



Great Basin Transmission ITP Submission to NTTG



May 2018

LS Power

Power generation and transmission company formed in 1990

39,000+ MW

Power generation
development, construction
or operations experience

\$1+ billion

High voltage transmission
placed into operations
since 2013



\$39+ billion

Capital raised to finance
and support investments in
energy

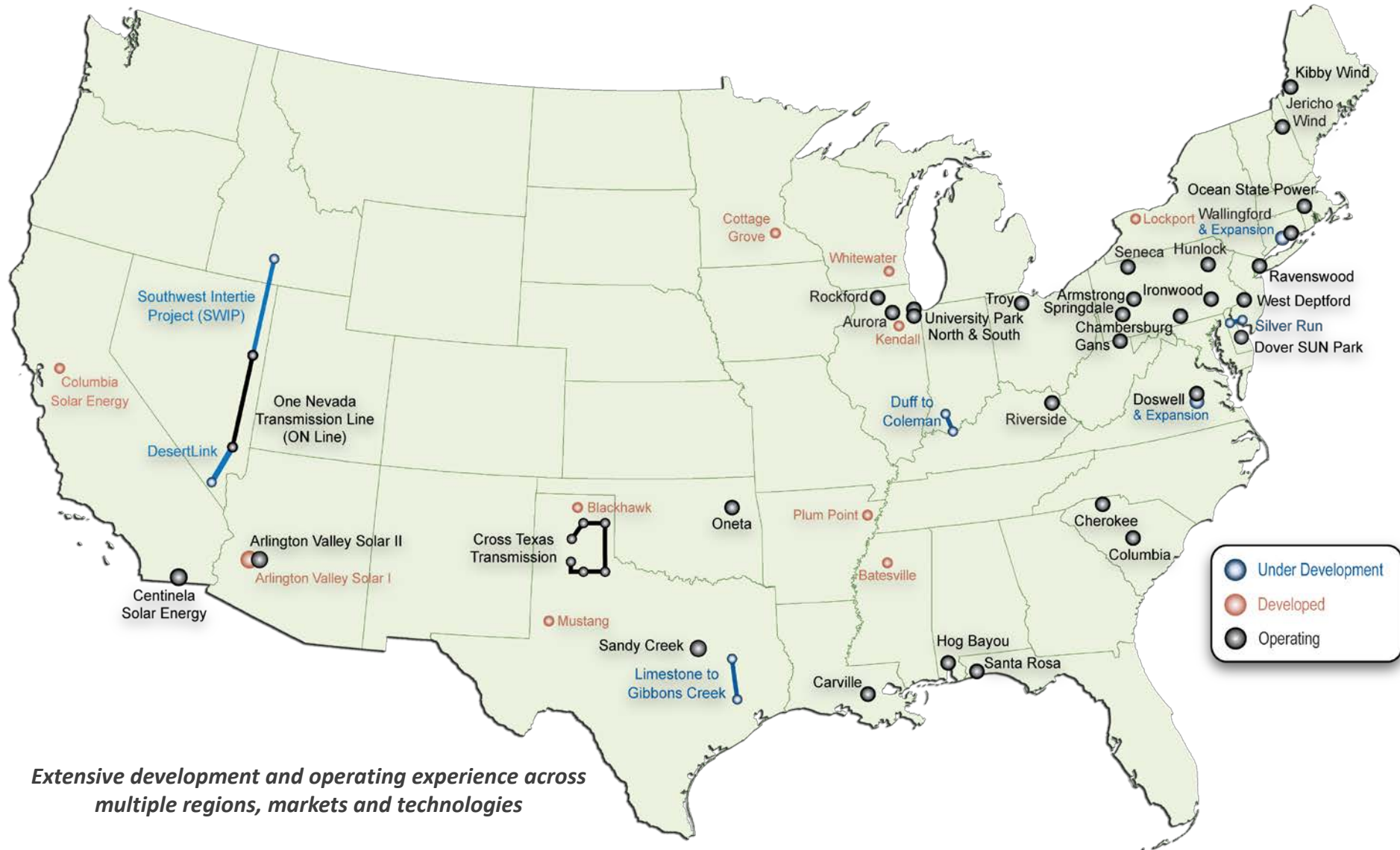
\$500+ million

High voltage transmission
in permitting or
construction

CAISO, ERCOT, MISO, PJM

Transmission competitively
awarded to LS Power

Project Portfolio



Extensive development and operating experience across multiple regions, markets and technologies

LS Power Transmission

One Nevada Transmission



Partnership with NV Energy

231 miles 500 kV transmission
8 miles 345kV transmission
EHV substation

\$500+ million construction cost

First connection between
northern and southern Nevada

Cross Texas Transmission



Selected by PUCT

260 miles 345 kV transmission
4 EHV substations

\$500 million rate base

Public Utility in Texas

Silver Run Electric



Selected by PJM in first
competitive process

3 mile 230 kV Delaware River
crossing, EHV substation

\$146 million construction cost
cap

Republic Transmission



Selected by MISO in first
competitive process

31 miles 345kV transmission

\$58 million cost cap

Public Utility in Indiana

DesertLink



Selected by CAISO in
a competitive process

60 miles 500 kV
transmission

\$145.5 million
construction cost cap

Limestone – Gibbons Creek

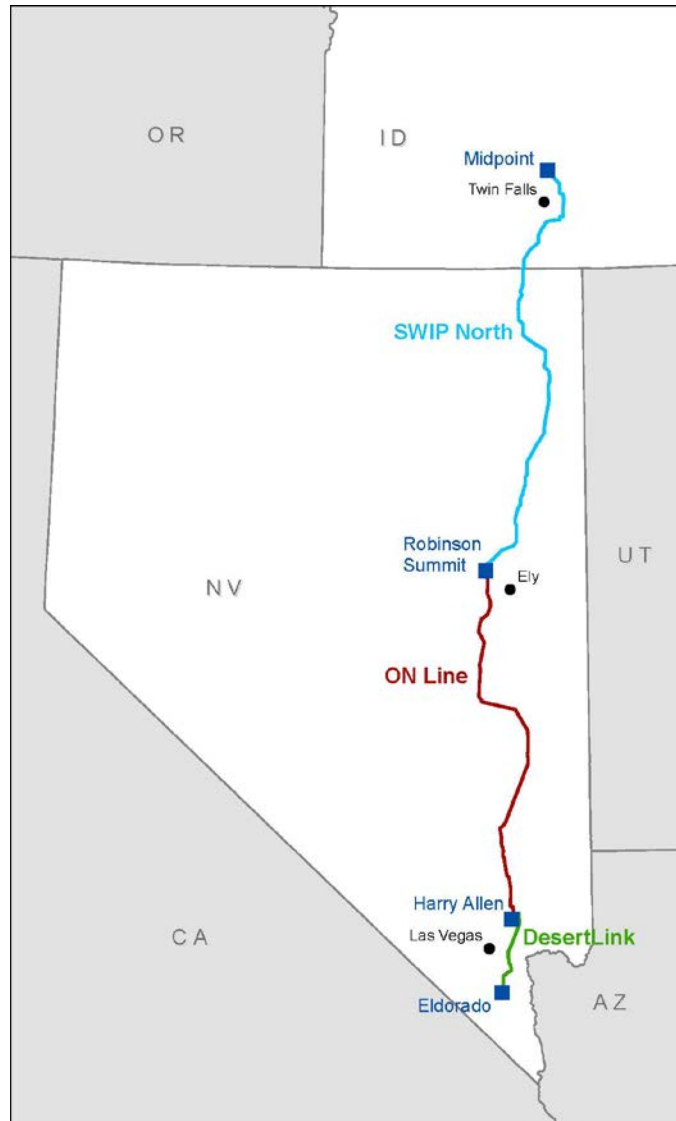
Partnership with
Garland Power & Light

67 miles 345 kV
transmission

\$200+ million
construction cost



Southwest Intertie Project



Phase I - ON Line (Robinson to Harry Allen) – Operating

- 231-mile 500 kV transmission line in Nevada
- Began commercial operations in January 2014
- First connection between Nevada Power Company and Sierra Pacific Power Company
- LS Power owns 75% with capacity leased to NV Energy who owns 25%

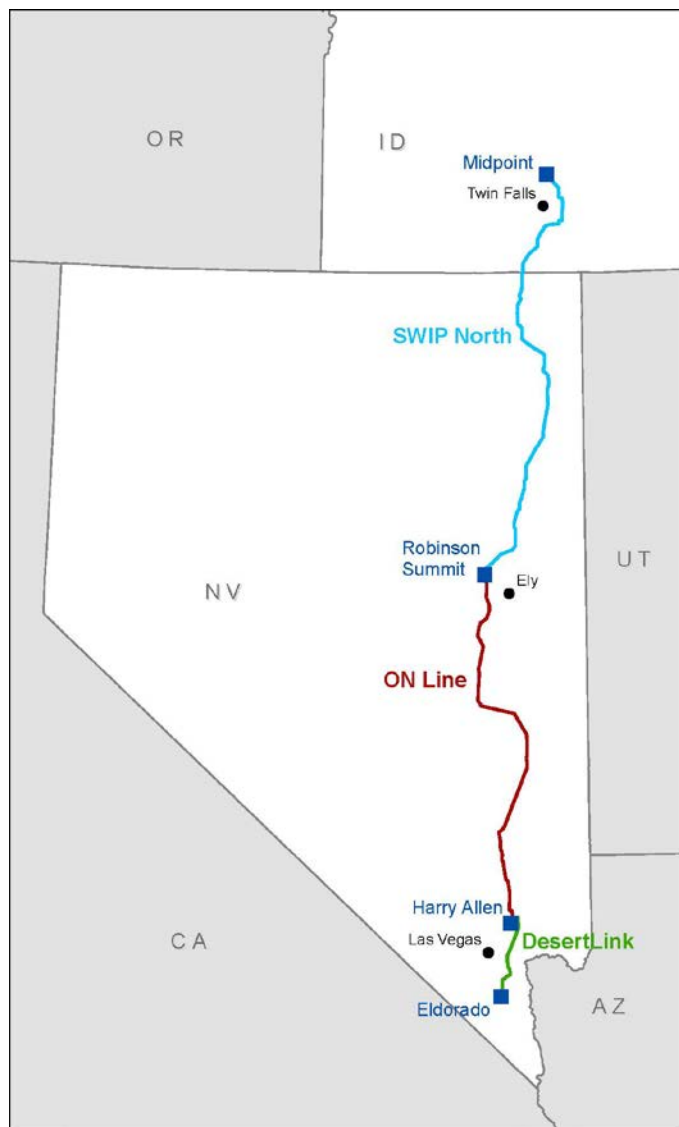
Phase II - DesertLink (Harry Allen to Eldorado) - Approved

- 60-mile 500 kV transmission line near Las Vegas
- Released for competitive solicitation pursuant to FERC Order 1000 in January 2015
- LS Power selected by CAISO as Approved Project Sponsor in January 2016
- Robust cost containment package including caps on construction costs (\$145.5 million), capital structure and ROE
- Scheduled to be in service by 2020

Phase III - SWIP North (Midpoint to Robinson) – Permitted, Seeking Cost Recovery

- 275-mile 500 kV transmission line in Idaho & Nevada
- Links PacifiCorp, Idaho Power and BPA to CAISO

SWIP Capacity & Cost Allocation



ON Line (Robinson to Harry Allen, 231 miles) – In Service

- Co-Ownership between NV Energy (25%) and LSP (75%)
- 100% of the cost borne by NVE:
 - 25% Up Front Capital
 - 75% Capital Reimbursed to LSP via Long Term Capacity Lease Payments
- 100% of capacity currently allocated to NVE

SWIP North (Midpoint to Robinson, 275 miles) – Not Yet In Service

- Owned 100% by LSP affiliate
- 100% of the cost responsibility = LSP
- When placed in-service, a capacity swap is triggered for both segments estimated as follows (*actual capacity will be a function of path rating, other factors*):

Segment	NVE Capacity, MW	LSP Capacity, MW
SWIP North	700	1,000
ON Line	1,000	1,000

SWIP North Overview

Missing Link for Western Grid Security, Congestion Relief & Renewable Integration

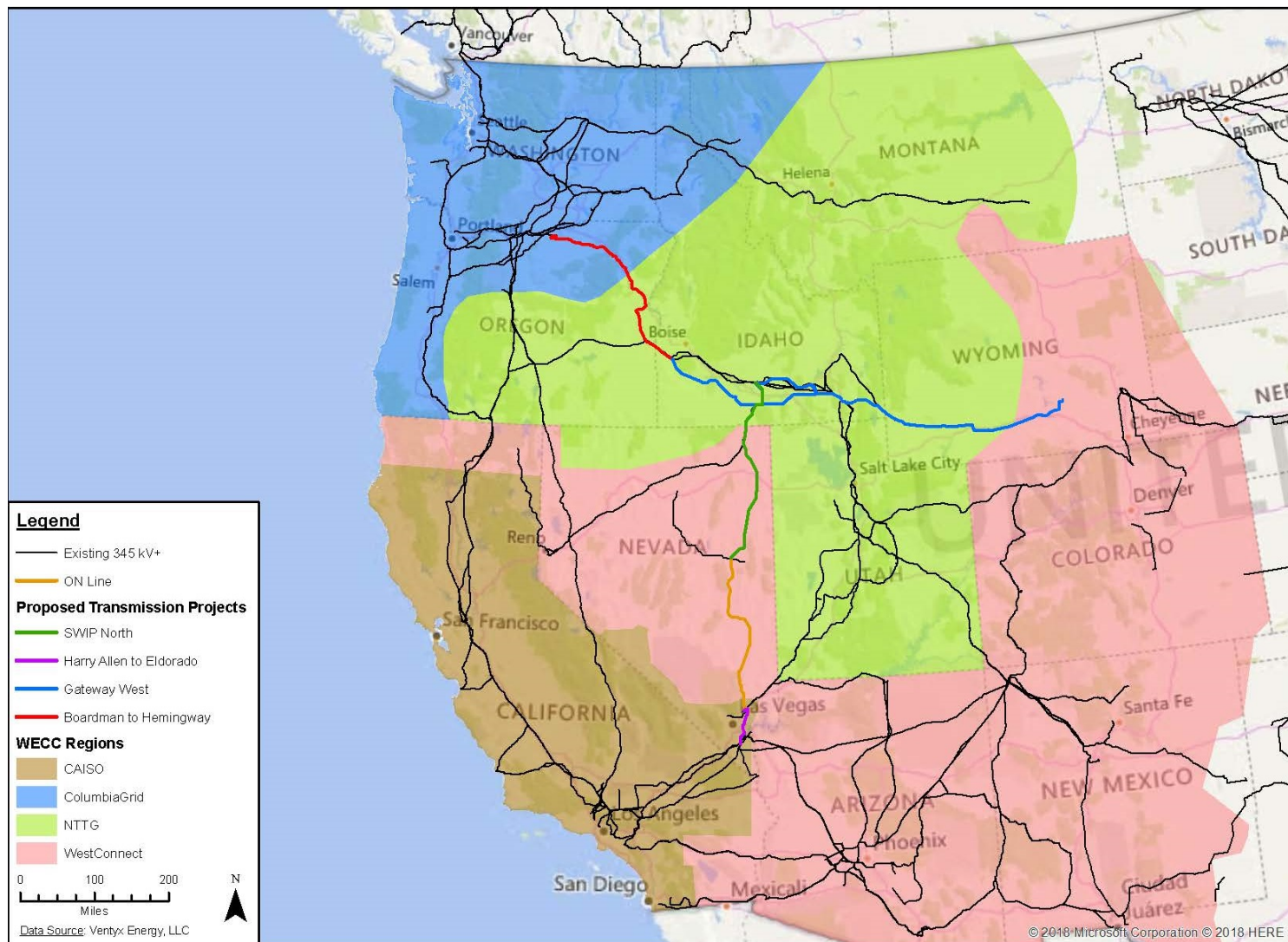
- Sponsor: Great Basin Transmission (LS Power)
- Location: Idaho/Nevada
- Cost: ~\$525 million total capital cost
- Scope: ~275 mile, 500 kV transmission line from Midpoint (Idaho Power) to Robinson Summit (NV Energy)
- Status:
 - Federal permits secured, ready for commercialization
 - Awaiting cost recovery (benefits to California & other Western states)
- Construction Start: As early as 2019
- In-Service: As early as 2021
- Benefits:
 - Completes 2,000 megawatt link between Desert Southwest and Pacific Northwest electric systems
 - Provides pathway for delivery of wind, hydro and other resources from North to South
 - Provides pathway to deliver excess solar from California and capture EIM benefits
 - Improves connectivity among major Western utility systems resulting in a more efficient and less congested grid and savings for consumers
 - Enhances system reliability for entire Western grid
 - 250-300 construction jobs during 2 to 3 year construction period
 - Local & state tax revenues



SWIP North Development Status

- Federal Approvals
 - Federal NEPA process complete
 - BLM Rights-of-Way secured
 - Construction, Operation and Maintenance Plan Approved
 - Conditional Notice to Proceed with Construction Issued
- State and Local Approvals
 - No County Approvals Required in Idaho
 - White Pine County, Nevada Special Use Permit & Development Agreement Approved
 - Key permits to be obtained:
 - Elko County, Nevada Special Use Permit
 - Public Utilities Commission of Nevada UEPA Permit
- Transmission Interconnection Requests Filed
 - Midpoint Substation – Idaho Power
 - Robinson Substation – NV Energy
- WECC Path Rating - Phase II draft report stage
- Private Real Estate Acquisition substantially complete

WECC Planning Regions



Region boundaries are approximate for illustrative purposes only

SWIP North ITP Submittal

SWIP North was submitted as an Interregional Transmission Project (ITP) to CAISO, NTTG, & WestConnect

- Requested study as an economic/policy ITP with cost allocation
- Study scope is Midpoint to Harry Allen, cost allocation scope limited to Midpoint to Robinson (Robinson to Harry Allen already in service)
- Three (3) Relevant Planning Regions with “direct electrical interconnection”, FERC approved contractual path from Midpoint to CAISO at Harry Allen
- Includes two studies demonstrating substantial benefits estimated at ~\$70-\$235 million (2018 USD) per year
- Studies identify policy and reliability benefits in addition to economic benefits
- CAISO connection is via ON Line project at Harry Allen with DesertLink line in service as of 2020
- LS Power has ~1000 MW of available capacity on ON Line to match LS Power’s ~1000 MW on SWIP-North
- NV Energy responsible for full cost of ON Line, to be considered in cost allocation analysis
- Total path rating up to ~2000 MW

Overview of SWIP North Benefits

SWIP North improves transfer capability between CAISO, PacifiCorp, NV Energy, Idaho Power, and BPA with many benefits:

Economic Benefits

- Energy Savings, Congestion Reduction & Producer Benefits
- Capacity and Geographical Diversity
- Increased EIM benefits

Policy Benefits

- Helps meet west wide RPS and GHG goals
- Aids in over-generation management and reduces renewable curtailment

Reliability Benefits

- Helps prevent WECC NE/SE separation in the event of loss of COI lines
- Addresses Northern CA bulk transmission overloads
- Significant incremental transfer capability
- Insurance value against unforeseen events
- Overcomes 776 MW transfer limit identified in E3 integration study
- Resource procurement savings
- Lower peak capacity needs
- More efficient unit commitment and dispatch

Summary of SWIP North Studies

CAISO

- Evaluated as regional economic project in 2015-16, 2016-17 and 2017-18 annual plans, and as an ITP in the 2016-17 and 2017-18 plans.
- Helps resolve congestion on the Bulk System in Northern California.
- Benefits associated with access to out-of-state resources to achieve 50% renewables goal by 2030 need to be taken into account in future planning forums.
- Considered a 3-region interregional project and therefore should be submitted as an ITP for future evaluation.

NTTG

- Evaluated as regional economic project in 2014-15 and 2016-17 biennial plans, and as an ITP in the 2016-17 plan
- Not selected as a more efficient or cost-effective solution for the regional needs identified in those particular plans.

WestConnect

- Evaluated as an ITP in 2016-17 biennial plan, no regional needs identified

Low Carbon Grid Study

- www.lowcarbongrid2030.org
- SWIP North preferred path for WY wind to CAISO rather than the alternative of wheels through NV Energy or LADWP.
- SWIP North flows are bi-directional both seasonably and diurnally and perform functions other than delivering WY wind to CA...renewable economy energy

SWIP North Additional Studies

CEERT/NREL Study

- Conducted by Center for Energy Efficiency and Renewable Technologies (CEERT) and National Renewable Energy Laboratory (NREL)
- Performed production cost modeling with and without SWIP-North to quantify benefits identified in the Low Carbon Grid Study (LCGS)
- Started with LCGS Phase II Target Conventional scenario (50% RPS in California)
- TEPPC 2024 Common Case, with nodal analysis throughout WECC
- Gateway West and Gateway South in service
- Sensitivity case without Gateway South
- 2,725 MW of Wyoming wind generation injection at Aeolus
- 1,000 MW from Midpoint to Harry Allen available with no hurdle rate

Brattle Study

- Conducted by The Brattle Group
- Quantitative and Qualitative analysis of benefits with reference to:
 - Previous studies that considered SWIP-North & CEERT/NREL Study
 - Previous Brattle studies
 - EIM studies
 - PacifiCorp/CAISO integration study
 - Various WECC reports/studies

CEERT/NREL Study

- Conducted by Center for Energy Efficiency and Renewable Technologies (CEERT) and National Renewable Energy Laboratory (NREL)
- Extension of the 2015 Low Carbon Grid Study (www.lowcarbongrid2030.org)
- 50% RPS in California, 2,725 MW of wind in Wyoming
- Limited to production cost benefits only

Results

- Base Case ~\$70 million (2018\$) annual benefits by adding SWIP-North
- Sensitivity Case ~\$115 million (2018\$) annual benefits by adding SWIP-North with no Gateway South
- Gateway South sensitivity was included to examine the impact of any potential delays in the timing of construction of Gateway South.
- Congestion reduction on California Oregon Interface & WECC Path 26
- Allocation of benefits among the regions would require additional study
- Capacity and reliability benefits were not quantified
- CAISO regional expansion would enjoy increased benefits with SWIP-North

The Brattle Group Study

Brattle identified numerous categories of benefits, some of which were quantified in the study, resulting in the following estimates (2030 USD).

- Energy Market Value = >\$110-\$150 million per year
- COI Congestion Relief = \$23-\$59 million per year
- EIM Benefits = >\$26 million per year
- Wheeling Revenues = \$28 million per year
- Load Diversity/Capacity Sharing = \$15-\$45 million per year
- Reliability Benefits = not quantified
- Insurance Value = not quantified

Total Benefits estimated in excess of \$135-\$235 million per year (2018 USD)

Not building SWIP North will result in significant annual ratepayer costs could otherwise be avoided.