Pacific NorthWest Economic Region

The Pacific Northwest Economic Region Presents:

Overview of Our Regional Energy Infrastructure & Policy Landscape

Tuesday, August 16th | 9:30am-10:30am

Photo Courtesy of Montana Office of Tourism & Business Development

THANK YOU TO OUR SESSION SPONSOR

Moderated by:

Dan Kirschner
Executive Director Northwest Gas Association

Mike Cashell
VP of Transmission
NorthWestern Energy

Frank Afranji
President
Northwest Power Pool

Photo Courtesy of Montana Office of Tourism & Business Development

Moderated by:

Rep. Derek Skees
Montana State Legislature

Hon. Bruce Ralston
Minister of Energy, Mines, & Low Carbon Innovation
Government of BC

Rep. Joe Fitzgibbon
Washington State Legislature

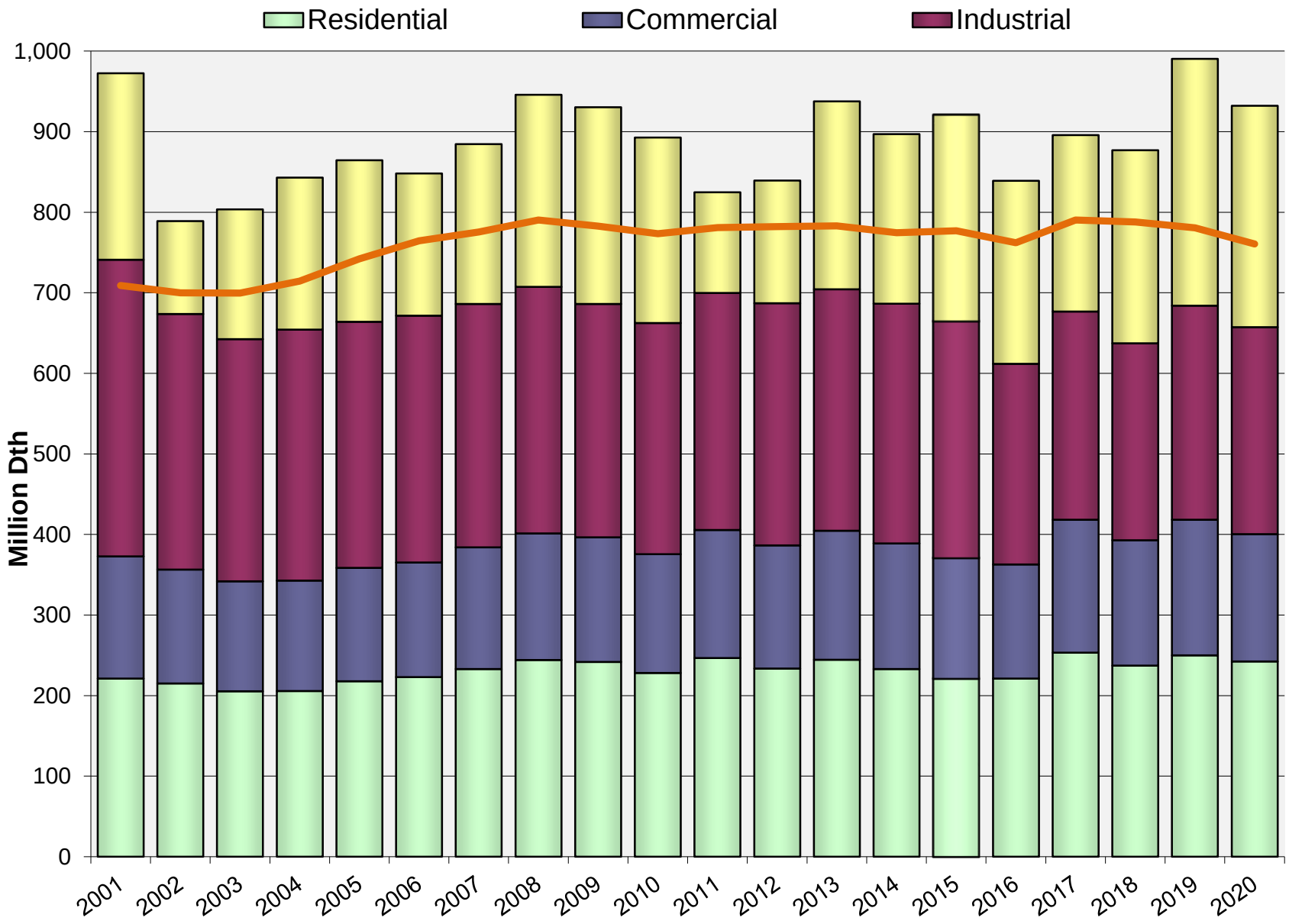
Sen. Lew Frederick
Oregon State Legislature

Photo Courtesy of Montana Office of Tourism & Business Development

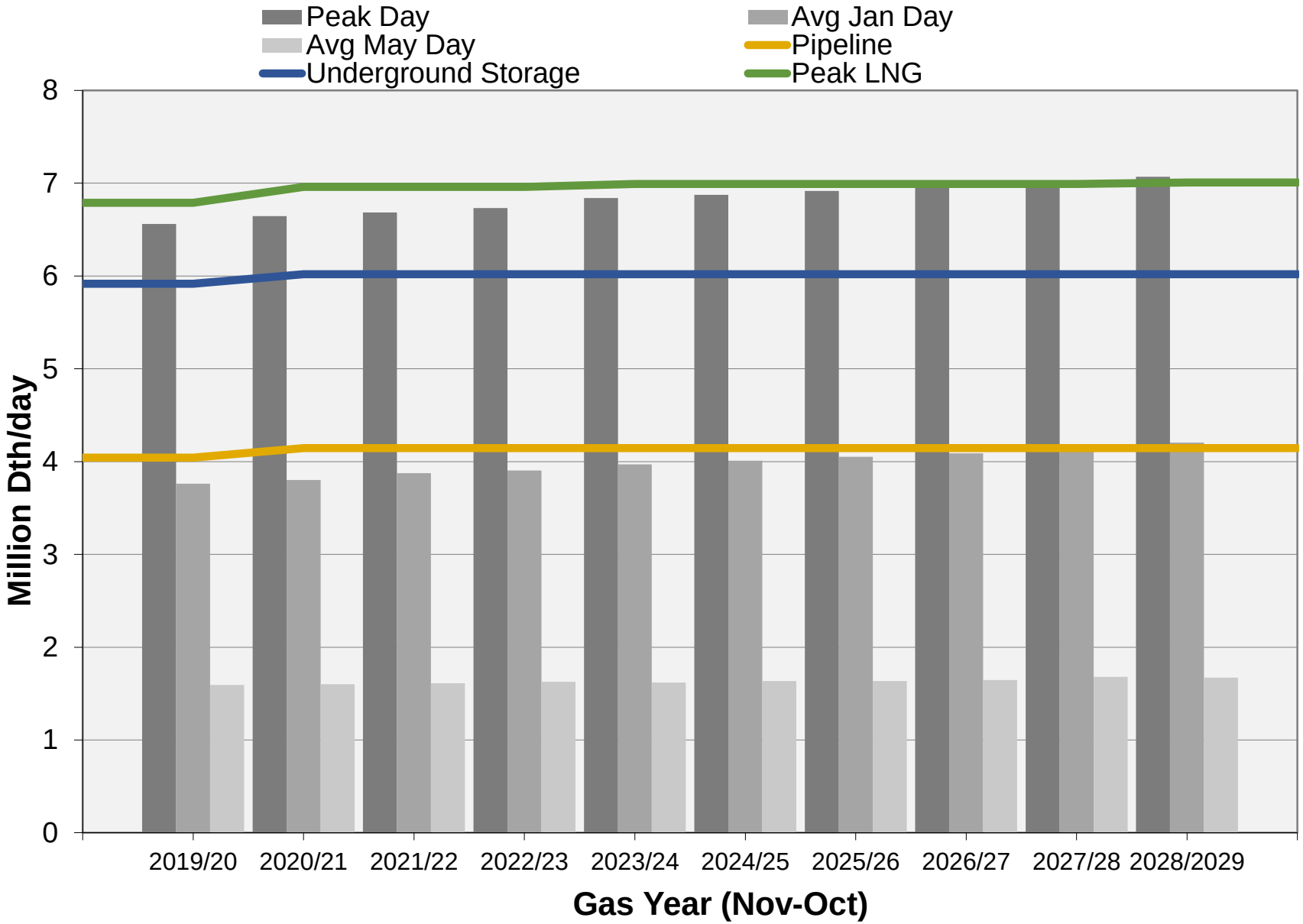
Natural Gas By the Numbers

State/Province	Households / Businesses	Pipeline (miles / km)
British Columbia	955,626 / 98,476	35,000 / 58,500
Idaho	433,237 / 44,420	17,500 / 29,000
Montana	279,987 / 38,099	16,250 / 27,000
Oregon	783,100 / 85,081	30,000 / 50,000
Washington	1,234,324 / 109,451	45,000 / 75,000
TOTAL	**3,686,274 / 375,527**	**143,750 / 239,500**

Recent Gas Demand



System Supply Demand Balance



Peak Energy

- January 5, 2017, 7am-8am:
  - ~30 GWh delivered via electric system
    - = 1,000,000 therms
  - ~1,800,000 therms delivered via gas system
    - = 53 GWh

8 x

2021 NWPP overview Resources & Transmission

Tuesday, August 17, 2021, at the PNWER Annual Summit during our Energy session

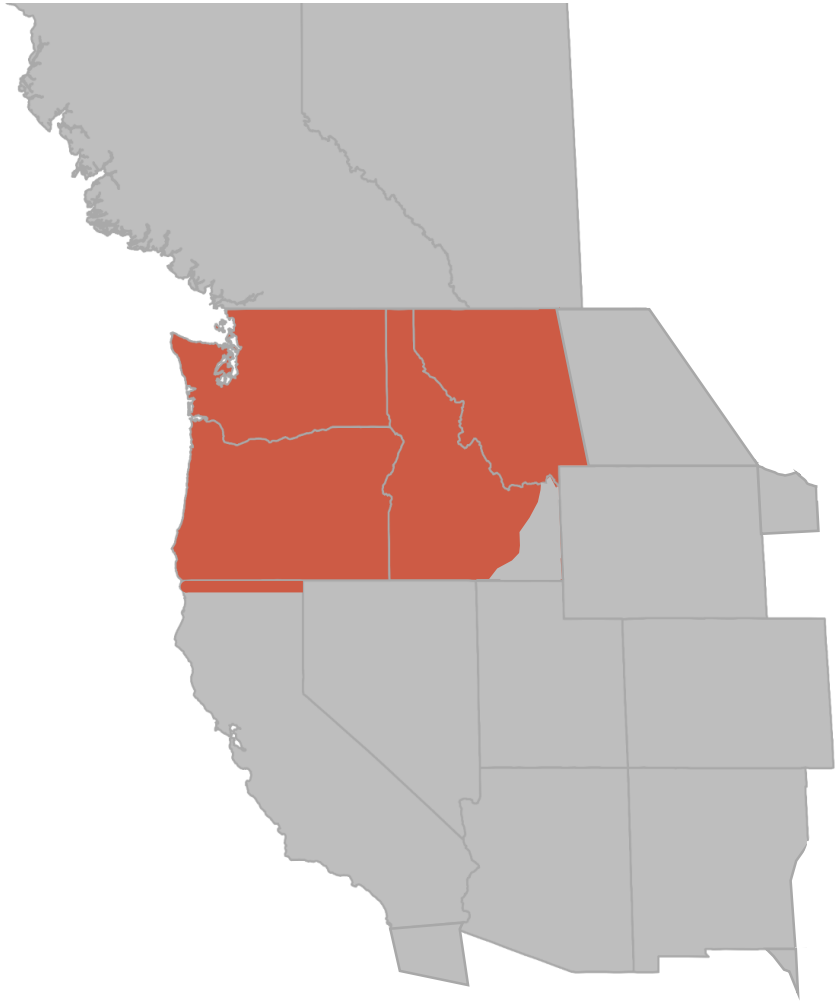
Frank Afranji

NWPP, President

Aug 2021

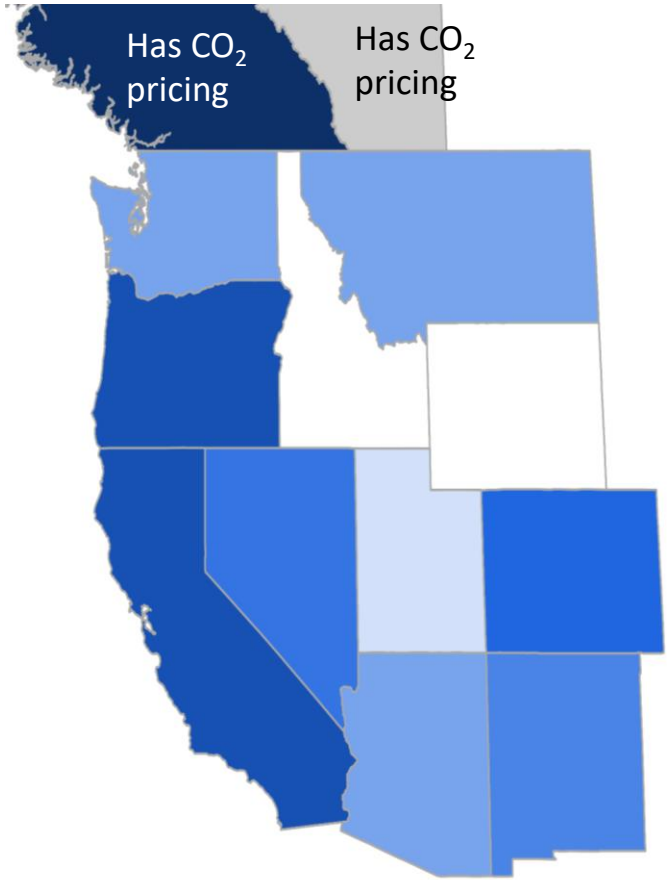
2021 Northwest Regional Forecast

- Aggregates utility data in Power Act footprint
  - Over 100 utilities
- Requirements
  - 1-in-2 loads after energy efficiency, firm exports, a 16% planning margin for peak
- Resources
  - Expected generation from utility owned/contracted resources, long-term imports, hydro under critical water conditions (8% for peak), no short-term market transactions
- A power system barometer
  - Does not provide an exact need for power



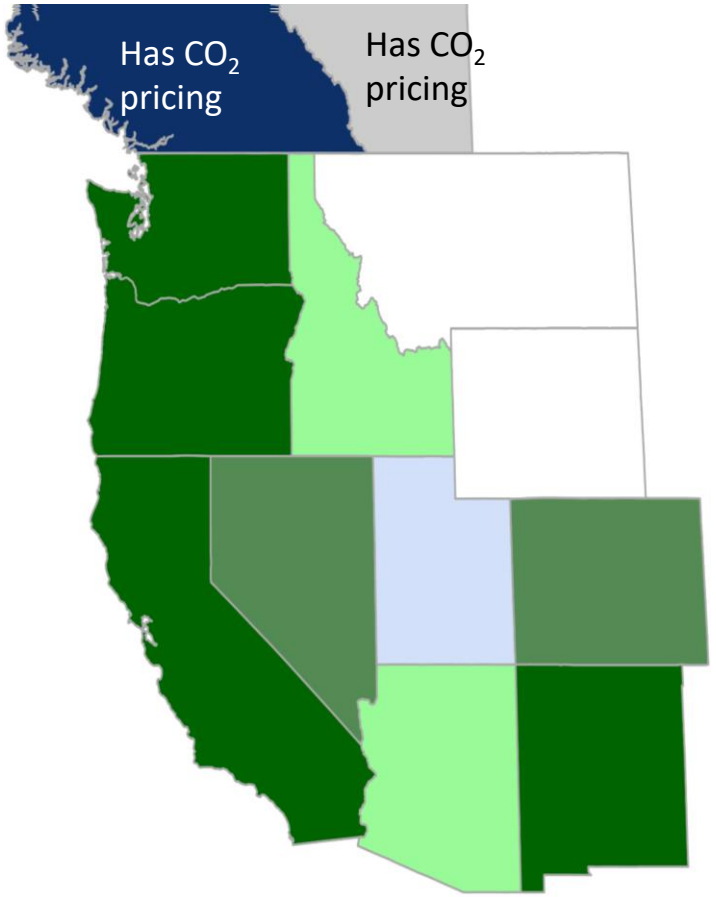
Major shifts in western carbon policies

2017

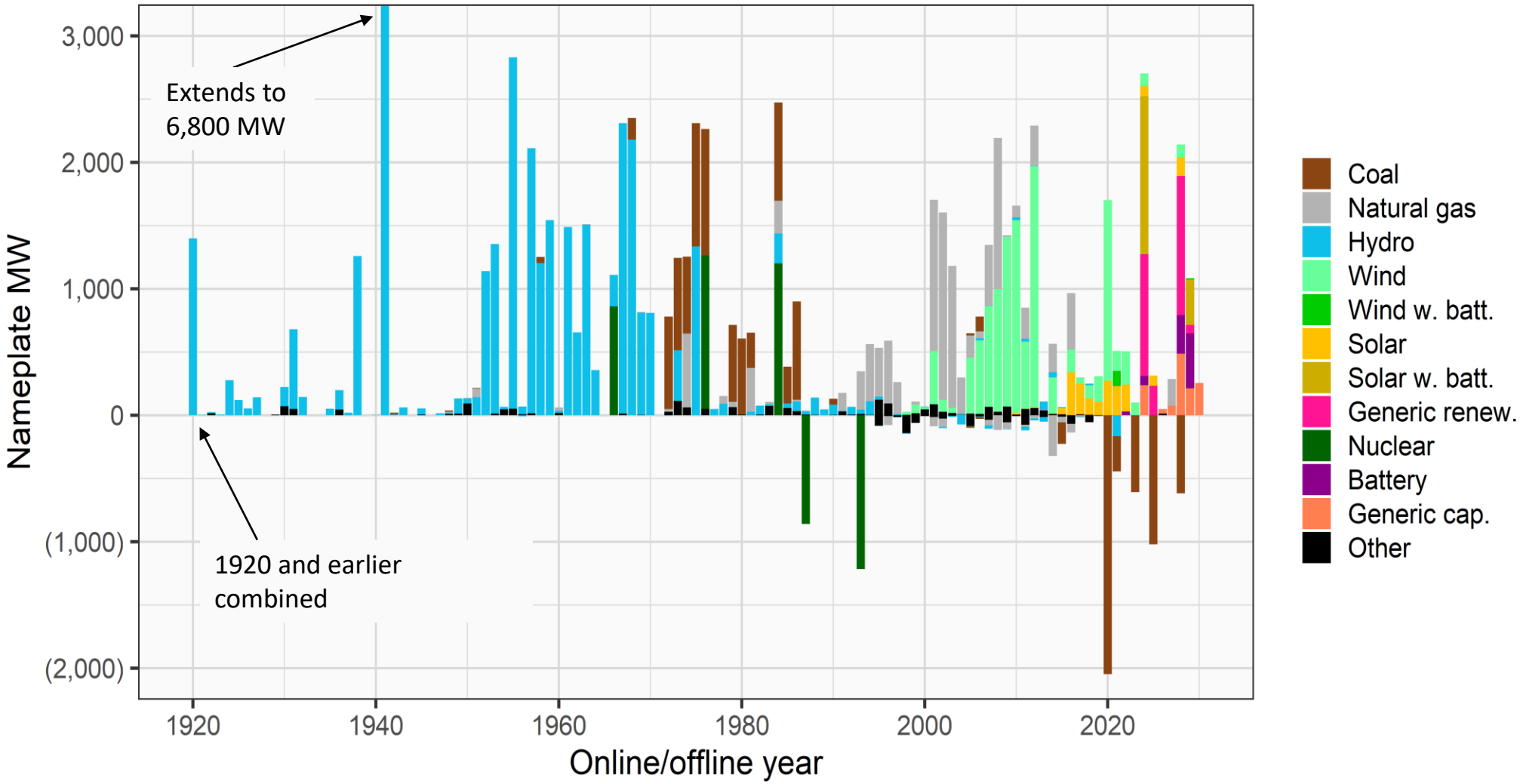


CO_2 free by 2040/2045 via state policy; also has RPS
Nearly CO_2 free by 2045/2050 via state goals; also has RPS
Nearly CO_2 free by 2045/2050 via utility/city goals
RPS only (darker equates to higher standard; BC (93%) includes hydro
Mandated coal retirements by 2030
No policy

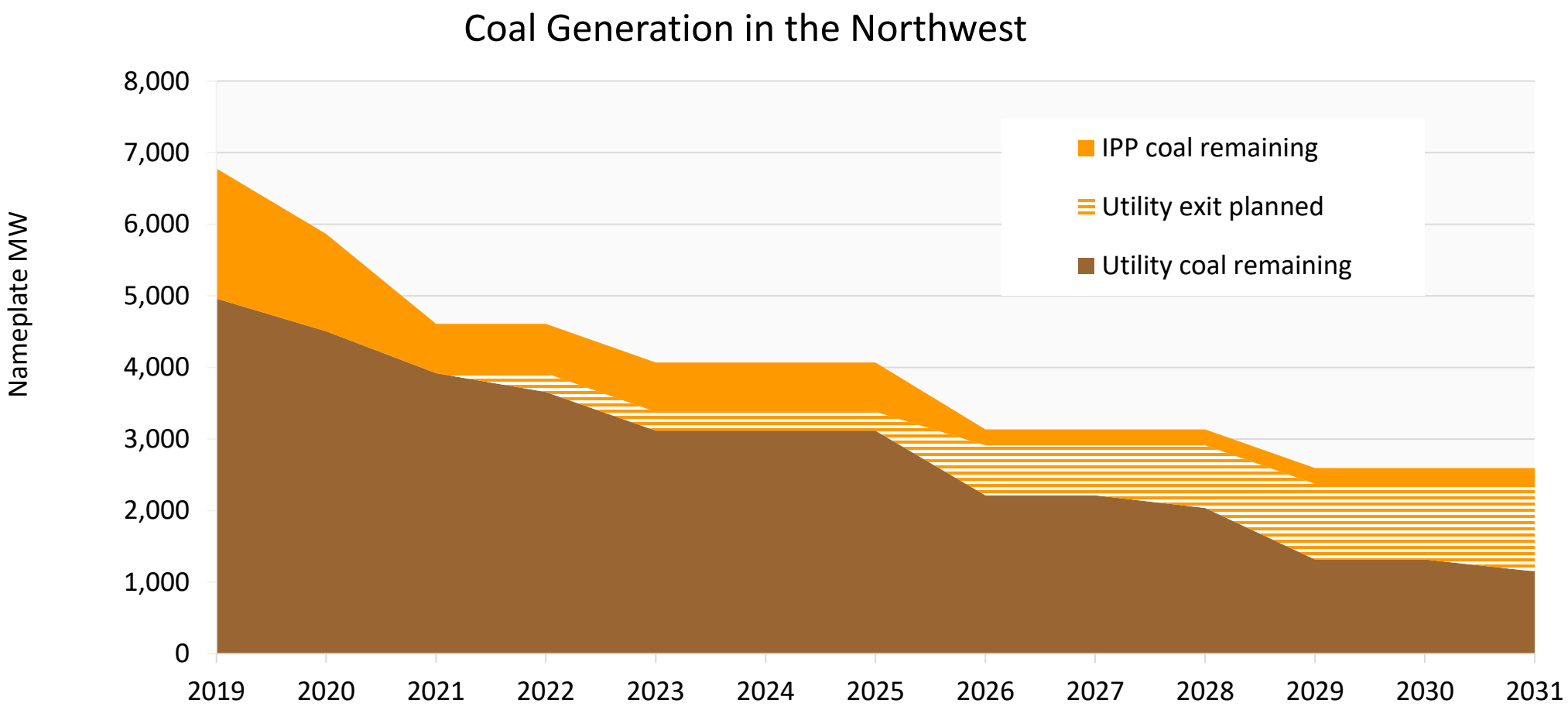
Summer 2021



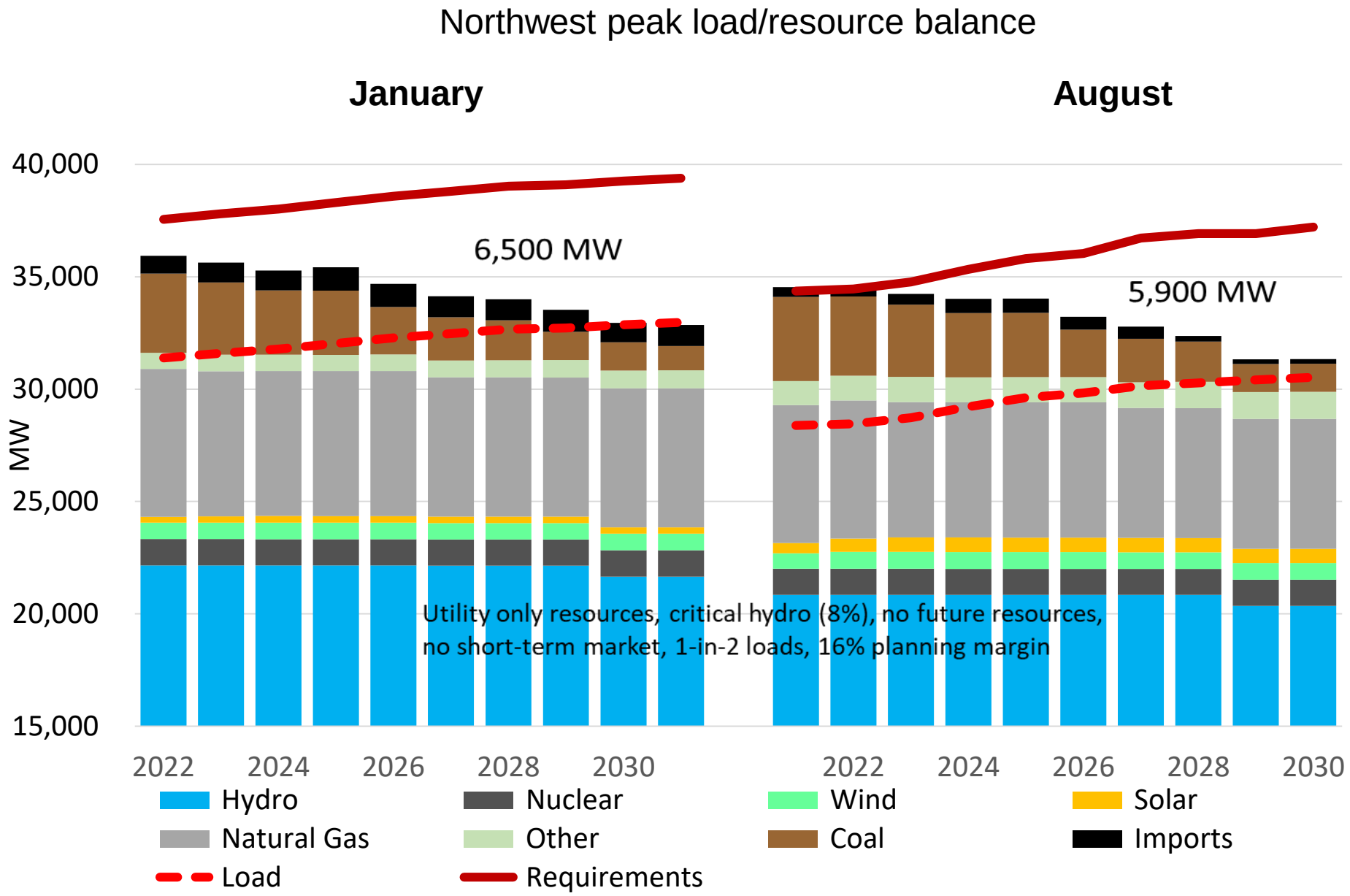
Historical NW resource development



Utilities exiting Northwest coal units



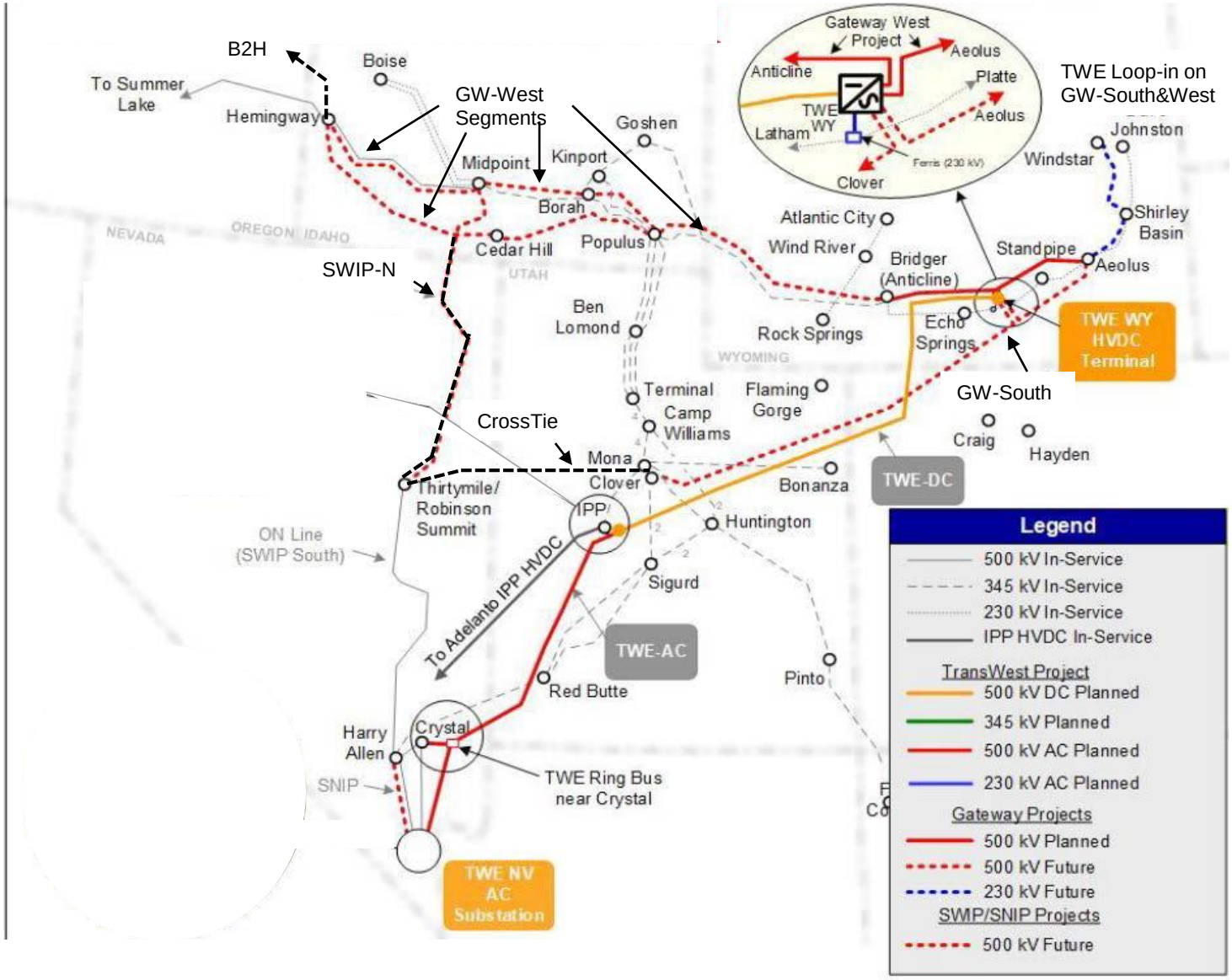
A barometer for need



NWPP Bulk Transmission

- Members 500 kV OR-WA-ID-WY-UT
  - Miles **>2,000**
  - Segments: B2H, Hem-Midpoint-Populas-Aeolus-Clover
    - Hermiston,OR – Boise,ID – Casper,WY – Salt Lake City,UT
- Members <500 kV
  - Miles **~200**
  - Segments Cascade Renewable (400 kV HVDC)
    - The Dallas,OR – W. Portland, OR
- ITP Projects under review
  - SWIP-N (AC) **~275** miles 500 kV
  - TWE (AC/DC) **~400** miles 500kV HVDC, **~320** Miles 500kV
  - Cross-Tie (AC) **~210** miles 500 kV

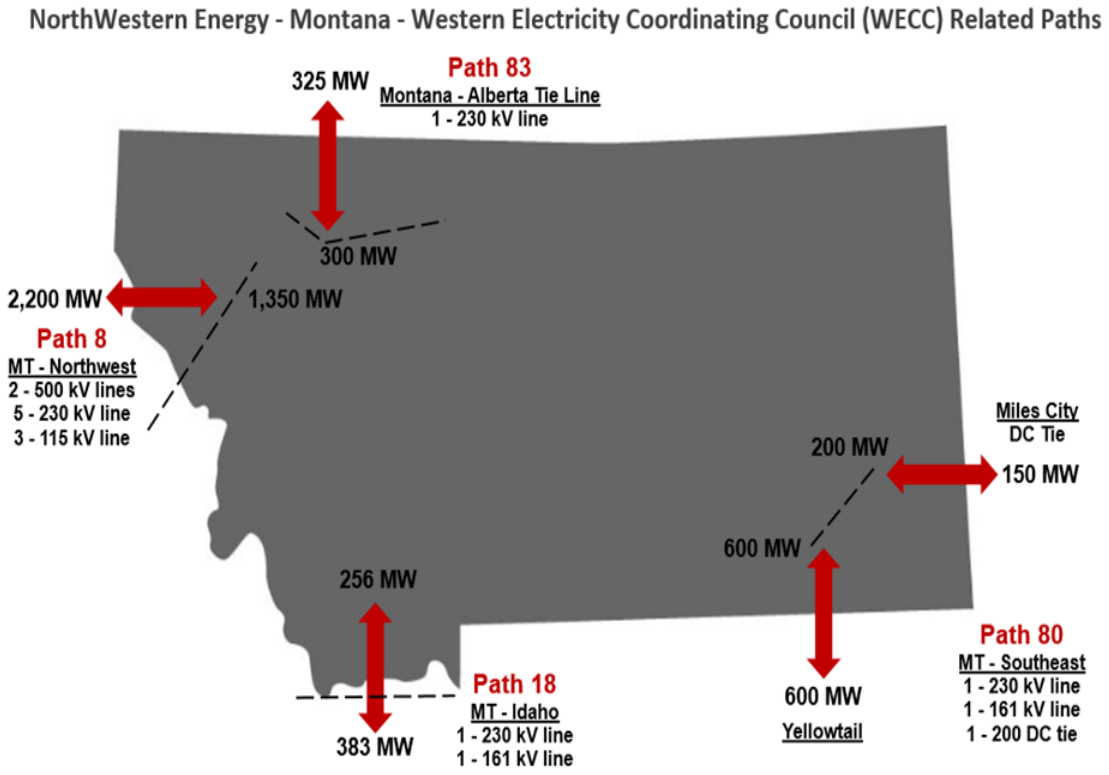
TransWest Express / SWIP-N / CrossTie / GW-W / GW-S



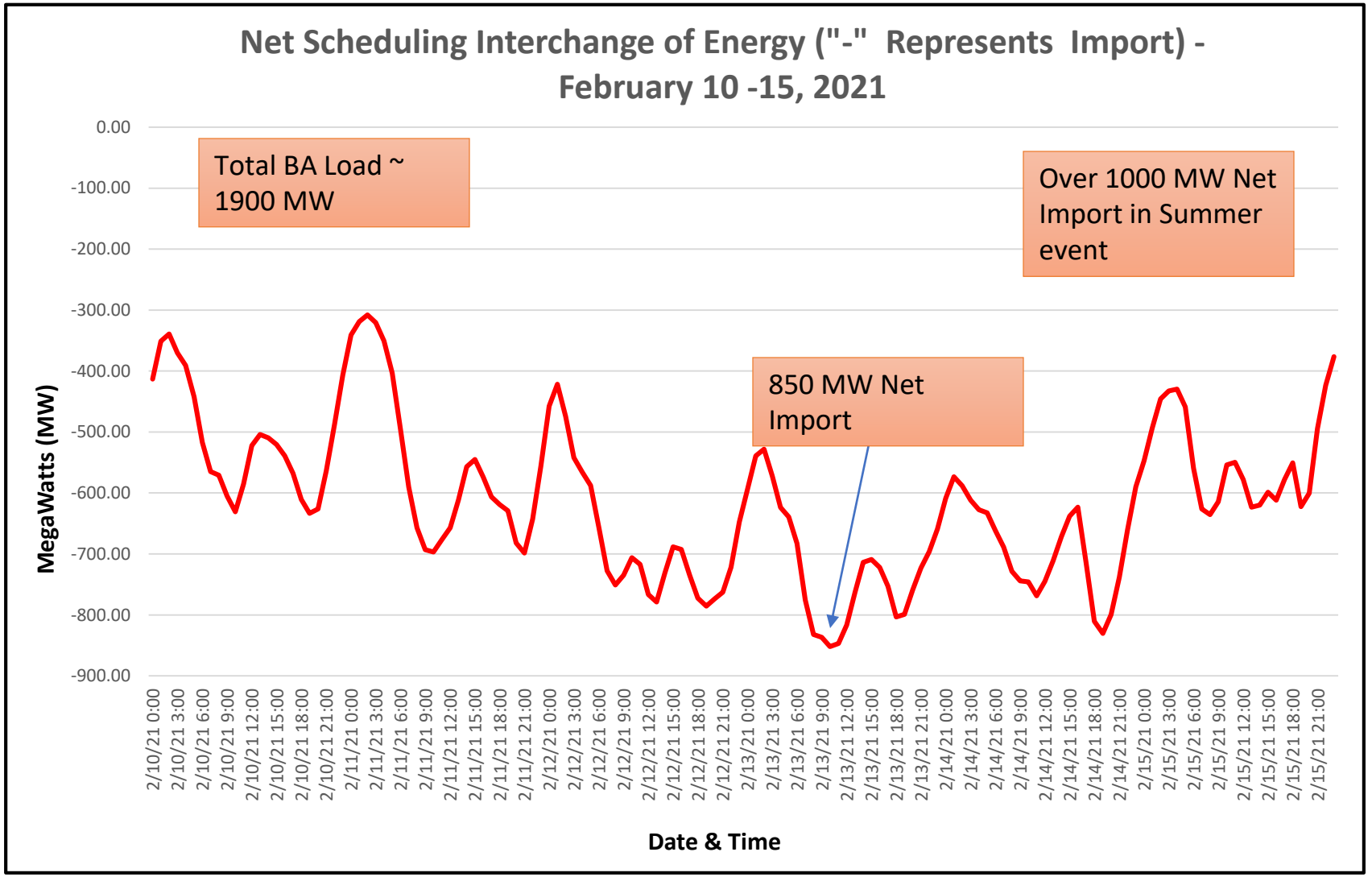
- NorthWestern plans for extreme weather events;
- Events are becoming more extreme
- Market unreliability at crisis level
  - Leads to incredible price volatility
  - Transmission constraints limit ability to import supply
  - Supply upgrades and capacity resources take years to accomplish; Requires urgent action
- Regional Resource Adequacy plays critical role in Montana challenges during weather events

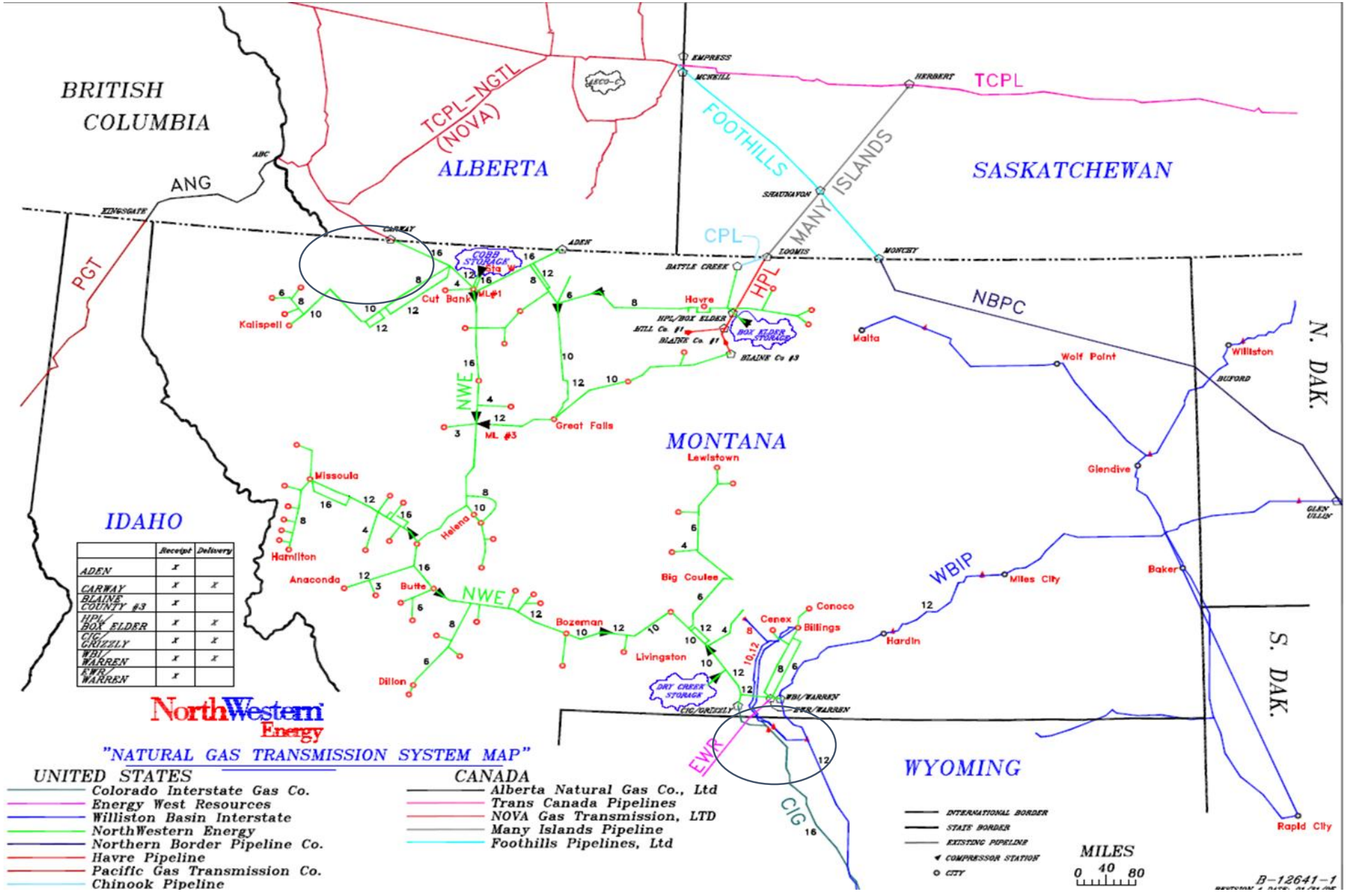
- The NorthWestern system is generation resource deficient.
  - Flexible generation not only needed for energy and capacity, but is also critical for support of the transmission system and for the provision of ancillary services
- The system is transmission constrained.
  - Generation and transmission system were developed together
  - Loss of generation in balancing authority is a significant concern and causing high imports from market
  - Transmission to import energy is constrained on peak hours when supply need is greatest
  - There is competition for transmission capacity
- Current situation has been described for several years
- The region is also constrained and recognizes a Resource Adequacy issue

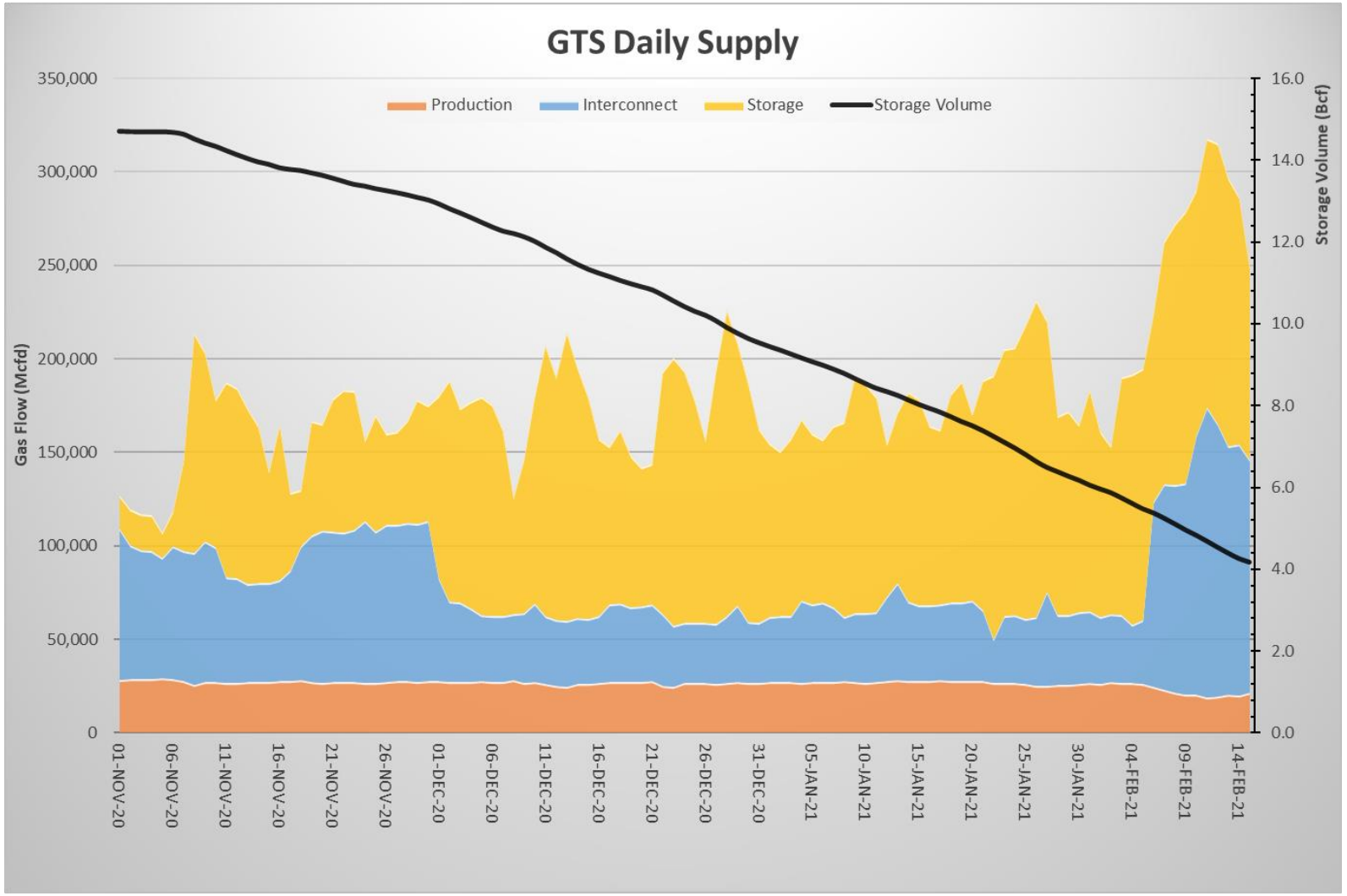
Yearly Firm ATC by Year (as of 02/17/2021)		
Path 8	*BPA Import*	**Yearly Firm ATC**
	2021	**0**
	2022	**0**
	2023	**0**
	2024	**32**
	AVAT Import	
	2021	**34**
	2022	**105**
	2023	**125**
	2024	**194**
Path 18	*BRDY Import*	
	2021	**0**
	2022	**59**
	2023	**59**
	2024	**59**
	JEFF Import	
	2021	**72**
	2022	**72**
	2023	**72**
	2024	**72**
Path 80	*YTP/Crossover Import*	
	2021	**462**
	2022	**493**
	2023	**495**
	2024	**495**



Very few trading partners on Path 80; Very unreliable and often gets cut


Net Scheduling Interchange of Energy ("-" Represents Import) - February 10 -15, 2021
Total BA Load ~ 1900 MW
Over 1000 MW Net Import in Summer event
850 MW Net Import
MegaWatts (MW)
0.00
-100.00
-200.00
-300.00
-400.00
-500.00
-600.00
-700.00
-800.00
-900.00
2/10/21 0:00
2/10/21 3:00
2/10/21 6:00
2/10/21 9:00
2/10/21 12:00
2/10/21 15:00
2/10/21 18:00
2/10/21 21:00
2/11/21 0:00
2/11/21 3:00
2/11/21 6:00
2/11/21 9:00
2/11/21 12:00
2/11/21 15:00
2/11/21 18:00
2/11/21 21:00
2/12/21 0:00
2/12/21 3:00
2/12/21 6:00
2/12/21 9:00
2/12/21 12:00
2/12/21 15:00
2/12/21 18:00
2/12/21 21:00
2/13/21 0:00
2/13/21 3:00
2/13/21 6:00
2/13/21 9:00
2/13/21 12:00
2/13/21 15:00
2/13/21 18:00
2/13/21 21:00
2/14/21 0:00
2/14/21 3:00
2/14/21 6:00
2/14/21 9:00
2/14/21 12:00
2/14/21 15:00
2/14/21 18:00
2/14/21 21:00
2/15/21 0:00
2/15/21 3:00
2/15/21 6:00
2/15/21 9:00
2/15/21 12:00
2/15/21 15:00
2/15/21 18:00
2/15/21 21:00
Date & Time


BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MONTANA
IDAHO
WYOMING
N. DAK.
S. DAK.
TCPL-NGTL (NOVA)
TCPL
FOOTHILLS
MANY ISLANDS
CPL
HPL
NBPC
PGT
ANG
WBIP
EWR
CIG
NWE
NWE
EMPRESS
MCNEILL
HERBERT
SHAUNAVON
IGOMIS
MONCHY
BATTLE CREEK
CARWAY
ADEN
KINGSGATE
ABC
COBB STORAGE
Cut Bank
ML #1
Kalispell
Havre
HPL/BOX ELDER
BOX ELDER STORAGE
BLAINE Co #3
Great Falls
ML #3
Missoula
Hamilton
Anaconda
Butte
Helena
Dillon
Bozeman
Livingston
Big Coulee
Lewistown
Malta
Wolf Point
Williston
BUFORD
Glendive
GLEN ULLIN
Baker
Miles City
Hardin
Cenex
Conoco
Billings
DRY CREEK STORAGE
CIG/GRIZZLY
WBI/WARREN
KWH/WARREN
Rapid City
Receipt
Delivery
ADEN
CARWAY
BLAINE COUNTY #3
HPL/ BOX ELDER
CIG/ GRIZZLY
WBI/ WARREN
KWH/ WARREN
NorthWestern Energy
"NATURAL GAS TRANSMISSION SYSTEM MAP"
UNITED STATES
Colorado Interstate Gas Co.
Energy West Resources
Williston Basin Interstate
NorthWestern Energy
Northern Border Pipeline Co.
Havre Pipeline
Pacific Gas Transmission Co.
Chinook Pipeline
CANADA
Alberta Natural Gas Co., Ltd
Trans Canada Pipelines
NOVA Gas Transmission, LTD
Many Islands Pipeline
Foothills Pipelines, Ltd
INTERNATIONAL BORDER
STATE BORDER
EXISTING PIPELINE
COMPRESSOR STATION
CITY
MILES
0 40 80
B-12641-1



Storage Seasonal Cycle – 11/1/20 = 14.4 BCF, 2/17/2021 = 3.9 BCF

- The Gas Transmission System operated well and as designed during cold weather event
- The system operated at or above its design limits at times
  - When above design limits, system is losing pressure
  - There were challenges, as there always are during peak period operations
  - Significant customer growth on gas transmission system, especially in certain areas
- Planning for major upgrades takes significant lead time including permitting, engineering and construction
- We are interconnected with others with operational dependence on other systems, markets and market pricing
- We continue to plan for the future growth for our gas transmission and distribution customers

Delivering a **bright future**

NorthWestern® Energy