Draft Study Scope for the 2026-2027 NorthernGrid Planning Cycle

Member Planning Committee Approval Date: TBD

Executive Summary

This Study Scope outlines the NorthernGrid 2026-2027 regional transmission planning process, as required under FERC Orders No. 890 and 1000, in accordance with each Enrolled Party's Open Access Transmission Tariff (OATT) Attachment K – Regional Planning Process and NorthernGrid Planning Agreement.

The NorthernGrid Regional Transmission Plan evaluates whether transmission needs within the NorthernGrid may be satisfied by regional and/or interregional transmission projects. The NorthernGrid Regional Transmission Plan provides valuable regional insight and information for all stakeholders to consider and use in their respective decision-making processes.

The study scope for NorthernGrid's 2026-2027 Regional Transmission Plan was developed using the following process:

- Identification of the Baseline Projects of Enrolled Parties. Baseline Projects are the transmission projects included in the Enrolled Parties' Local Transmission Plans.
- Evaluation of combinations of the Enrolled Parties Baseline Projects and Alternative Projects to identify whether there may be a combination that effectively satisfies all Enrolled Party Needs.
- Use of power flow and production cost analysis techniques to determine if the modeled transmission system topology meets the system reliability performance requirements and transmission needs.
- Selection of the Regional Combination that effectively satisfies all Enrolled Party Needs into the NorthernGrid Regional Transmission Plan.

Overview of Key Observations:

Regional Summary of Needs

The regional needs were sourced from member data submissions, including load forecasts, resource additions and retirements, anticipated transmission topology, and public policy requirements. Data submissions were received from NorthernGrid's 13 members:

- Avista (AVA)
- Bonneville Power Administration (BPA)
- Chelan PUD (CHPD),
- Idaho Power Company (IPC)
- Montana Alberta Tie Line (MATL)
- NV Energy (NVE)
- NorthWestern Energy (NWMT)
- PacifiCorp East and West (PACE and PACW)
- Portland General Electric (PGE)
- Puget Sound Energy (PSE)
- Seattle City Light (SCL)
- Snohomish PUD (SNPD)
- Tacoma Power (TPWR)

Summary of NorthernGrid Data Submittals for the 2036 future.

- The total NorthernGrid footprint, non-coincident peak load is 139,666 MW
- There are 8,484 MW of planned retirements
- There are 85,174 MW of planned generation additions
- There is one Non-incumbent Regional project
  - Cascade Renewable Transmission System
- There are six Non-Incumbent Interregional projects
  - Walker River-Tesla 500 kV Transmission Project
  - Western Bounty Project 500 kV (DC)
  - Silver Rock Transmission
  - High West Transmission
  - Sagebrush-Johnnie Corner
  - Trout Canyon-Arden 500 kV line

Case Analysis

The NorthernGrid Regional Transmission Plan will assess the existing transmission system and committed projects against combinations of planned and proposed transmission projects to compare their ability to reliably serve the forecasted 2036 load and generation dispatch conditions.

The NorthernGrid study effort will utilize a combination of posted power flow and production cost base cases from the Western Electric Coordinating Council (WECC); these cases will be modified for the purposes of this study. The hourly output from the production cost modeling run will be used to select stressed conditions in the Western Interconnection for reliability analysis. Multiple stress conditions will be analyzed for the 2026-2027 planning effort. Historical flows in the interconnection suggest east to west from Idaho/Montana/Wyoming and north to

south into southern California are of interest. Recent operations suggest that flows in the opposite direction occur frequently enough to warrant analysis. Typically, a heavy summer condition results in thermal overloads and a light spring condition results in voltage excursions; both conditions will get captured in this 2026-2027 analysis.

Cost Allocation

Three Interregional projects submitted for Cost Allocation consideration in the 2026-2027 planning cycle.

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Introduction and Purpose Statement

The objective of the transmission planning study is to produce the NorthernGrid Regional Transmission Plan, through the evaluation and selection of regional and interregional projects that effectively satisfy all the transmission needs within the NorthernGrid region. The regional needs were sourced from member data submissions, including load forecasts, resource additions and retirements, projected transmission, and public policy requirements.

The committees for NorthernGrid are as follows:

- **The Member Committee (MC)** is composed of NorthernGrid member representatives. The MC is responsible for membership approval, budget development and approval, and vendor management.
- **The Member Planning Committee (MPC)** is composed of transmission planner representatives from all NorthernGrid members. The MPC is responsible for development of the Regional Transmission Plan.
- **The Enrolled Parties Planning Committee** is composed of Federal Energy Regulatory Commission (FERC) jurisdictional utilities. Collectively these members are responsible for regional transmission planning compliance. There are two sub-committees of this primary committee:
    - **The Enrolled Parties and States Committee (EPSC)** is responsible for state engagement in the regional transmission planning process.

- **The Cost Allocation Task Force (CATF)** is composed of enrolled parties and states representatives and is responsible for cost allocation compliance.

Regional Transmission Plan Development

Regional Transmission Plan Development Process Overview

NorthernGrid began the process to develop a regional transmission plan by requesting members to submit data pertaining to forecasted loads, resource additions and retirements, transmission additions and upgrades, and public policy requirements. The plan spans the 2024-2036 time period.

The Regional Transmission Plan will be developed over the course of two years, beginning March 31, 2024, and ending December 31, 2025. A summary of the key deliverables in Year 1 and Year 2 is included below. Deliverables not defined by Attachment K are subject to change.

General Schedule and Deliverables

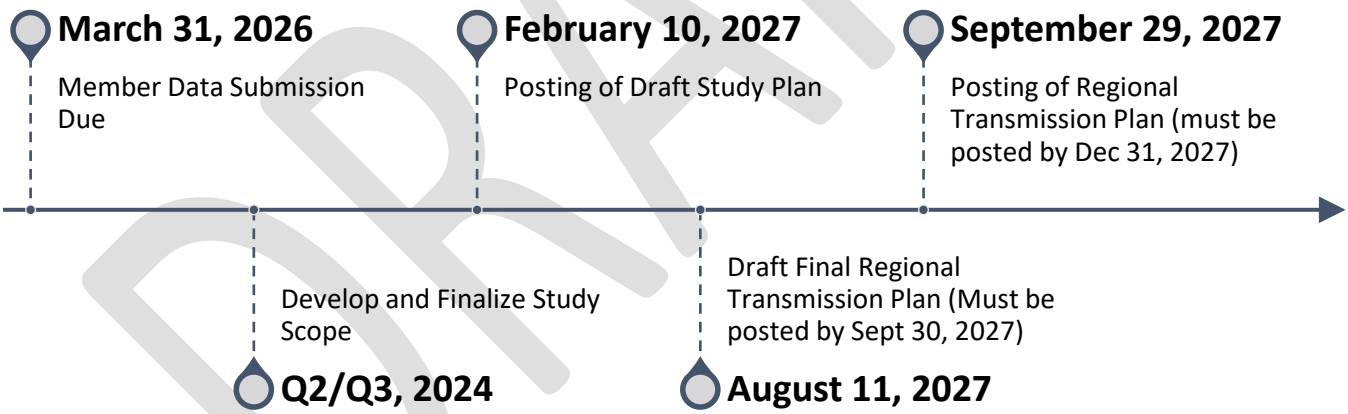

Figure 1: General Timeline of Deliverables

Stakeholder Engagement

Stakeholders including state agencies are invited to participate in the public meetings and comment periods. They will also have active involvement in the development of the Regional Transmission Plan. The first period for stakeholder comments begins with the publishing of the Draft Study Scope. There are three main opportunities to provide comment, and they are in response to the following publications: the Draft Study Scope, the Draft Regional Transmission Plan, and the Draft Final Regional Transmission Plan.

Regional Summary of Needs

Current and Committed Project Transmission System

The NorthernGrid system is depicted below in Figure 2: NorthernGrid Balancing Authority Areas and the existing transmission is depicted in Figure 3: NorthernGrid Existing or Committed Transmission. The Boardman to Hemingway 500 kV project (B2H) and the Gateway South transmission projects (placed in-service Q4 2024) are included in Figure 3 because they are Committed Projects and will be assumed in-service for the planning analysis.

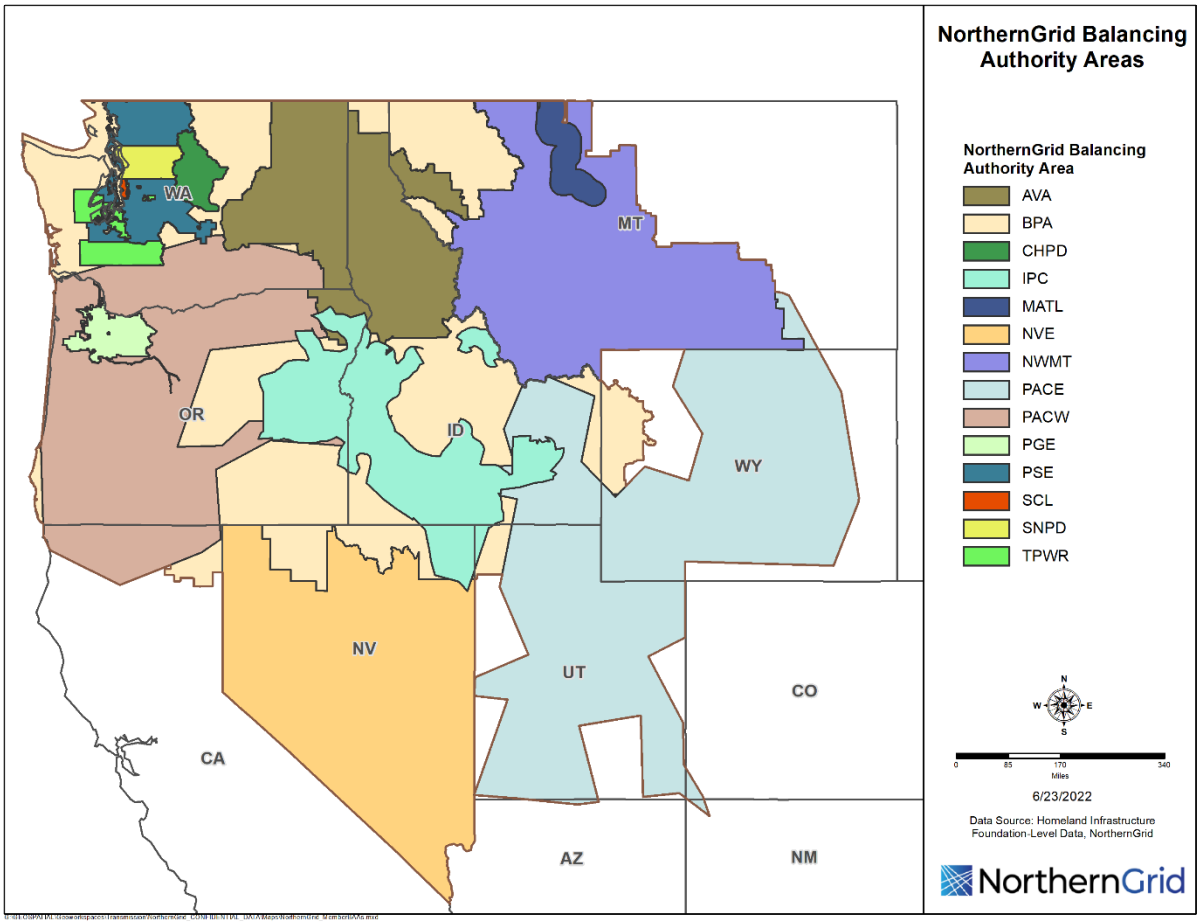

Figure 2: NorthernGrid Balancing Authority Areas

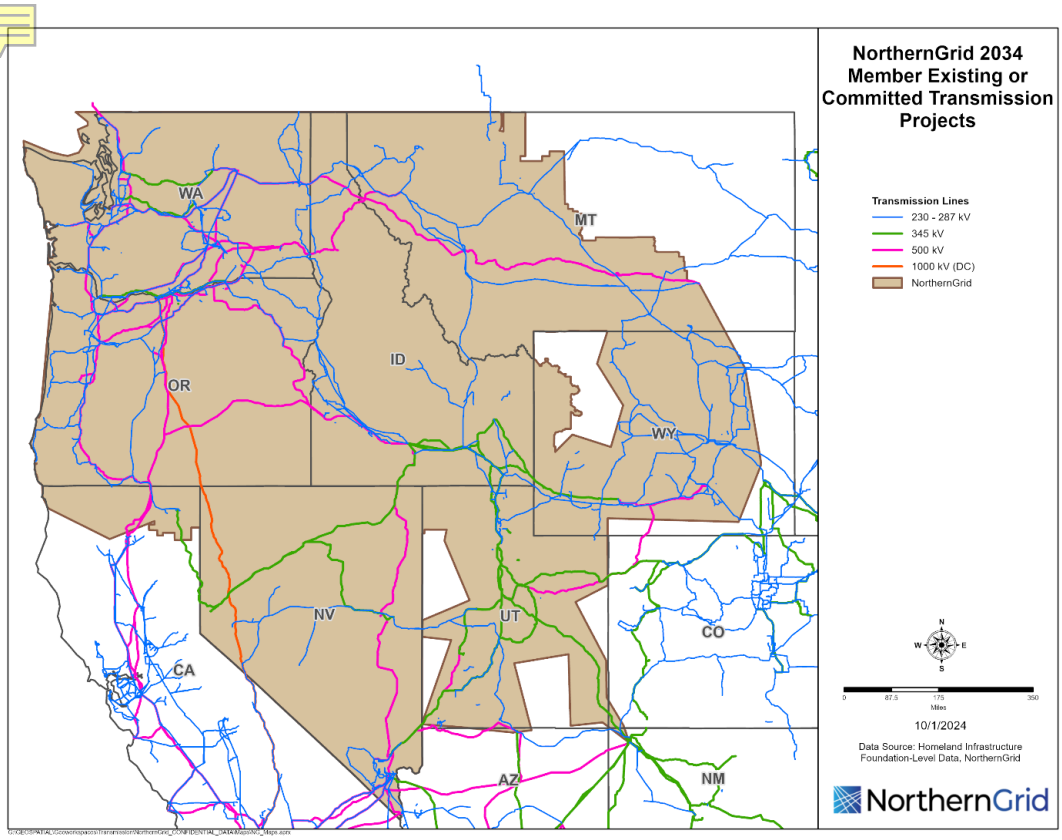

Figure 3: NorthernGrid Existing or Committed Transmission Projects

Data Submission Summary

This section summarizes the data submission results that NorthernGrid received from its 13 members. The NorthernGrid is made up of Avista (AVA), Bonneville Power Administration (BPA), Chelan PUD (CHPD), Idaho Power Company (IPC), Montana Alberta Tie Line (MATL), NV Energy (NVE), NorthWestern Energy (NWMT), PacifiCorp East and West (PACE and PACW), Portland General Electric (PGE), Puget Sound Energy (PSE), Seattle City Light (SCL), Snohomish PUD (SNPD), and Tacoma Power (TPWR). The member Balancing Authority Areas (BAA) are illustrated in Figure 2.

The NorthernGrid members that are registered as Balancing Authority Areas are required to submit a ten-year load and resource forecast to the Western Electricity Coordinating Council (WECC) annually. This forecast includes identification of forecasted generation resources and transmission facilities. NorthernGrid leverages this submission for the biennial Regional Transmission Plan. Each member submitted their data and NorthernGrid summarized the data pertinent to the NorthernGrid region: load, generation resource retirements, generation resource additions, and 230 kV and above transmission additions. Resource additions do not necessarily reflect *planned* resource additions but may represent *conceptual* resource needs required to meet public policy goals. Conceptual resource needs are based on the existing Integrated Resource Plan (IRP) preferred portfolios and may change during subsequent Biennial Planning Cycles.

Local Transmission Projects

The NorthernGrid members have projected the need for new and upgraded transmission system projects in the local transmission planning processes. These projects primarily support local load service and reliability and have not been deemed to be regionally significant.

Loads Summary

Table 1: NorthernGrid Loads, in MW

Cycle	2024-2025	2026-2027
Year	2034	2036
Percent Change		14%
Jan	57,557	65,456
Feb	55,910	63,018
Mar	52,493	59,589
April	50,336	56,935
May	49,789	58,881
Jun	60,178	67,933
July	63,118	72,255
Aug	62,037	70,967
Sep	56,315	65,350
Oct	51,615	59,179
Nov	54,937	61,535
Dec	58,079	65,266

Table 1: NorthernGrid Loads represents the cumulative non-coincident peak load for each of the utilities that make up the NorthernGrid footprint. Overall, the NorthernGrid footprint load for 2036 is expected to be approximately 15% higher than the updated load prediction for 2034. The peak loading condition for NorthernGrid occurs in the summer which is consistent with the 2024-2025 cycle.

Resources Summary 2024-2036

There are approximately 85 GW of resources being developed within the NorthernGrid region along with approximately 8.6 GW of resources being retired.

All future resources are based on member resource planning processes. The NorthernGrid members determine resource additions through the development of their Loads and Resources needed for base case development. In some instances, the Integrated Resource Planning (IRP) requirements needed to meet state mandate may inform the development of the Loads and Resources data. Many of the resource additions presented are based on the existing IRP preferred portfolio which may change during subsequent biennial planning cycles. Members may include conceptual resource additions beyond what is included in their Loads and Resources submittal to more closely align resource needs with goals set forth by public policy requirements.

Table 2: Generation Changes for the NorthernGrid Footprint

	Addition	Retirement
Biomass	5	5
Bulk Storage	12,477	2
Coal	4,676	2,103
Fuel Oil	15	31
Gas	117	-
Geothermal	595	608
Hydro	3,137	245
Landfill Gas	37	23
Natural Gas	17,021	2,901
Nuclear	896	-
Solar	21,068	1,436
Solid Waste	5	
Unknown	224	13
Waste Heat	8	39
Wind	24,722	1,071
Wood Waste	172	107

Transmission Service Obligations

Like loads, resources, and public policy, transmission service obligations may drive transmission development. The NorthernGrid members are encouraged to submit all transmission service data that is used in the development of their local transmission plan so that it may be considered during the development of the Regional Transmission Plan. No regionally significant transmission service arrangements were submitted for consideration into the 2026-2027 Study Plan.

Regional and Interregional Transmission Projects

Enrolled Parties as well as Developers submitted the regional projects depicted below.

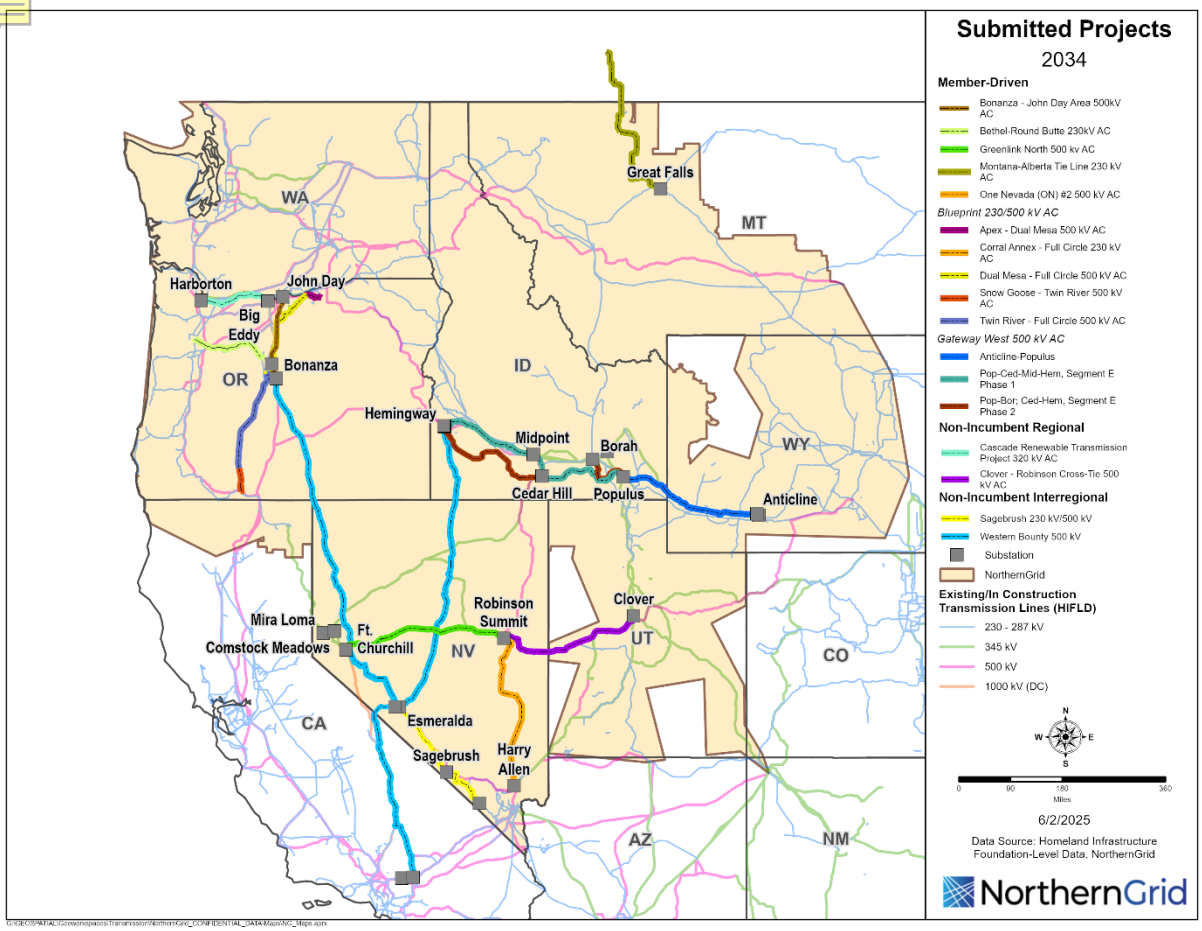

Figure 4: Submitted Regional and Interregional Transmission Projects

Member-Driven Transmission Projects

The projects submitted by the NorthernGrid Parties are as follows:

Committed Projects

1. IPCO Barker Project
2. IPCO Bennett Mountain - Danskin - Rattlesnake 3-Terminal Line
3. PGN Bethel-Monitor 230 kV
4. PGN Bethel-Round Butte 500kV upgrade
5. IPCO Blacks Creek Solar
6. AVA Bluebird - Garden Springs 230kV Transmission Line
7. IPCO Boardman - Hemingway (B2H) Project
8. NEVP Comstock Meadows 345 kV Bus
9. IPCO Gateway West Transm. (Segment 8)
10. NEVP Greenlink North
11. NEVP Greenlink West
12. PGN Harborton-St Marys 230kV

13. NEVP HVD: Project AZ 1
14. NEVP HVD: Project AZ 3
15. NEVP HVD: Project Garnet Valley
16. NEVP HVD: Project Gateway
17. NEVP HVD: Project Gateway
18. NEVP HVD: Project HGIII
19. NEVP HVD: Project LAS
20. NEVP HVD: Project Optimus - Peru Shelf Ph 1
21. NEVP HVD: Project Optimus - South Valley Ph 1
22. NEVP HVD: Project VIP Phase I
23. NEVP Lantern 345 kV Substation
24. IPCO Mayfield - Pleasant Valley Solar 230kV
25. IPCO Mayfield 230kV Substation
26. PGN McLoughlin-Monitor 230 kV
27. NEVP NVE: Magic Way 230 kV Conversion
28. IPCO Pallette Junction Switching Station
29. PGN Pearl-Sherwood Project
30. IPCO Pronghorn Project
31. IPCO Rebuild T902 Phase 3
32. IPCO Rebuild T902 Phase 4
33. NEVP Shaffer 345 kV Substation
34. NEVP Sierra Solar Network Upgrades
35. NEVP SWIP-N, Added to committed projects, remove
36. IPCO SWIP-North
37. NEVP TPL: CAP#2074
38. NEVP TPL: CAP#2077
39. IPCO Wrap T906 into Mayfield Substation
40. IPCO Wrap T912 into Rattlesnake Substation

Uncommitted Projects

1. BPA Big Eddy-Chemawa Rebuild
2. BPA BIG EDDY-OSTRANDER-1: (STEEL) 2.5" RECONDUCTOR WITH 2-ACSS PLOVER
3. AVA Big Eddy-Quenett Creek Upgrade
4. BPA Carlin Bay - Ogara 115kV Transmission Line
5. AVA Chehalis-Cowlitz Tap Rebuild // CHEH-COVI-1: LINE UPGRADE TO COWLITZ TAP TSEP 2022 (DES/CON)
6. PSEI Coeur d'Alene Transmission Reinforcement
7. IPCO Cross-Cascades
8. IPCO Gateway West Transm. (Segment 10)
9. IPCO Gateway West Transm. (Segment 5)
10. IPCO Gateway West Transm. (Segment 6)

11. IPCO Gateway West Transm. (Segment 7)
12. NEVP Gateway West Transm. (Segment 9)
13. NEVP Greenlink 3
14. NEVP HVD: Project AZ 2
15. NEVP HVD: Project Optimus
16. NEVP HVD: Project PR
17. NEVP HVD: Project Shintaku
18. BPA HVD: Project VIP Phase II
19. AVA La Pine-Bonanza Line
20. AVA Lewiston 230kV Mitigation
21. NWMT, IPCO Lolo – Oxbow Rebuild
22. NEVP M2I
23. NEVP NVE: Brooks 230/138 kV Substation
24. BPA NVE: LGIP Requirements
25. BPA PEARL-SHERWOOD-MCLOUGHLIN: UPGRADE 230 kV Lines
26. BPA ROCK CREEK-JOHN DAY-1 500KV LINE UPGRADE
27. BPA Ross-Rivergate Rebuild
28. BPA Schultz SHUL: INSTALL SERIES CAPS ON SHUL-RAVE-3&4 // Schultz-Raver No 3 & No 4
29. PSEI Schultz-Raver Reconductor and Paul Capacitor
30. PSEI White River – BPA Covington #1 & #2 230 kV Transmission Project

Non-Incumbent Transmission Projects

The NorthernGrid regional planning process allows non-incumbent and merchant transmission developers to submit projects for analysis. Several non-incumbent or merchant transmission projects were received during the submission period. They are further classified into regional and interregional transmission projects based on whether the project terminals are within the region or interconnect between regions, i.e. interregional.

1. Walker River-Tesla 500 kV Transmission Project
    a. Cobalt Transmission Partners, LLC is proposing the Walker River-Tesla 500 kV project, a new 500 kV line from the NV Energy (new) Walker River substation to PG&E's Tesla substation. There are no proposed resources associated with this line. Cobalt Transmission Partners, LLC is not seeking Interregional Cost Allocation.
2. Western Bounty Project 500 kV (DC)
    a. Western Bounty Project- ENGIE North America is proposing the Western Bounty Transmission System project, which is an interregional, +/- 525 kV HVDC transmission system that would enable 12 gigawatts of transmission capacity between the central 'hub' in Nevada and the project's 4 termination points: SCE's Lugo-Vincent 500 kV line and LADWP's Adelanto Substation in California, BPA's Grizzly Substation in Oregon, and Idaho Power's Hemingway Substation in Idaho. ENGIE North America is not seeking Interregional Cost Allocation.
3. Silver Rock Transmission
    a. Pattern Energy is proposing the Silver Rock Transmission project connecting the Millard County, Utah to the Eldorado substation in southern Nevada. The 500 kV line is expected to be able to deliver 1500 to 3000 MW. There are no resource additions associated with the Silver Rock Transmission project and Pattern Energy is not seeking Interregional Cost Allocation.
4. High West Transmission
    a. GridLiance is proposing the High West Transmission project. The High West Transmission Project is comprised of the following:
        i. New 135-mile 500 kV from Clover to Granite Peak
        ii. New Red Butte 500 kV Switchyard with a 500/355 kV transformer
        iii. New 105-mile 500 kV line from Granite Peak to the new 500 kV switchyard
        iv. New 120-mile 500 kV line from RedButte to NV Energy's Harry Allen
        v. New 53-mile 500 kV line from Harry Allen to Sloan Canyon.
    b. GridLiance is proposing 2GW of geothermal associated with this project.
    c. GridLiance is requesting Interregional Cost Allocation.
5. Sagebrush-Johnnie Corner

a. GridLiance is proposing the Sagebrush-Johnnie Corner project.
    i. New GridLiance West (GLW) Johnnie's Corner substation with two 500/230 kV transformers
    ii. Relocate Johnnie-Corner-Valley Switching Station to new bay with a new 500/230 kV transformer
    iii. Expand Sagebrush to allow for new bay
    iv. New 41-mile 500 kV line from GLW's Johnnie Corner to Sagebrush substation with 4330 MVA rating
    v. New 58-mile 500 kV line from GLW's Johnnie Corner to Northwest substation, assumed 4330 MVA rating
b. There are no new resources being proposed with the Sagebrush-Johnnie Corner project.
c. GridLiance is requesting Interregional Cost Allocation.

6. Trout Canyon-Arden 500 kV line
    a. Expand Trout Canyon
    b. New 500/230 transformer at Arden
    c. New 39-mile 500 kV line from Trout Canyon to Arden, 4330 MVArating
    d. There are no resources associated with the Trout Canyon-Arden project.
    e. GridLiance is requesting Interregional Cost Allocation.
7. Cascade Renewable Transmission System
    a. Cascade Renewable Transmission System- PowerBridge is proposing to construct the Cascade Renewable Transmission System Project. This Project is a 100-mile, 1,100 MW transfer capacity +/- 400 kV HVDC underground cable (95 percent installed underwater) interconnecting with the grid through two +/- 1100 MW AC/DC converter stations interconnecting with the AC grid at Big Eddy and Harborton substations. There are no proposed generation resources associated with the transmission line. PowerBridge is not seeking Regional Cost Allocation.

Alternative Projects

The Enrolled Parties Planning Committee did not identify any Alternative Projects: no Alternative Projects were carried over from the 2024-2025 cycle and no new Alternative Projects were submitted at the beginning of the 2026-2027 planning cycle.

Public Policy Requirements Summary

Approach

NorthernGrid evaluated regional transmission needs driven by Public Policy Requirements by first identifying a list of enacted public policies that impact resource and local transmission plans in the NorthernGrid planning region. This data was procured through the NorthernGrid data submission process and polling of members to inquire about enacted policies that are driving their regional transmission needs. NorthernGrid identified enacted public policies in the states within the NorthernGrid region.

Key Assumptions

- Enacted policies include local, state, and federal policies for the NorthernGrid member service area.
- Analysis focuses on enacted policies (through 2036) that address the type of energy portfolio to be delivered.
- Non-enacted policies are not included in the analysis.
- Policies pertaining to energy purchases or corporate goals are not included.
- WECC will provide an initial production cost model, but it is the responsibility of the NorthernGrid members to verify.
- Each member's IRP process incorporates public policy and the NorthernGrid members evaluate their IRP to determine the data that is submitted.

Key Observations

- There are enacted public policies in six of the eight states, including the Renewable Portfolio Standards (RPS) that exist in Washington, California, Oregon, Montana, Nevada, and Utah.
- There are no identified public policy requirements that are driving regional transmission needs in Wyoming and Idaho.

Case Analysis

Methodology and Assumptions Overview

This methodology defines the analysis objectives, conditions (NorthernGrid transmission system path stressing, power flow direction, imports/exports) necessary to assess the ability of the transmission system to support the 2036 loads and resource, types of analysis, performance criteria, paths to monitor, case checking and tuning (reactive devices, phase shifting transformers) and contingencies. This process is designed to meet Order 890 and 1000 planning requirements and is not intended to evaluate market efficiencies.

Analysis Objectives

The NorthernGrid Regional Transmission Plan will assess the existing transmission system and committed projects against combinations of planned and proposed transmission projects to compare their ability to reliably serve the forecasted 2036 load and generation dispatch conditions.

Performance Criteria

The power flow simulations will be monitored for compliance with the North American Electric Reliability Corporation (NERC) Reliability Standard TPL-001-5.1 and WECC Criterion TPL-001-WECC-CRT-4 and TOP specific standards. The reliability standard requires transmission facilities to operate within normal and emergency limits. The criterion further defines the default base planning criteria for steady-state, post-contingency, dip, and recovery voltage along with oscillation dampening. The WECC criteria also allow for transmission planners to apply a more or less stringent criterion for their own system provided they gain agreement or allowance, respectively.

Base Case Conditions

The following conditions have been studied in the past as being of the most interest to the NorthernGrid footprint and may be considered and subject to change for the 2026-2027 cycle:

1. Heavy system loading, lower renewable generation output
2. North to South, East to West interface flows
3. Low Hydro/End of Summer conditions
4. East to West interface flows
5. West to East interface flows
6. South to North interface flows
7. Summer peak loading condition
8. Winter peak loading condition
9. West of Cascades, North

Evaluation of Regional Transmission Project Combinations

To determine whether transmission needs within the NorthernGrid may be satisfied by regional transmission projects, NorthernGrid evaluates combinations of the proposed regional and interregional (if any) transmission projects independently and in regional combinations. The regional combinations are determined by the MPC based on their knowledge of the NorthernGrid Region.

Impacts on Neighboring Regions

As stated above, the power flow cases represent the entire western interconnection. Therefore, during the power flow analysis NorthernGrid will monitor for NERC standard and WECC criterion violations occurring in the neighboring regions. Upon identification of a violation in a neighboring region, NorthernGrid will coordinate with the region to confirm validity and whether the violation is due to an existing condition. Mitigation plans for a violation will be determined in accordance with the NorthernGrid Member tariffs and planning agreement.

Cost Allocation

Introduction

Regional project cost allocation is one of the FERC Order 1000 transmission planning reforms. The NorthernGrid FERC jurisdictional entities, the Enrolled Parties, describe the requirements for a project in their OATT Attachment K. The process begins with the sponsor/developer becoming qualified. The following developers submitted information and were determined to be qualified.

Qualified Developers

GridLiance submitted developer qualification information which was reviewed by the Cost Allocation Task Force (CATF) resulting in the approval of GridLiance as a Qualified Developer for this planning cycle.

Benefits and Beneficiary Analysis

If the Sponsored Project is selected into the plan as meeting Enrolled Party or Parties need, the project benefits and beneficiaries will be determined. The cost allocation metrics and analysis process is described in each Enrolled Party's OATT Attachment K – Regional Planning Process.