

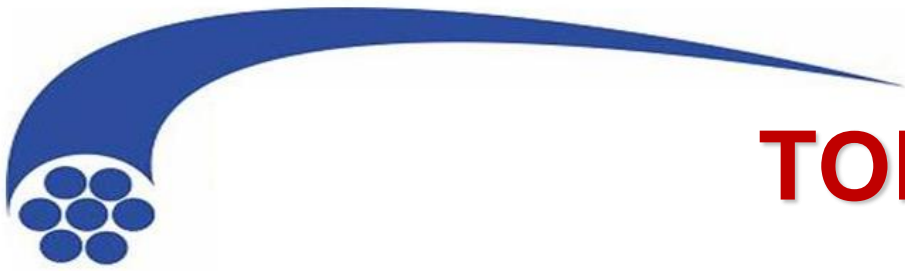


NTTG Annual Interregional Information

Annual Interregional Coordination Meeting

Tempe, AZ

February 27, 2020



TOPICS

- NTTG Annual Interregional Information
 - NTTG organization and planning process overview
 - NTTG 2018-2019 Regional Transmission Plan
- Order 1000 update and Q1 Activities



NTTG Organization and Planning Process Overview

Presented by
Sharon Helms, NTTG Program Manager



Northern Tier Transmission Group

Participating Utilities

Deseret Power
Idaho Power
MATL LLP
NorthWestern Energy
PacifiCorp
Portland General Electric
UAMPS

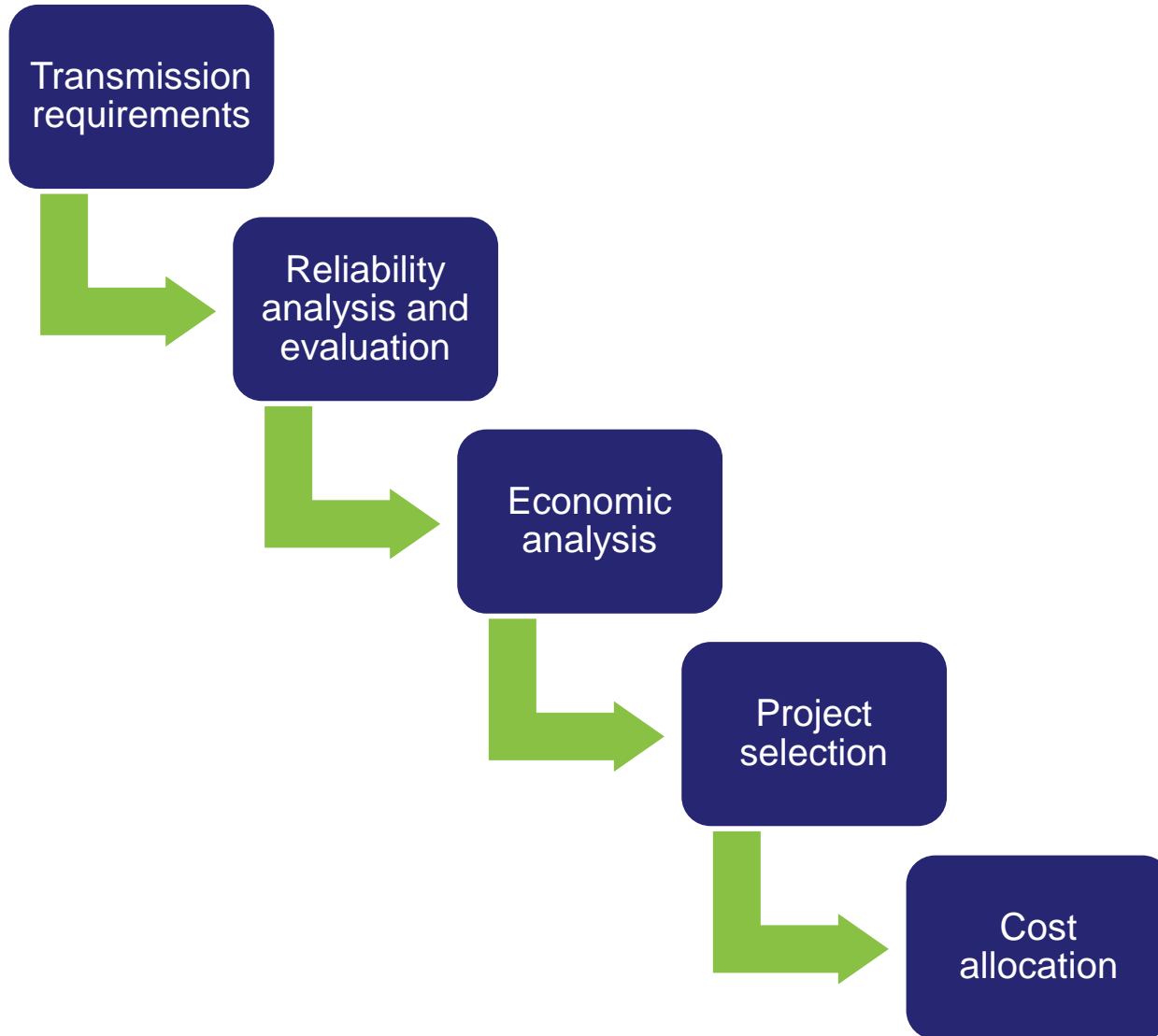
Participating State Representatives

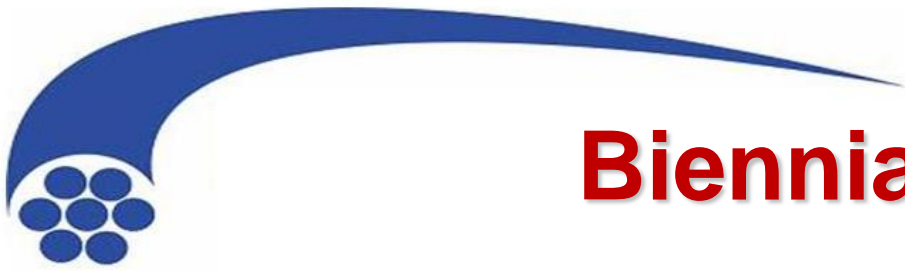
Idaho Public Utilities Commission
Montana Consumer Counsel
Montana Public Service Commission
Oregon Public Utility Commission
Utah Office of Consumer Services
Utah Public Service Commission
Wyoming Office of Consumer Advocates
Wyoming Public Service Commission





Plan Development Process





Biennial Cycle

EIGHT-QUARTER BIENNIAL PROCESS

Q1-Q4
2018

Q1
Regional
Transmission
Plan Data
Gathering
and Economic
Study Request
Window

Q2
Study Plan
Development
and Approval

Q3-Q4
Run Studies

Q4
Draft Regional
Transmission
Plan and
Economic
Study Results

Q5-Q8
2019

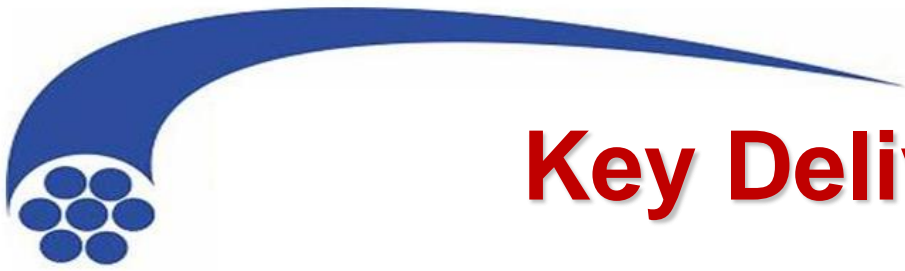
Q5
Stakeholder
Review, Data
Updates and
Economic
Study Request
Window

Q6
Cost
Allocation,
Draft Final
Regional
Transmission
Plan (DFRTP)

Q7
DFRTP
Review

Q8
Project Sponsor
Pre-qualification
for Next Cycle

Regional Transmission
Plan Approval and
Economic Study Results



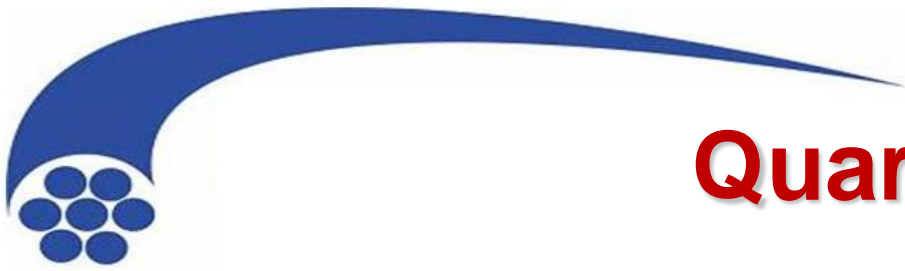
Key Deliverables

- 2018-2019 Study Plan
 - Posted December 2018 on the NTTG website at: [2018-2019 Amended Study Plan](#)
- 2018-2019 Regional Transmission Plan
 - Posted December 2019 on the NTTG website at: [2018-2019 Regional Transmission](#)



NTTG 2018-2019 Regional Transmission Plan Overview

Presented by
Jared Ellsworth, NTTG Planning Committee Chair



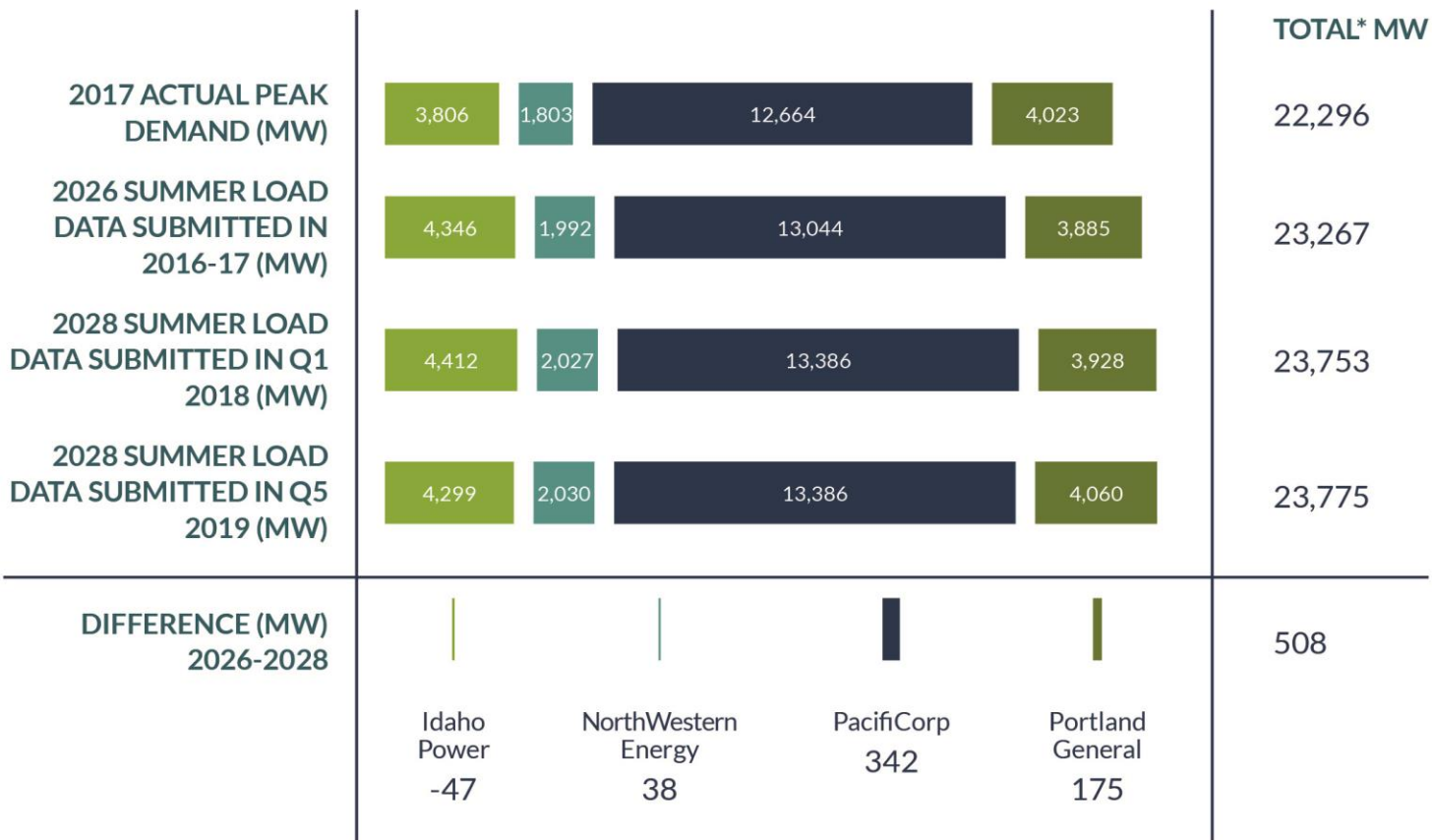
Quarter 1

- Q1: Data Submittals
 - Load, resource, firm service, interregional projects, PPR/PPC, capital/reserves/losses
- Q2: Develop Study Plan
 - 10 year look at the system
 - Technical Work Group, composed of members of the Planning Committee
 - Approval of Study Plan from Steering Committee



Forecasted Loads

2028 FORECASTED LOADS

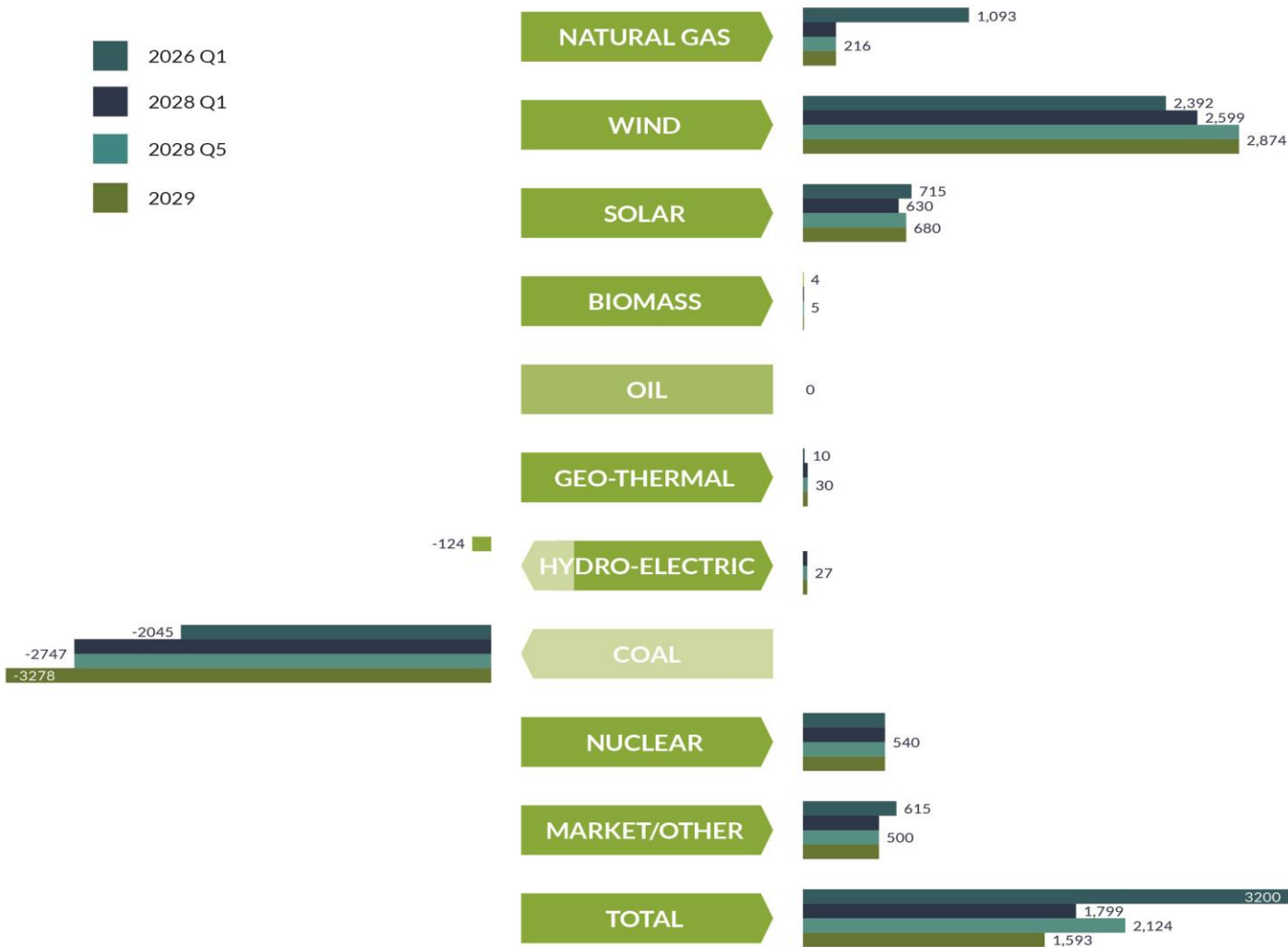


*Loads for Deseret G&T and UAMPS are included in PacifiCorp East



Forecasted Resources

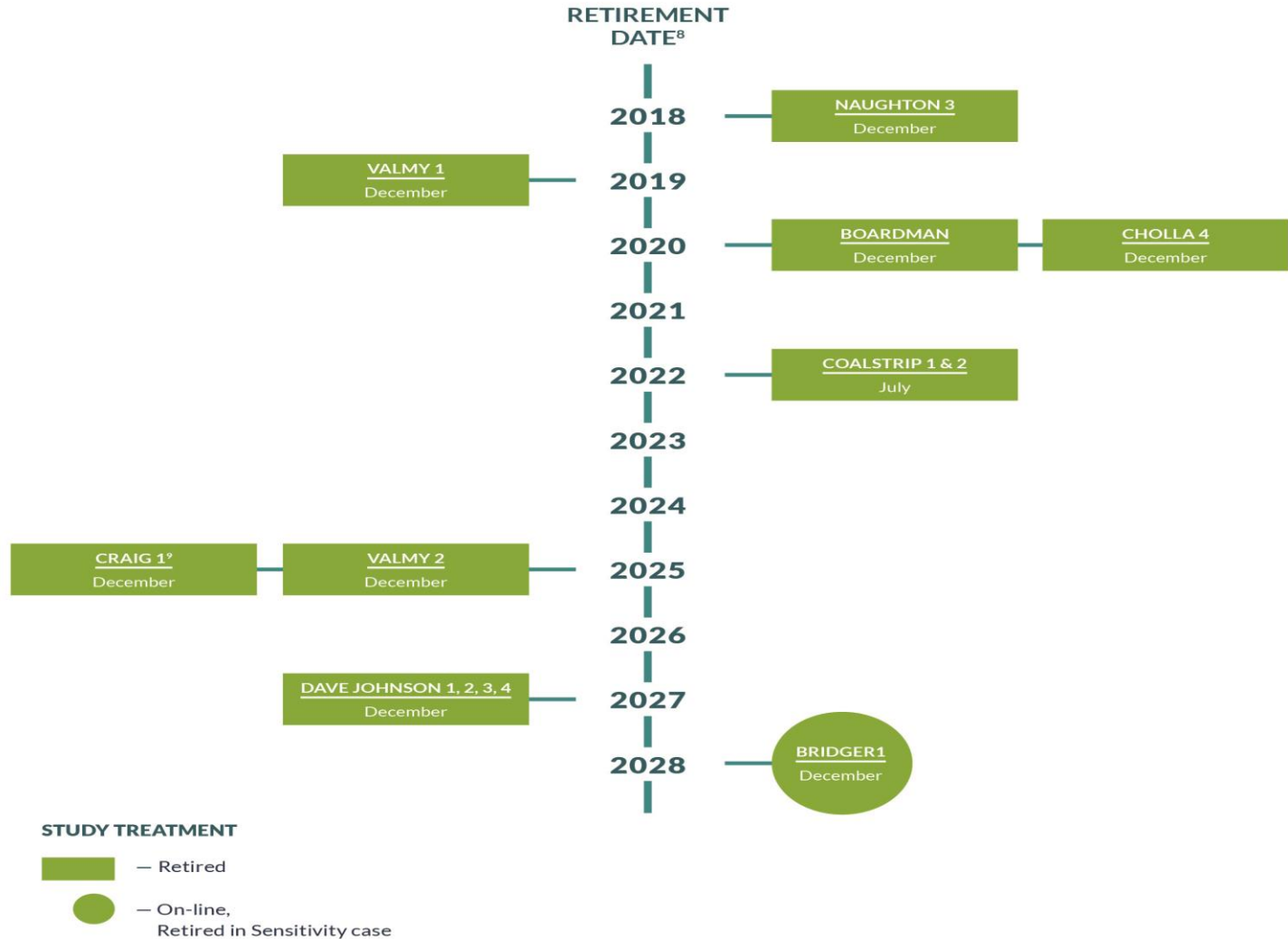
COMPARISON OF FORECASTED RESOURCES (MW)





Planned Coal Retirements

PLANNED COAL RETIREMENTS



⁸ Units are assumed to retire at the end of the stated month.

⁹ Reflects PacifiCorp's retirement of coal retirements outside the NTTG footprint.



Transmission Projects

MARCH 2018 DATA SUBMITTAL – TRANSMISSION ADDITIONS BY 2028

SPONSOR	FROM	TO	VOLTAGE	CIRCUIT	TYPE	REGIONALLY SIGNIFICANT ¹⁰	COMMITTED	PROJECTS
IDAHO POWER	Hemingway	Longhorn	500 kV	1	LTP & pRTP	Yes	No	B2H Project (2026)
	Hemingway	Bowmont	230 kV	2	LTP	Yes	No	New Line-associated with Boardman to Hemingway (2026)
	Bowmont	Hubbard	230 kV	1	LTP	Yes	No	New Line-associated with Boardman to Hemingway (2026)
	Hubbard	Cloverdale	230 kV	1	LTP	No	No	New Line (2021)
	Midpoint	Hemingway	500 kV	2	LTP	Yes	No	Gateway West Segment #8 (joint with PacifiCorp East) (2024)
	Cedar Hill	Hemingway	500 kV	1	LTP & pRTP	Yes	No	Gateway West Segment #9 (joint with PacifiCorp East) (2024)
	Cedar Hill	Midpoint	500 kV	1	LTP	Yes	No	Gateway West Segment #10 (2024)
	Midpoint	Borah	500 kV	1	LTP & pRTP	Yes	No	(convert existing from 345 kV operation) (2024)
	Ketchum	Wood River	138 kV	2	LTP	No	No	New Line (2020)
	Willis	Star	138 kV	1	LTP	No	No	New Line (2019)
ENBRIDGE	SE Alberta		DC	1	LTP	Yes	No	MATL 600 MW Back to Back DC Converter (2024)



Transmission Projects

MARCH 2018 DATA SUBMITTAL – TRANSMISSION ADDITIONS BY 2028

SPONSOR	FROM	TO	VOLTAGE	CIRCUIT	TYPE	REGIONALLY SIGNIFICANT ¹⁰	COMMITTED	PROJECTS
PACIFICORP EAST	Aeolus	Clover	500 kV	1	LTP & pRTP	Yes	No	Gateway South Project-Segment #2 (2024)
	Aeolus	Anticline	500 kV	1	LTP & pRTP	Yes	No	Gateway West Segments 2&3 (2020)
	Anticline	Jim Bridger	500 kV	1	LTP & pRTP	Yes	No	345/500 kV Tie (2020)
	Anticline	Populus	500 kV	1	LTP & pRTP	Yes	No	Gateway West Segment #4 (2024)
	Populus	Borah	500 kV	1	LTP	Yes	No	Gateway West Segment #5 (2024)
	Populus	Cedar Hill	500 kV	1	LTP & pRTP	Yes	No	Gateway West Segment #7 (2024)
	Antelope	Goshen	345 kV	1	LTP	Yes	No	Nuclear Resource Integration (2026)
	Antelope	Borah	345 kV	1	LTP	Yes	No	Nuclear Resource Integration (2026)
	Windstar	Aeolus	230 kV	1	LTP & pRTP	Yes	No	Gateway West Segment #1W (2024)
	Oquirrh	Terminal	345 kV	2	LTP	Yes	Yes	Gateway Central
	Cedar Hill	Hemingway	500 kV	1	LTP	Yes	No	Gateway West Segment #9 (joint with Idaho Power) (2024)
	Shirley Basin	Standpipe	230 kV	1	LTP	Yes	No	Local Wind Integration (2020)
PACIFICORP WEST	Wallula	McNary	230 kV	2	LTP	Yes	Yes	Gateway West Segment A (2020)



Transmission Projects

MARCH 2018 DATA SUBMITTAL – TRANSMISSION ADDITIONS BY 2028

SPONSOR	FROM	TO	VOLTAGE	CIRCUIT	TYPE	REGIONALLY SIGNIFICANT ¹⁰	COMMITTED	PROJECTS
PORTLAND GENERAL	Blue Lake	Gresham	230 kV	1	LTP	No	Yes	New Line (2018)
	Blue Lake	Troutdale	230 kV	1	LTP	No	Yes	Rebuild (2018)
	Blue Lake	Troutdale	230 kV	2	LTP	No	Yes	New Line (2018)
	Horizon	Springville Jct	230 kV	1	LTP	No	Yes	New Line (Trojan-St Marys-Horizon) (2020)
	Horizon	Harborton	230 kV	1	LTP	No	Yes	New Line (re-terminates Horizon Line) (2020)
	Trojan	Harborton	230 kV	1	LTP	No	Yes	Re-termination to Harborton (2020)
	St Marys	Harborton	230 kV	1	LTP	No	Yes	Re-termination to Harborton (2020)
	Rivergate	Harborton	230 kV	1	LTP	No	Yes	Re-termination to Harborton (2020)
	Trojan	Harborton	230 kV	2	LTP	No	Yes	Re-termination to Harborton (2020)
				115 kV	1	LTP	No	Yes



Interregional Projects

PROJECT NAME	COMPANY	RELEVANT PLANNING REGION(S)	TERMINATION FROM	TERMINATION TO	STATUS	IN SERVICE DATE
Cross-Tie Transmission Project	TransCanyon, LLC	NTTG, WestConnect	Clover, UT	Robinson Summit, NV	Conceptual	2024
SWIP-North ¹¹	Great Basin Transmission LLC	CAISO ¹² , NTTG, WestConnect	Midpoint, ID	Robinson Summit, NV	Permitted	2021
TransWest Express Transmission DC/AC Project 18	TransWest Express, LLC	CAISO ¹² , NTTG, WestConnect	Rawlins, WY	Boulder City, NV	Conceptual	2022
TransWest Express Transmission DC Project ¹³	TransWest Express, LLC	CAISO ¹² , NTTG, WestConnect	Rawlins, WY	Boulder City, NV	Conceptual	2022

¹¹ The SWIP-North project submitted by Great Basin Transmission (GBT) requires a new physical connection at Robinson Summit, at the southern end of the Project. To transmit power beyond the Project, about 1,000 MW of capacity rights on the already in-service ON Line Project from Robinson Summit to Harry Allen 500 kV, as well as completion of CAISO's Harry Allen to Eldorado Project in 2020, those GBT capacity rights will provide a CAISO access to SWIP-North.

¹² CAISO has volunteered to participate in the studies and accept cost allocation.

¹³ Two Alternatives were submitted by TransWest Express, 1) a DC Line the entire Length, and 2) a DC line from Wyoming to the Intermountain Power Project area then an AC line to Nevada.



Q2: Development of Study Plan

- Methodology
- Assumptions
- Software to be used
 - Production Cost Modeling: GridView
 - Power flow: PowerWorld
- Criteria
- Public Policy Requirements/Considerations



Development of Base Cases

- “Round Trip” process
- Started with WECC 28hs1a (PF) and WECC 2028 ADS Phase 2.1 (PCM)
- Ran PCM which resulted in 8760 hours
- Ultimately 8 stress cases were selected from the 8760 hours
- Converted those PCM cases back to transient-stability ready PF cases



Stressed Case Hours

STRESSED CONDITION	DATE	HOUR	TWG LABEL
NTTG SUMMER PEAK	JULY 19, 2028	16:00	A
NTTG WINTER PEAK	DEC. 5, 2028	19:00	B
HIGH EASTBOUND IDAHO-NW	JUNE 3, 2028	02:00	C
HIGH WESTBOUND IDAHO-NW ¹⁵	OCT. 11, 2028	11:00	D
HIGH TOT2/COI/PDCI	MAY 16, 2028	19:00	E
HIGH WYOMING WIND	FEB. 24, 2028	MIDNIGHT	F
HIGH BORAH WEST	DEC. 11, 2028	02:00	G
HIGH NTTG FOOTPRINT IMPORT	JULY 27, 2028	14:00	H
HIGH AELOUS WEST AND SOUTH	JUNE 3, 2028	18:00	I

^{14, 15} TWG dropped further study of Case D since the case did not achieve the desired case objectives.

Stressed Case Results

EIGHT STRESSED CASES

NTTG SUMMER PEAK (A)	NTTG WINTER PEAK (B)	HIGH EASTBOUND IDAHO-NW (C)	HIGH TOT2/COI/PDCI (E)
4PM, 07/19/2028	5PM, 12/05/2028	2AM, 06/03/2028	7PM, 05/16/2028
23,542 MW	21,149 MW	11,586 MW	15,214 MW
19,331 MW	18,050 MW	9,408 MW	15,789 MW
735 MW	633 MW	484 MW	766 MW
4,946 MW	3,733 MW	2,662 MW	191 MW

This case showed a need to import energy during the summer peak. Both the Prior RTP and Initial RTP performed reasonably well in this scenario.

The region would need to import energy during the winter peak. Only a few local system violations occurred in the Prior RTP case.

Energy flowing eastbound on the Idaho-Northwest Path was 1,970 MW in this case. But the existing Idaho-Northwest import capability is 1,200 MW. The path had 128 hours that exceeded that level, mostly from May through July. NTTG would need to import a total of approximately 2,662 MW to make up the imbalance.

This case evaluated the performance of the ITPs in supporting interregional transfers. Loads and resources nearly balanced in this scenario, with a slight import of 191 MW required after line losses.

Time
 Demand
 Supply
 Loss
 Import
 Export

Stressed Case Results



HIGH WYOMING WIND (F)	HIGH BORAH WEST (G)	HIGH NTTG FOOTPRINT IMPORT (H)	HIGH AEOLUS WEST AND SOUTH (I)
12AM, 02/24/2028	2AM, 12/11/2028	2PM, 07/27/2028	6PM, 06/03/2028
12,218 MW	12,482 MW	20,872 MW	14,287 MW
15,292 MW	14,150 MW	15,135 MW	13,300 MW
731 MW	696 MW	530 MW	637 MW
2,344 MW	972 MW	6,267 MW	1,624 MW

This case studied power produced by wind-propelled turbines in Wyoming. The actual extracted-case wind production was 2,707 MW. At a targeted level of 2,655 MW, which is 90 percent of the capacity factor of the wind turbines, generation from the wind turbines would exceed the target for 1,020 hours in an average year, usually from mid-September through May.

The Borah West path is currently rated at 2,557 MW. Any firm transfers above this level would require upgrades. In the analysis, the 2,557 MW net flow level was exceeded 11 times. A second version of the case was able to bring loads and resources nearly in balance by reconfiguring flows from generating resources.

No current operating procedures would restrict operation in this dispatch region. One notable condition of this dispatch hour is that the Wyoming wind production was near zero.

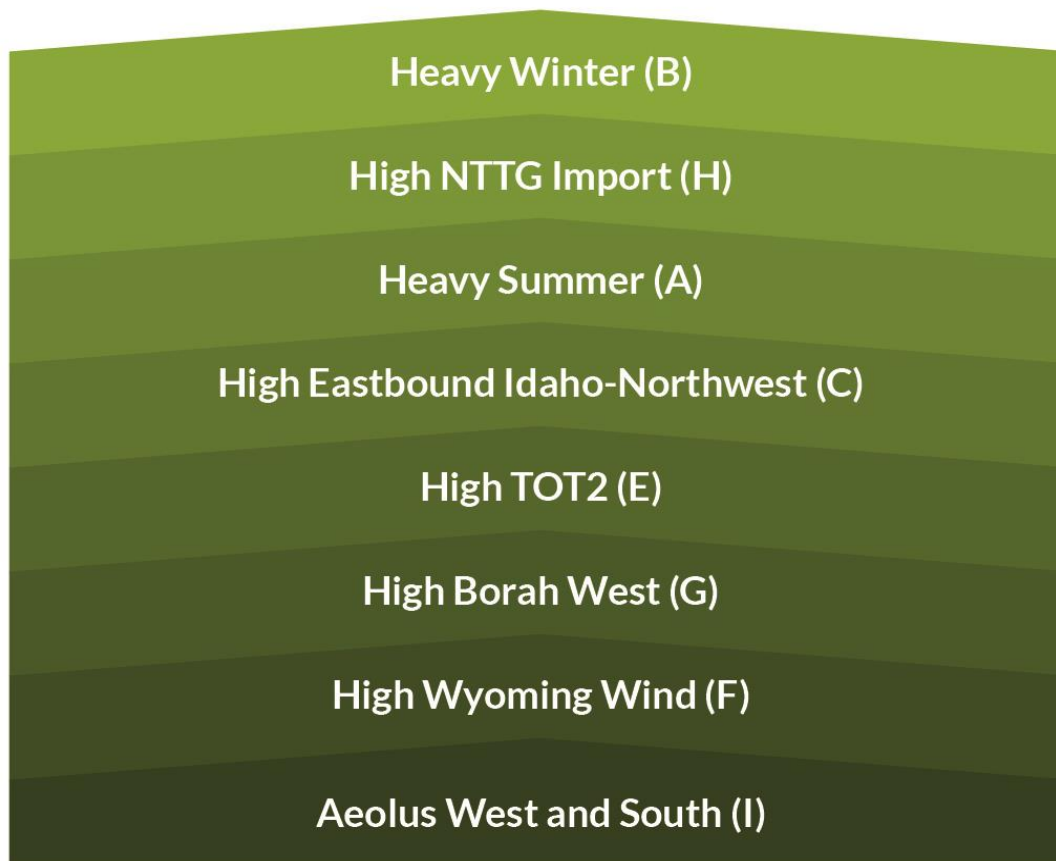
In reviewing the flows of the other extracted hours, the TWG noted that few hours fully stressed the Gateway South project. This hour was selected for that purpose. In this case, electricity flows on the Gateway South project are 1,018 MW. The wind level in this case, 2,855 MW, is likely to be exceeded 513 hours per year.

Time
 Demand
 Supply
 Loss
 Import
 Export

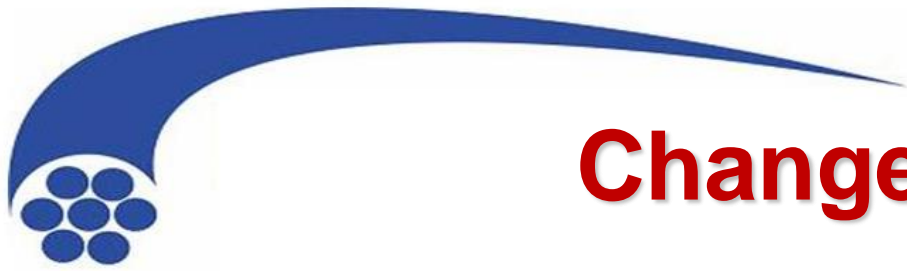


Summary of Stressed Cases

better



worse



Change Cases

- Null Case: Today's topology with forecasted changes
- Start with the Initial Regional Transmission Plan
 - Rollup of projects identified in the local plans AND those from the prior Regional Plan
- Scenarios where one or more of the Alternative Projects is added to or replaces one or more Non-Committed project in the Initial Regional Transmission Plan

Change Case Matrix

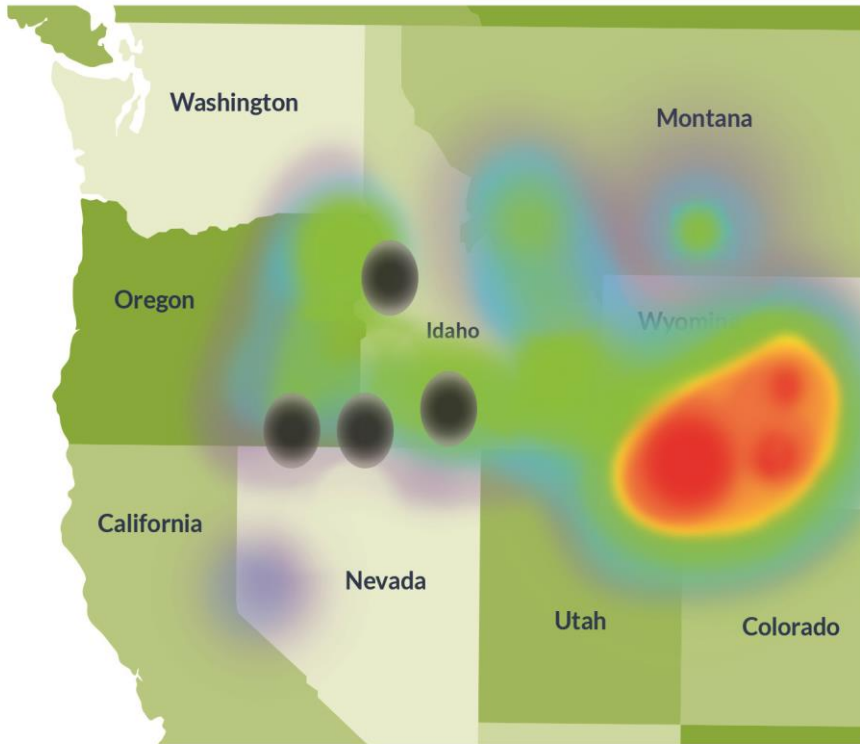
CHANGE CASE MATRIX									
CASE	B2H	GATEWAY S	GATEWAY W	ANTELOPE PROJECTS	SWIP N	CROSS-TIE	TWE DC	TWE DC/AC	STRESSED CONDITIONS
null									ABCFGHI
pRTP	X	C	a	X					ABCEFGHI
IRTP	X	X	X	X					ABCEFGHI
CC1	X								ABCFG I
CC2		X		X					ACEFI
CC3		X							ACEFI
CC4	X								ACEFI
CC5	X								ACEFI
CC6									ABCEFGHI
CC7									BCEFI
CC8									C EFI
CC9									CFI
CC10									BCF
CC11									RPS@1500
CC12									(E)+RPS@1500
CC13									(E)+RPS@1500
CC14		X						X	(E I)+RPS@1500
CC15				X			X		(E)+RPS@1500
CC16		X		X			X		(E)+RPS@1500
CC17			a	X			X		(E)+RPS@1500
CC18		X	a	X			X		(E)+RPS@1500
CC19				X		X			(E)+RPS@1500
CC20		X		X		X			(E)+RPS@1500
CC21		X	a	X		X			(E I)+RPS@1500
CC22			a	X	X				(E)+RPS@1500

More than 150 reliability studies were performed against more than 480 contingencies

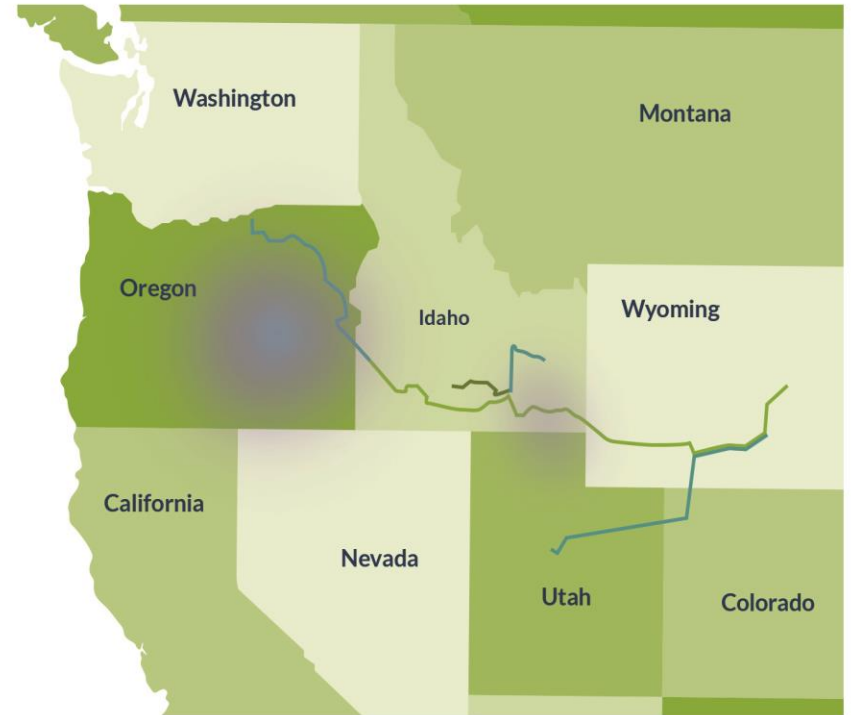


Results: Heat Map Example

Case F: Null Case
Demonstrates violations



Case F: Initial Regional Plan
Demonstrates improvement from Null



A complete set of heat map analysis of the Change Cases is included in Section V of the [Draft Final RTP](#)



Reliability Conclusions

- Transmission projects represented by both the Prior RTP and the Initial RTP satisfied the NTTG reliability criteria
- None of the ITPS resolved NTTG's reliability performance issues and were not considered for inclusion in the RTP



Economic Evaluation Conclusions

To determine which change case is more efficient or cost-effective plan, three metrics were applied

11/16/2018	iRTP	pRTP	pRTP LESS iRTP
Capital Related Cost	\$903,531,849	\$802,814,981	(\$100,716,868)
Loss-Monetized	\$ 77,520,138	\$77,608,982	\$88,814
Reserve-Monetized	(\$750,000)	(\$750,000)	\$0
Incremental Cost	\$980,301,987	\$879,673,933	(\$100,628,054)



Public Policy Consideration Scenario Requests

- One request to gauge the transmission reliability impacts and implications of closing Jim Bridger Unit 1 and Naughton Units 1 and 2
- All three retirements are outside the 2028 study period.
- The TWG conducted Powerflow analysis on four change cases and made a number of observations
- A full report of the study can be found in the [Draft Final RTP](#)



Regional Economic Study Requests

- NTTG received one request to evaluate up to two 345-kV transmission lines as a lower cost alternative to the 500 kV GW West and GW South lines
- Economic studies demonstrated acceptable performance.
- However, additional PCM simulations indicated
 - lower overall transmission capacity,
 - Generation being dispatched without economics consideration
- Additionally,
 - PacifiCorp already has procured required right of ways, construction has begun and energization is scheduled for 2020
 - The proposed 345-kV option has no sponsor



Final NTTG Regional Transmission Plan





Questions





Order 1000 Update and Next Steps

Presented by
Sharon Helms, NTTG Program Manager



Regional Planning Organization Update

- On January 28th the NTTG Transmission Providers filed a revised NorthernGrid Attachment K requesting an effective date of April 1, 2020

Docket Numbers:

- ER20-882 PacifiCorp
- ER20-883 Northwestern Energy
- ER20-890 Idaho Power
- ER20-891 MATL
- ER20-892 Portland General



Regional Planning Organization Update

- Upon FERC acceptance, any data collected as part of the Northern Tier planning process will be transferred to NorthernGrid and will be used in the new NorthernGrid planning process
- In the event FERC does not grant an April 1 effective date, NTTG's planning process will remain in effect until such FERC approval is obtained



NTTG's Biennial Cycle

EIGHT-QUARTER BIENNIAL PROCESS

Q1-Q4
2020

Q1
Regional
Transmission
Plan Data
Gathering
and Economic
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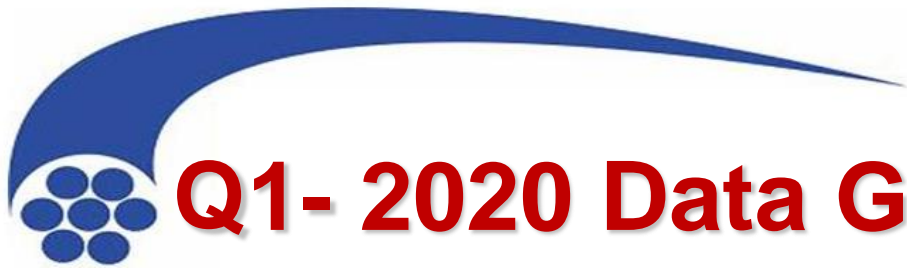
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Q7
DFRTP
Review

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Project Sponsor
Pre-qualification
for Next Cycle

Regional Transmission
Plan Approval and
Economic Study Results



Q1- 2020 Data Gathering Activities

- Quarter 1 data gathering opportunities:
 - Transmission Providers Needs
 - Local Plans, including loads, resources and transmission requirements
 - Proposed Solutions
 - Sponsored and/or Un-sponsored Transmission Projects, and Merchant Transmission Developer Projects
 - Interregional Transmission Projects, and non-transmission alternatives
 - Cost Allocation
 - Project Sponsors must have been pre-qualified during Q8-2019
 - Qualified Project Sponsors must submit Project and Cost Allocation Data



Order 1000 Activities: Regional

- Study requests that inform but do not change the plan
 - Regional Economic Study Requests
 - Requests to model the ability of specific upgrades or other investments to the transmission system to reduce the cost of reliably serving the transmission providers needs
 - Public Policy Consideration Studies
 - Consideration of factors relevant to public policy but not required by local, state or federal laws



2020 Q1 Planning Milestones

Milestone	Window Closes
Q1 Data Submittal Window <ul style="list-style-type: none">• Projects, NTA's and ITP's• Local TP Plans/Needs• Cost allocation data• Public Policy Consideration Studies• Economic Study Requests	March 31, 2019

- Submission windows are open from January 1, 2020 through March 31, 2020
- All submissions must be provided, using the NTTG data submission forms on the NTTG website
- Completed forms must be submitted to NTTG mailbox via info@nttg.biz



**Additional information regarding
the NTTG Regional Planning
Process can be accessed at**

www.NTTG.biz



Questions



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Sharon Helms, Sharon.Helms@comprehensivepower.org