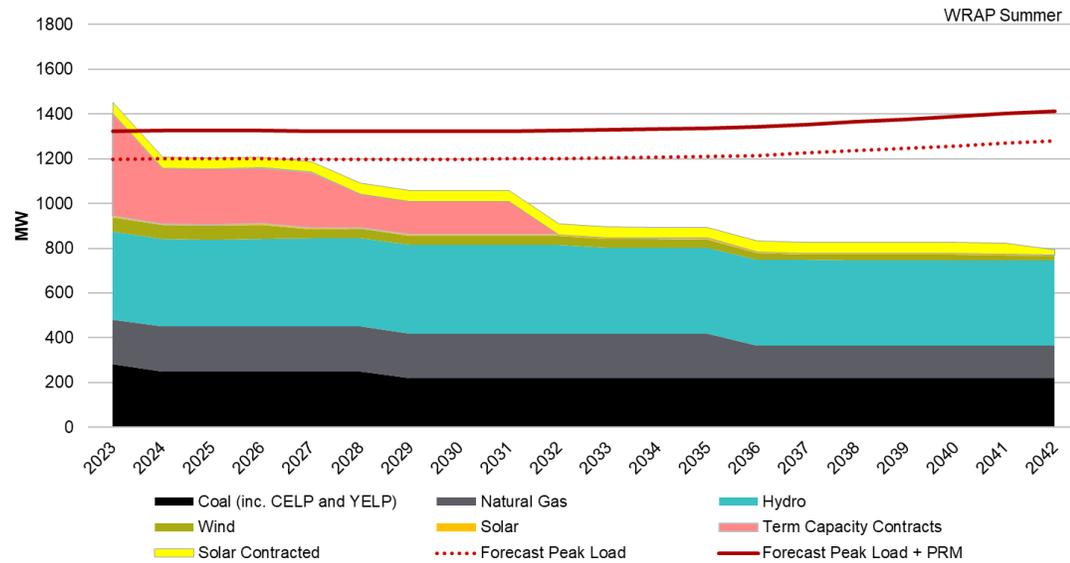
- Electric transmission consists of 500, 230, 161, 115, 100, 69, and 50 kV lines totaling ~6,900 miles.
- Four interconnected paths.
- NorthWestern’s retail load consists of ~2/3 of the BA load with the rest being made up of:
  - Electric supply choice customers
  - Electric cooperatives
  - Federal power marketing agencies.
- Latent capacity is diminishing.

2022 Peak Hours (Mountain Time)	Total BA Load	Total BA Imports	NWE Retail Load	NWE Market Purchases
Winter 2/23/22 HE08	1921	953 (49.6%)	1138	539 (47%)
Summer 8/1/22 HE17	1977	743 (37.6%)	1239	256 (21%)
Winter 12/22/22 HE19	2073	983 (47.4%)	1256*	688 (55%)*

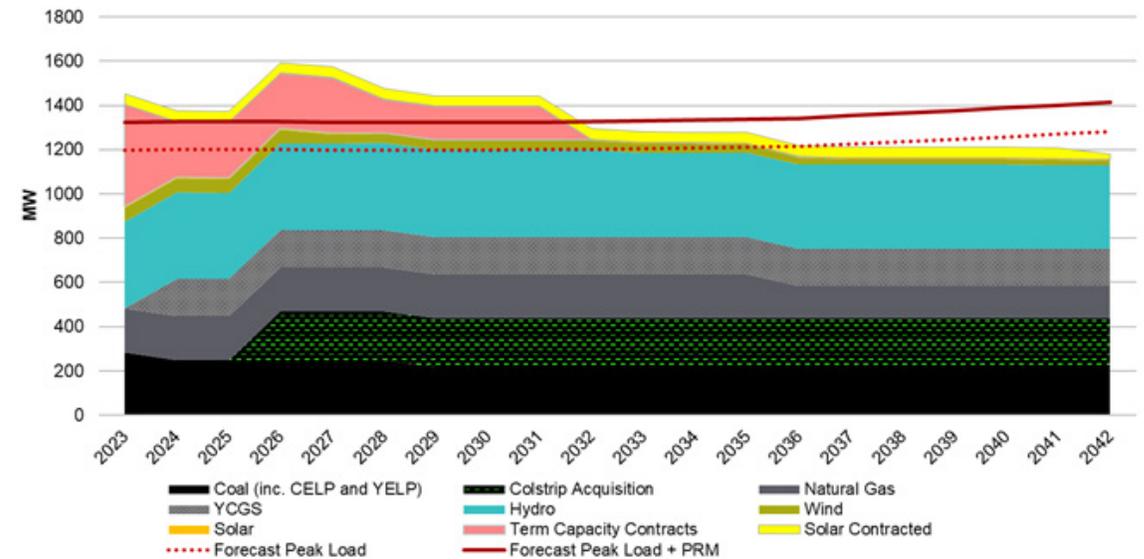
\*Retail load peaked HE20 at 1316 MW with 727 MW (55%) of market purchases.

# Supply Portfolio – Summer Capacity Position

## Today's Portfolio



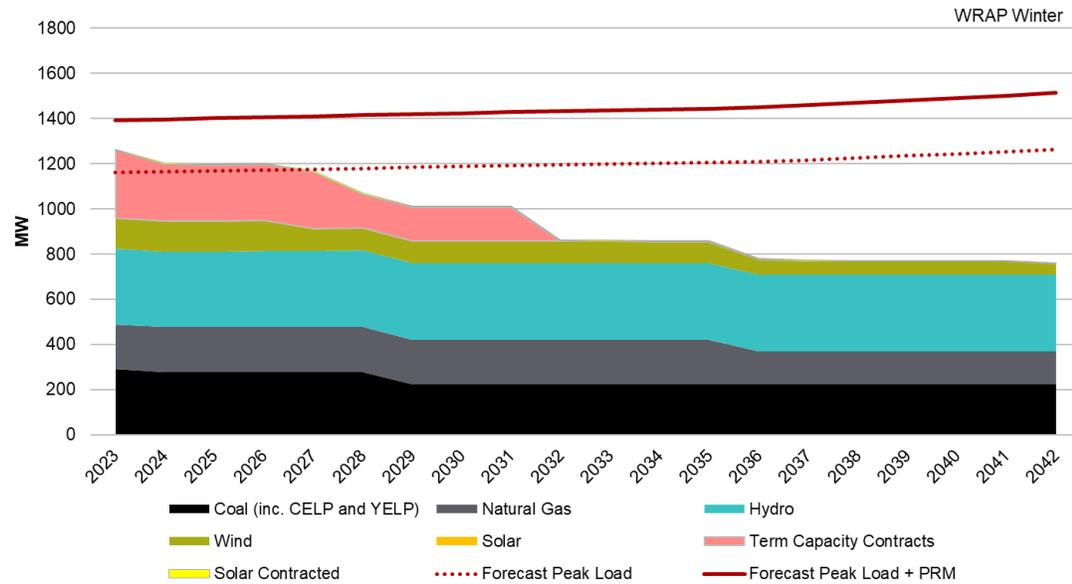
## (+) YCGS and Colstrip Acquisition



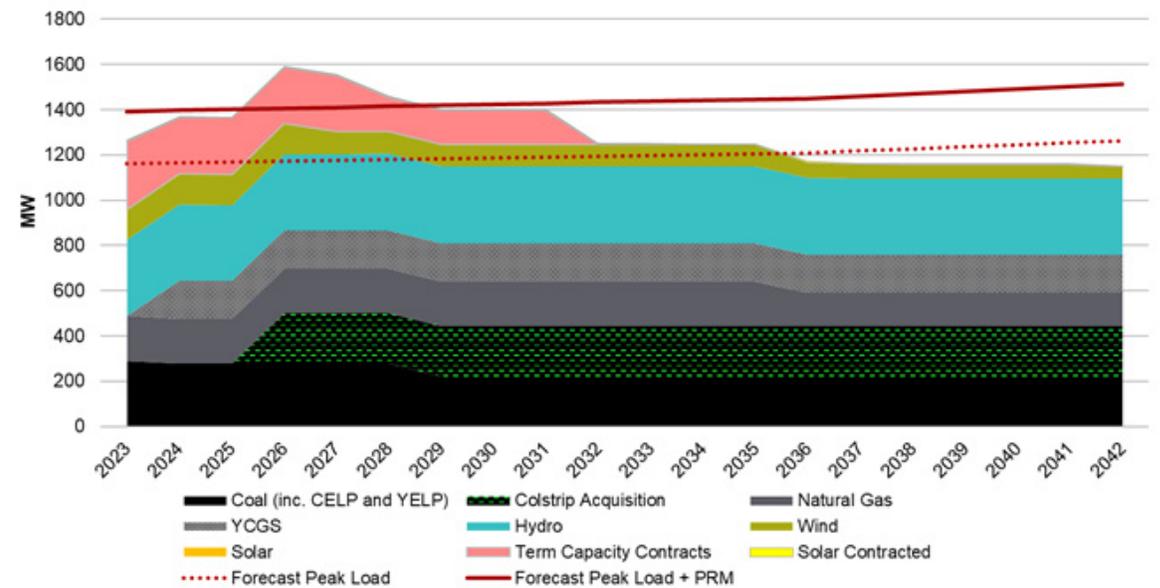
Resource adequate through 2031 with YCGS and the Colstrip acquisition.

# Supply Portfolio – Winter Capacity Position

## Today's Portfolio

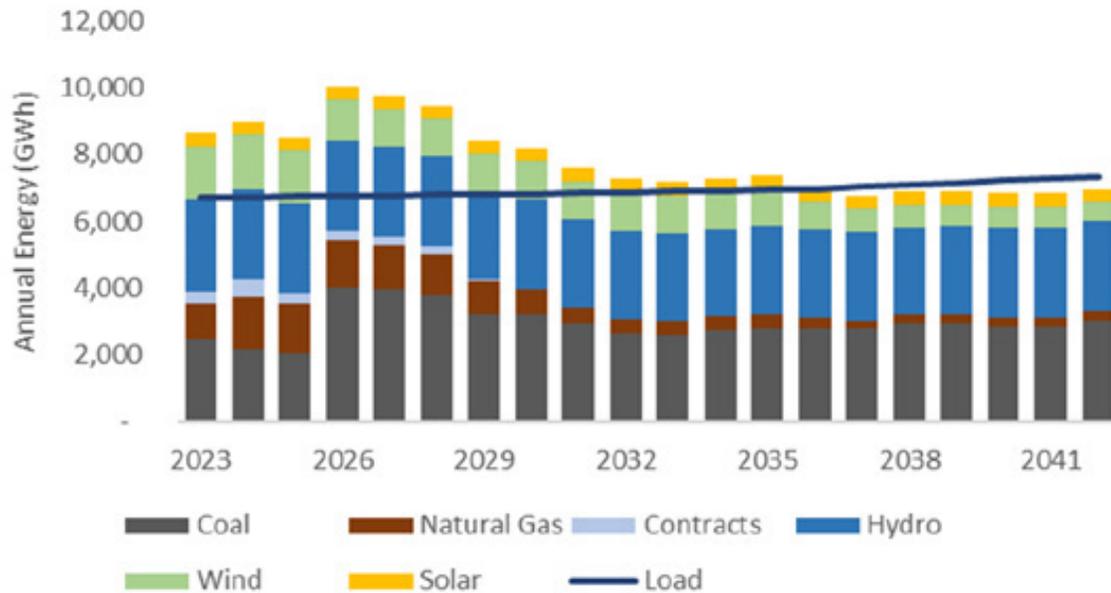


## (+) YCGS and Colstrip Acquisition



Resource adequate through 2028 with YCGS and the Colstrip acquisition.  
 New capacity contracts have been added to fill near term gap.

# Supply Portfolio – Energy Position

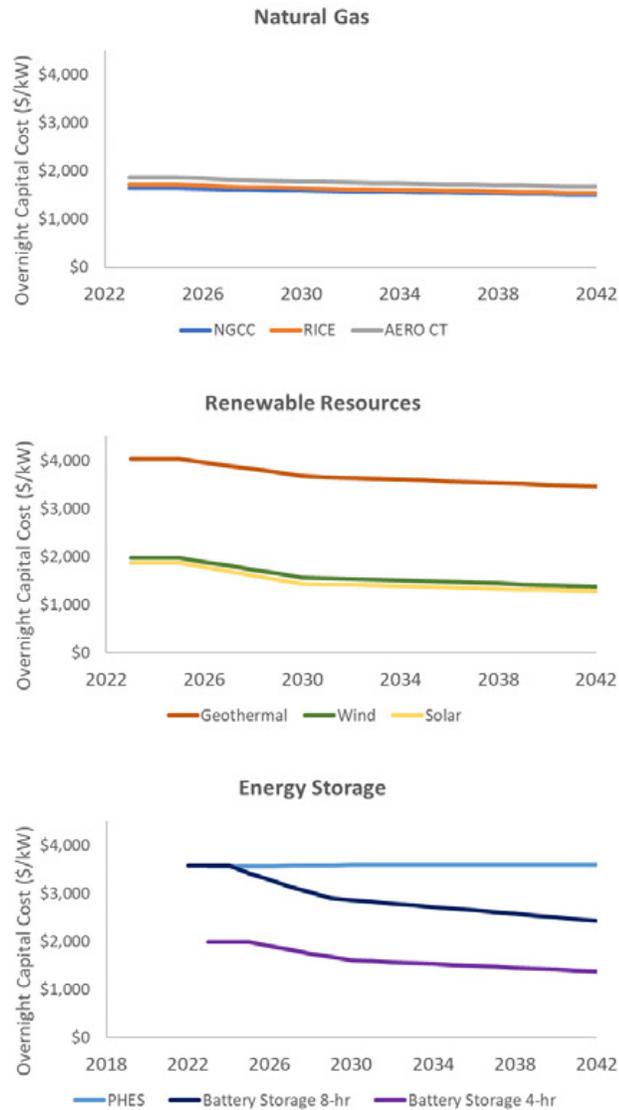


Including YCGS and Colstrip acquisition, NorthWestern's portfolio is energy long through 2035.

## Modeling for the Plan

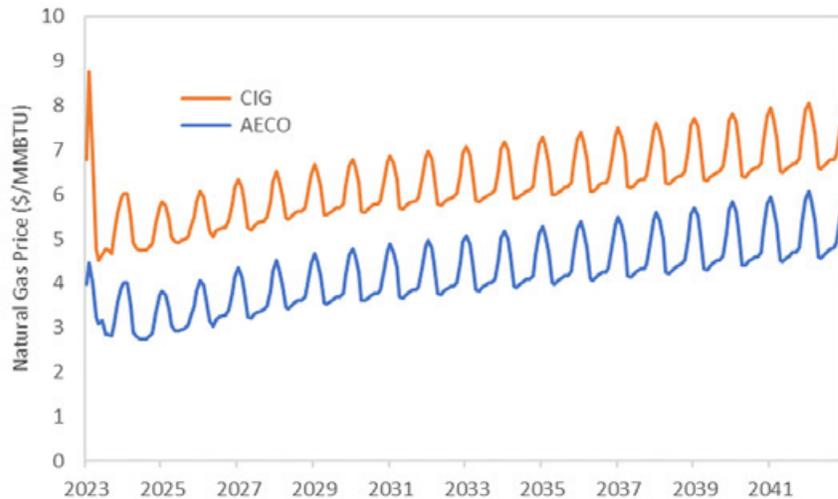
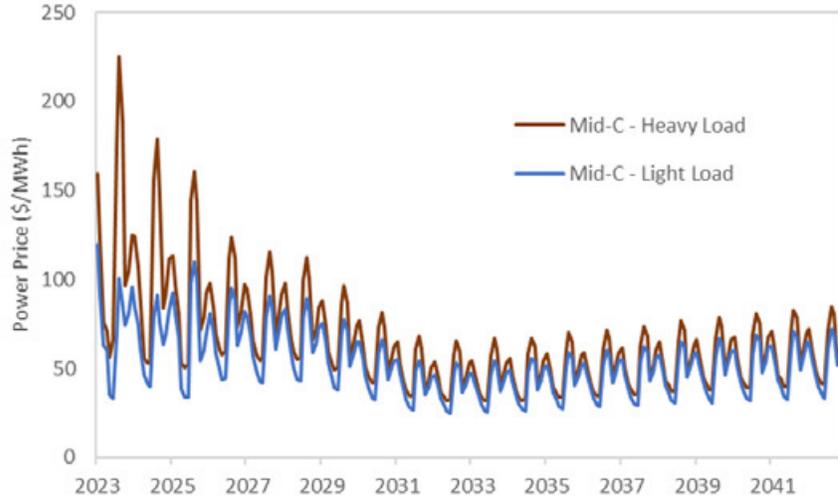
- NorthWestern uses Ascend Analytics' PowerSIMM™.
- Candidate resources were defined for capacity expansion modeling.
  - Characteristics include capacity, capital and fixed costs, unit construction limit, technical specs.
- Capacity requirements were set by the WRAP.
- Energy was constrained to no more than 150% of load.
- Fossil fuel resources were not allowed after 2035 consistent with NorthWestern's Net Zero by 2050 goal.
- Resources were not allowed to build before 2027.
- PowerSIMM™ applies stochastic models for load, weather, and prices.
- Scenario and sensitivity assumptions were defined.

# Model Inputs – Resource Costs



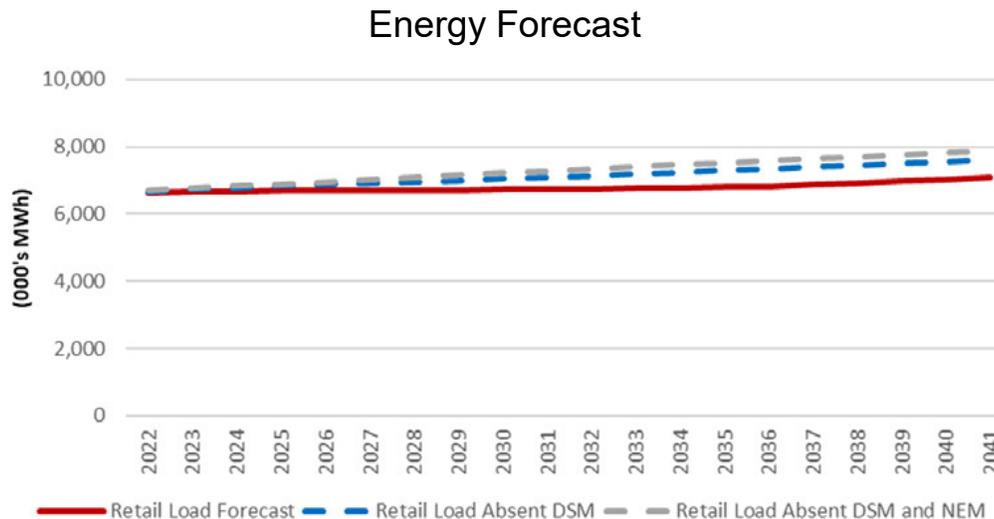
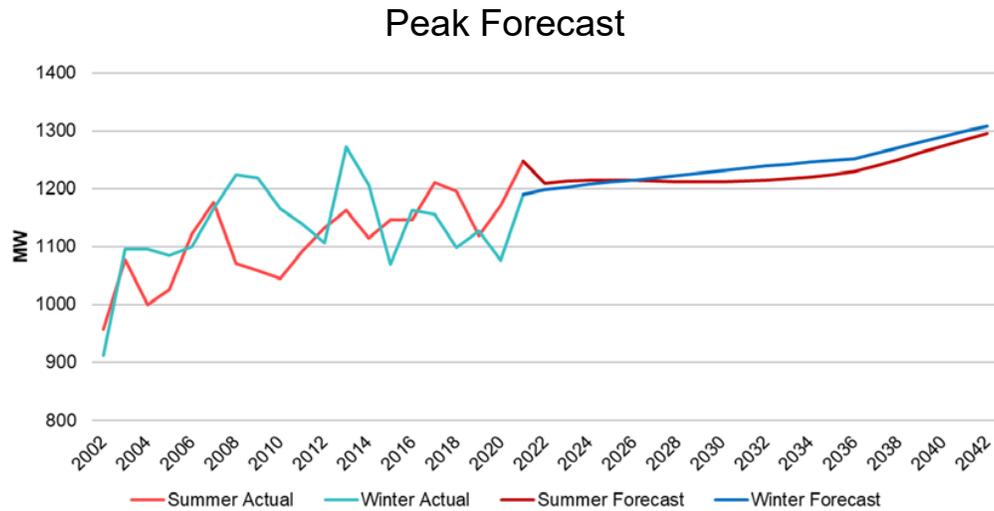
- Aion Energy developed cost estimates including capital and O&M for each candidate resource (excluding the SMR estimate).
- Estimates derived from RFPs, IRPs, and previous NorthWestern Plans.
- IRA tax credits were included.
- Estimates do not include “outside-the-fence” costs.
- Technology costs adjustments were based on NREL’s 2022 Annual Technology Baseline.

# Model Inputs – Commodity Forecasts



- Power price forecasts are derived from Mid-C futures, AECO gas forecast, EIA near-term supply outlook, and state and federal policies.
  - Mid-term prices decline with increased renewable growth, and long-term prices gradually rise with CA & WA carbon policies
- Gas forecasts are derived from gas futures and assumed to increase annually at 2%.
- AECO gas is used to supply Dave Gates, Basin Creek, and gas customers through storage, and CIG will supply YCGS.

# Modeling Inputs – Load Forecast



- Load forecast is class specific.
- Residential and small commercial making up 88% of our load serving obligation.
- Forecast is based on regression with inputs of number of customers, energy, total degrees days.
- Transmission line losses are included.
- The load forecast is net of DSM and NEM expected growth rate is 0.3%.
- Historically, the peak occurs in both summer and winters.

# Modeling Scenarios & Sensitivity Analysis

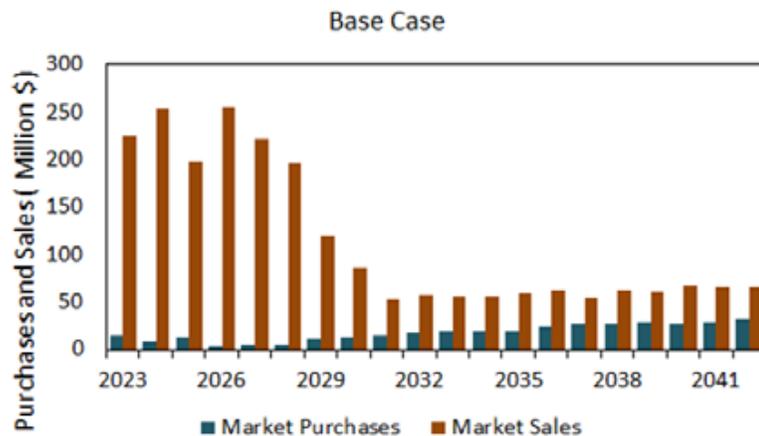
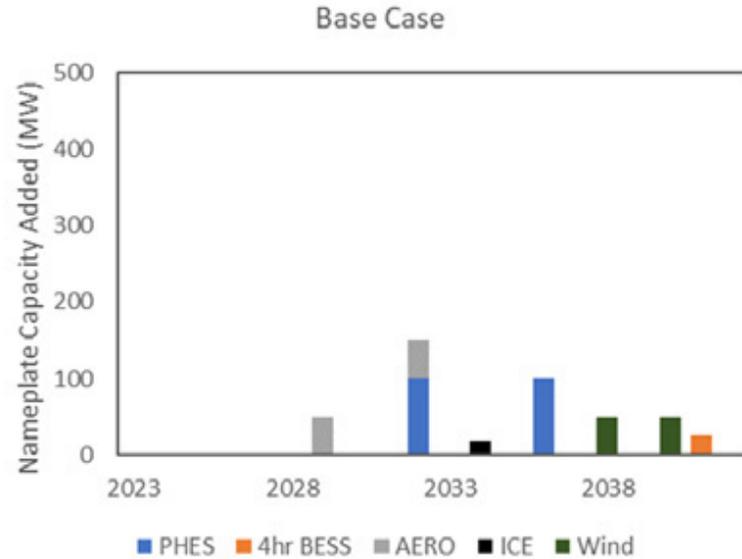
## Core Scenarios

1. **Base Case** – NorthWestern’s current portfolio including the Colstrip 222 MW acquisition beginning Jan 1, 2026.
2. **Colstrip Retirement in 2030** – Colstrip 222 MW acquisition occurs in 2026 and then Colstrip retires in 2030.
3. **Colstrip Retirement in 2035** – Colstrip 222 MW acquisition occurs in 2026 and then Colstrip retires in 2035.
4. **Colstrip Retirement in 2035 with SMR replacement** – Colstrip 222 MW acquisition occurs in 2026 and then Colstrip retires in 2035. A 320 MW SMR replaces Colstrip.
5. **Colstrip Retirement in 2025 with renewable replacements** – Colstrip retires in 2025. The model can only select wind, solar, and energy storage for future procurements. The scenario was provided by the Joint Environmental Group in comments for ETAC.

## Sensitivity studies applied to Core Scenarios

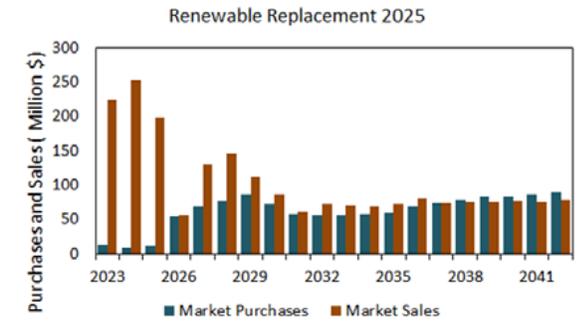
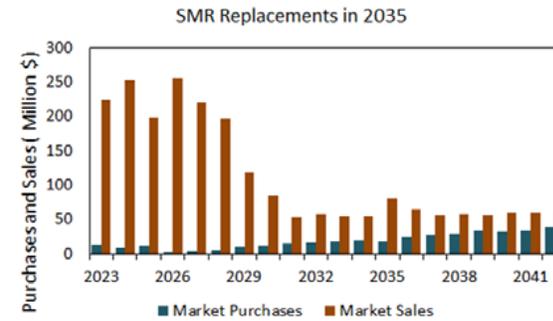
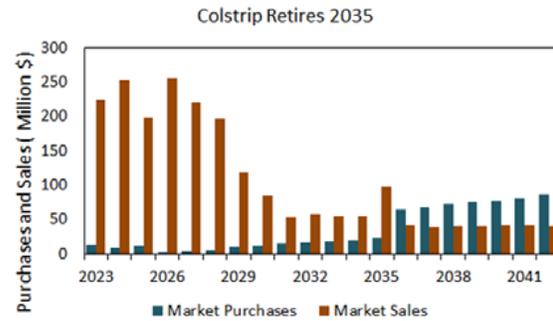
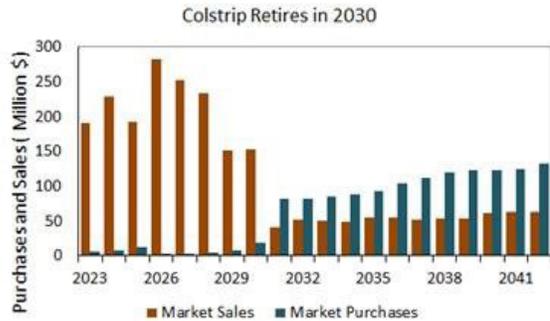
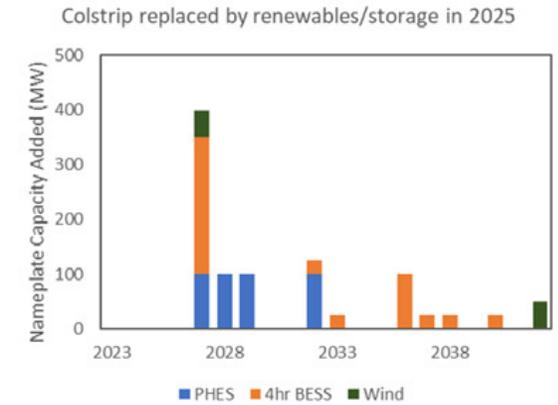
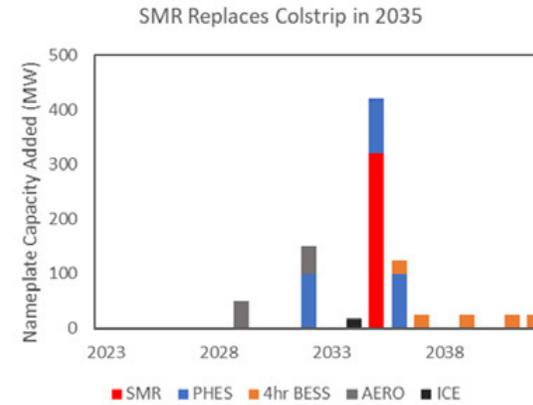
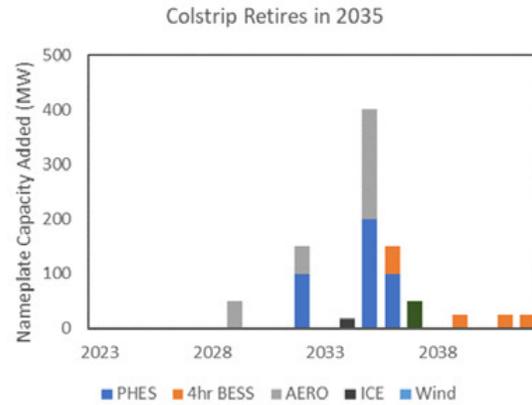
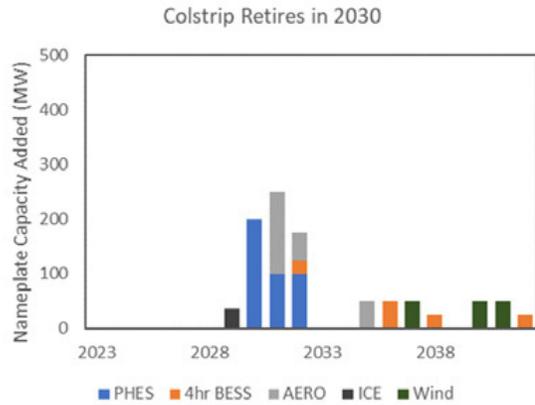
- High load, high gas prices, high gas and power prices, carbon cost.

# Results – Base Case



- Model favors energy storage, pumped hydro and batteries, and flexible natural gas, combustion turbines and ICE.
- NorthWestern’s long energy position will decline in the late 2030s so wind is selected.
- Total nameplate capacity added 443 MW.
- Total market sales \$1.65B.

# Results – Other Core Scenarios



Total nameplate capacity added (MW):

961

893

863

975

Market sales (\$ billions) for 20 years:

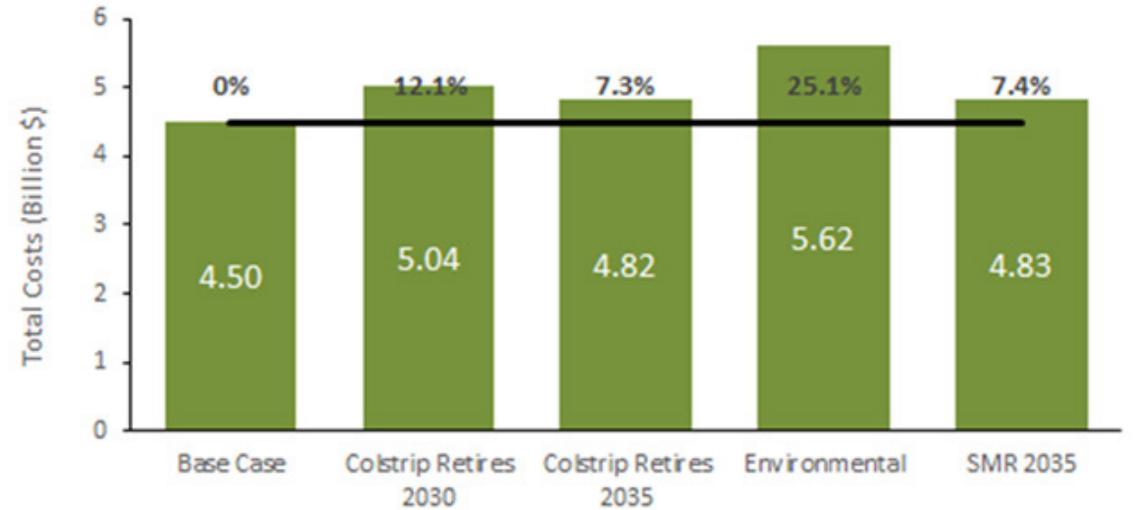
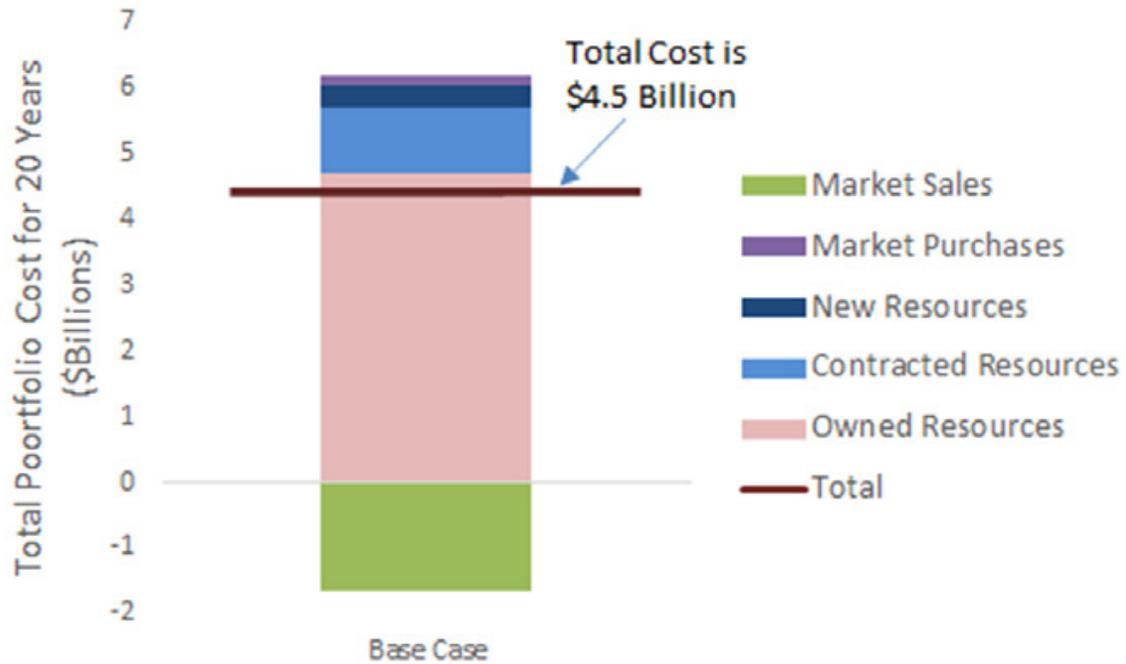
\$1.52

\$1.59

\$1.63

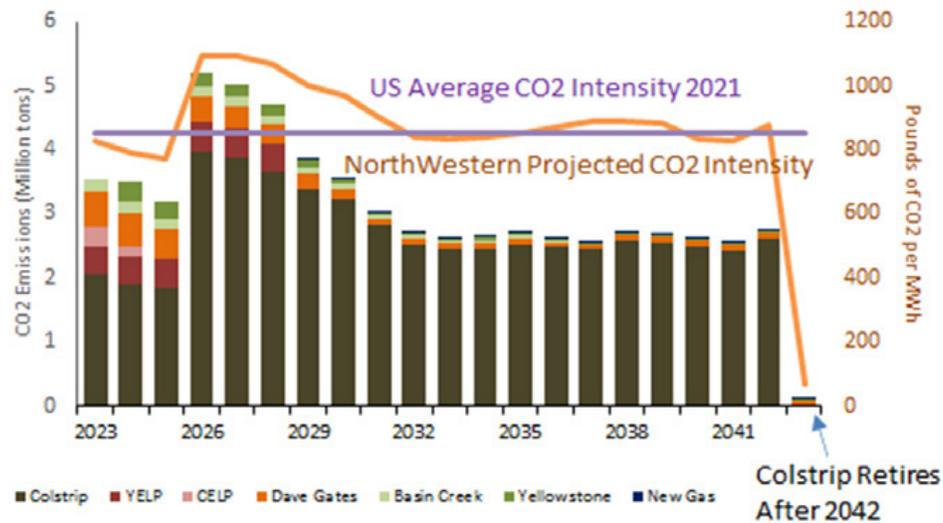
\$1.35

# Results – Costs



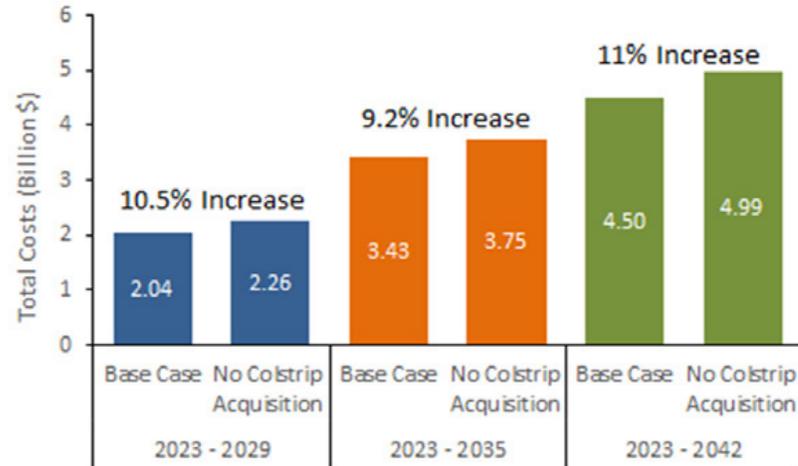
Early retirement of Colstrip increases the portfolio costs.

# Results – Carbon Emissions



- Carbon intensity of the portfolio is ~850 lbs/MWh.
- Colstrip is the largest emitter, but it is also the largest single resource.
- CELP and YELP are more carbon intense, but produce less energy/emissions than Colstrip as they are smaller.

# Additional Studies



- Base Case vs No Colstrip Acquisition.
- The current, undeveloped QF portfolio includes:
  - 194 MW of wind
  - 320 MW of wind plus storage
  - 563 MW of solar plus storage
- The Base Case was the least cost portfolio across scenarios and sensitivities.
- Read the Plan at [Montana IRP 2023](#).



# Questions?



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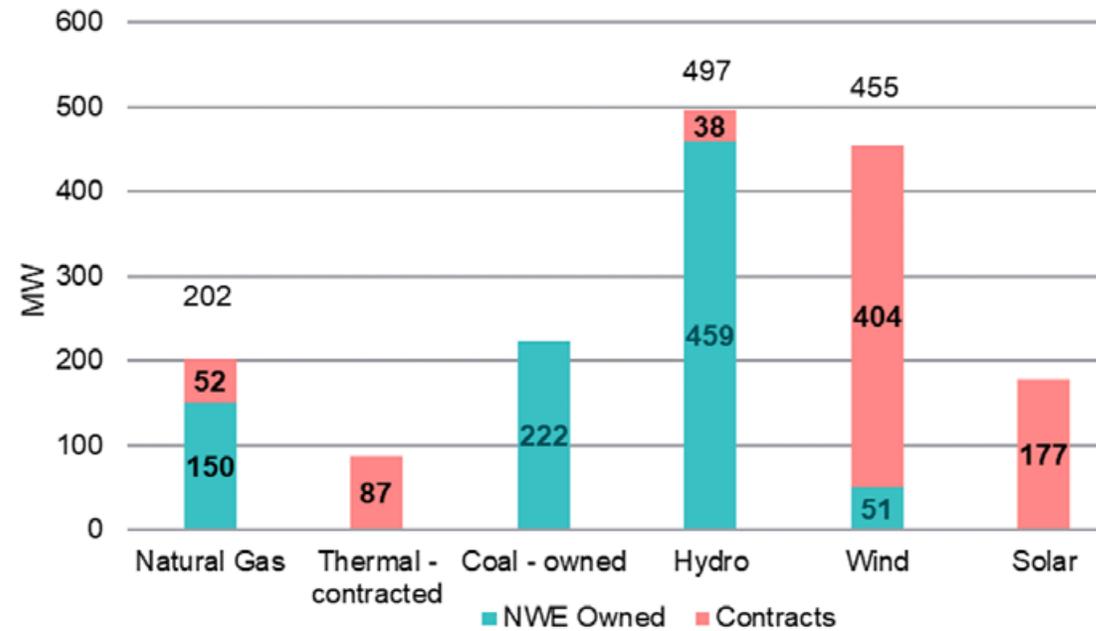
Steve Schmitt, Manager of Energy Supply Planning

[Steven.Schmitt@northwestern.com](mailto:Steven.Schmitt@northwestern.com)



# WRAP Accreditation & Nameplate Resources

ELCC Source	WRAP Calculations		NorthWestern Historical Values	
	Summer ELCC	Winter ELCC	Summer ELCC	Winter ELCC
Wind	13%	31%	13%	13%
Solar	30%	3%	30%	1%
Storage (4hr)	80%	80%	100%	100%



# Transmission Paths

