Great Basin Transmission
ITP Submission to
California ISO





May 2018

LS Power

Power generation and transmission company formed in 1990

39,000+ MW

Power generation development, construction or operations experience

$39+ billion

Capital raised to finance and support investments in energy

$1+ billion

High voltage transmission placed into operations since 2013

$500+ million

High voltage transmission in permitting or construction

CAISO, ERCOT, MISO, PJM

Transmission competitively awarded to LS Power

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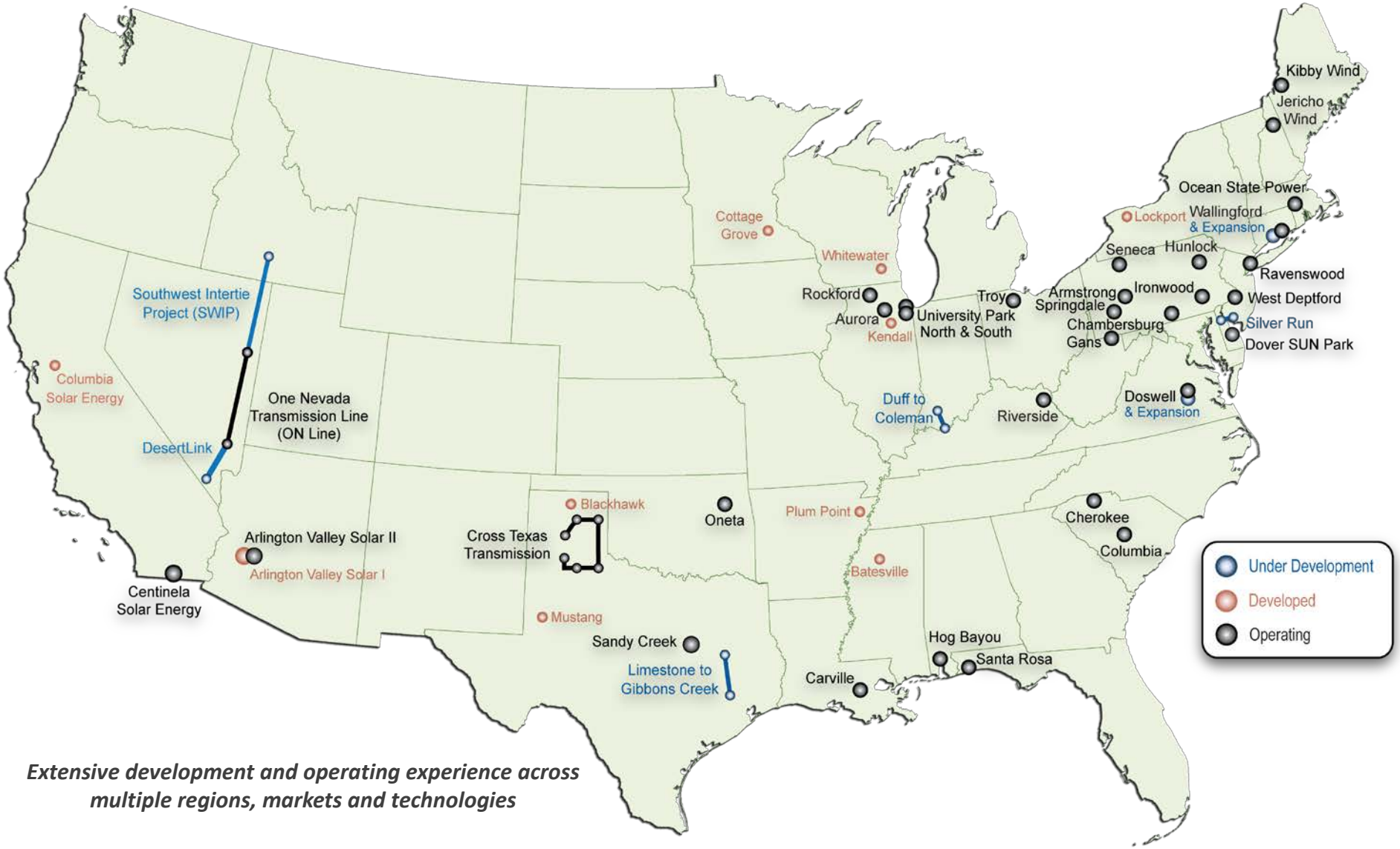
Project Portfolio



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

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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

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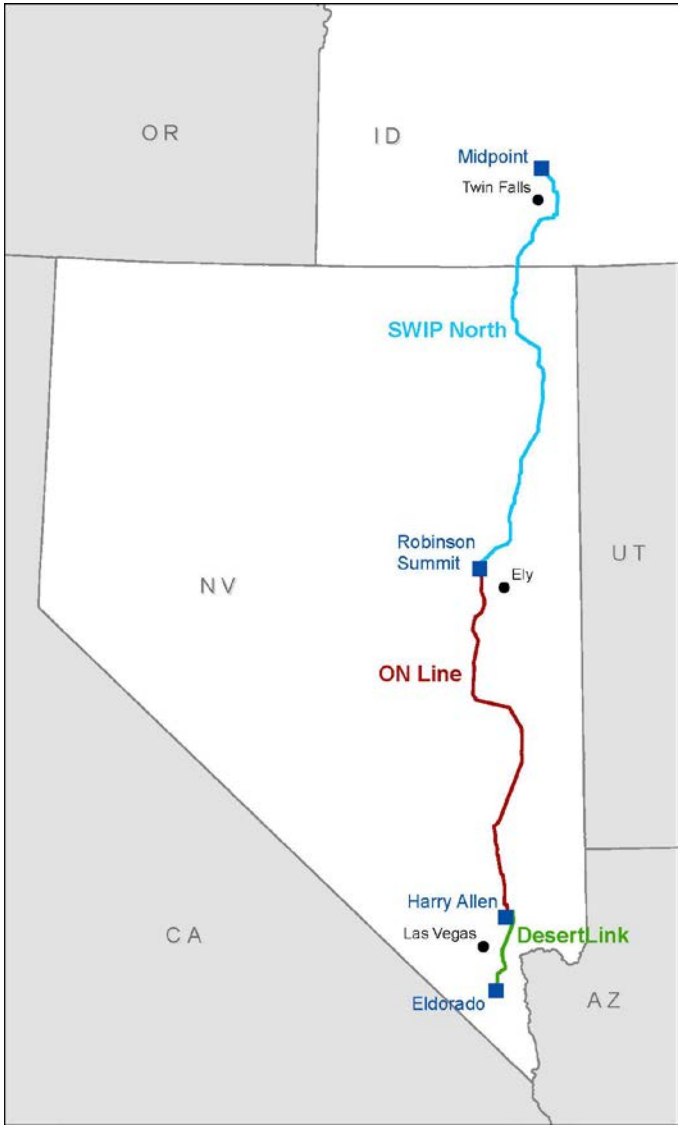
Southwest Intertie Project



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%

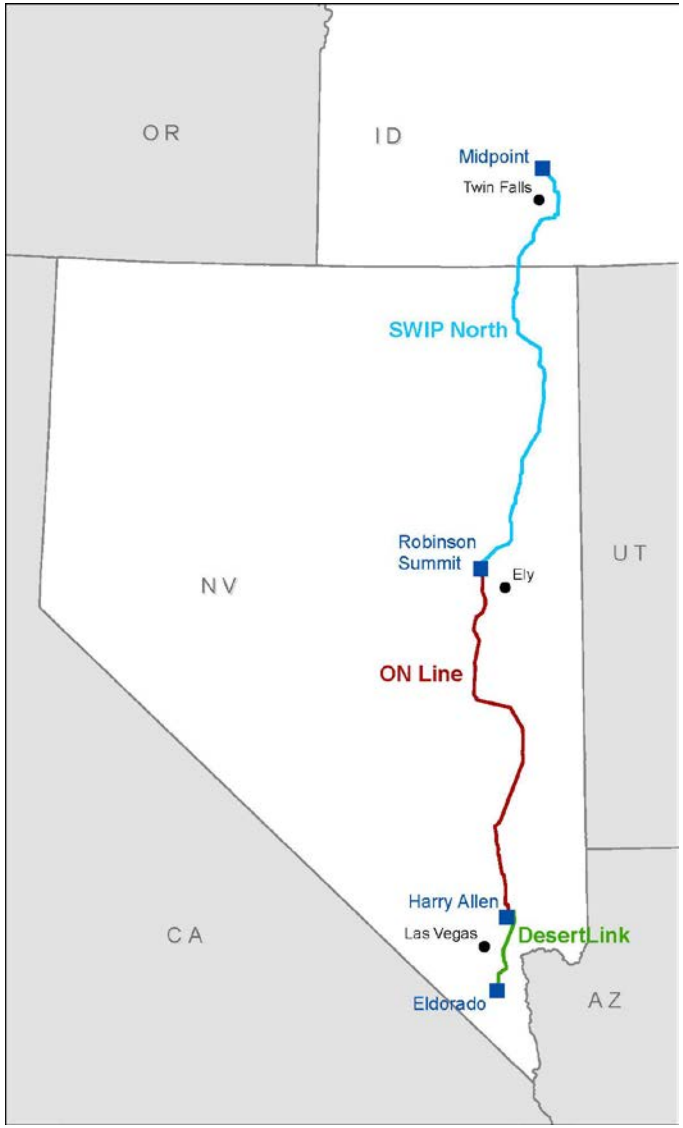
Phase II - DesertLink (Harry Allen to Eldorado) - Approved

- 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

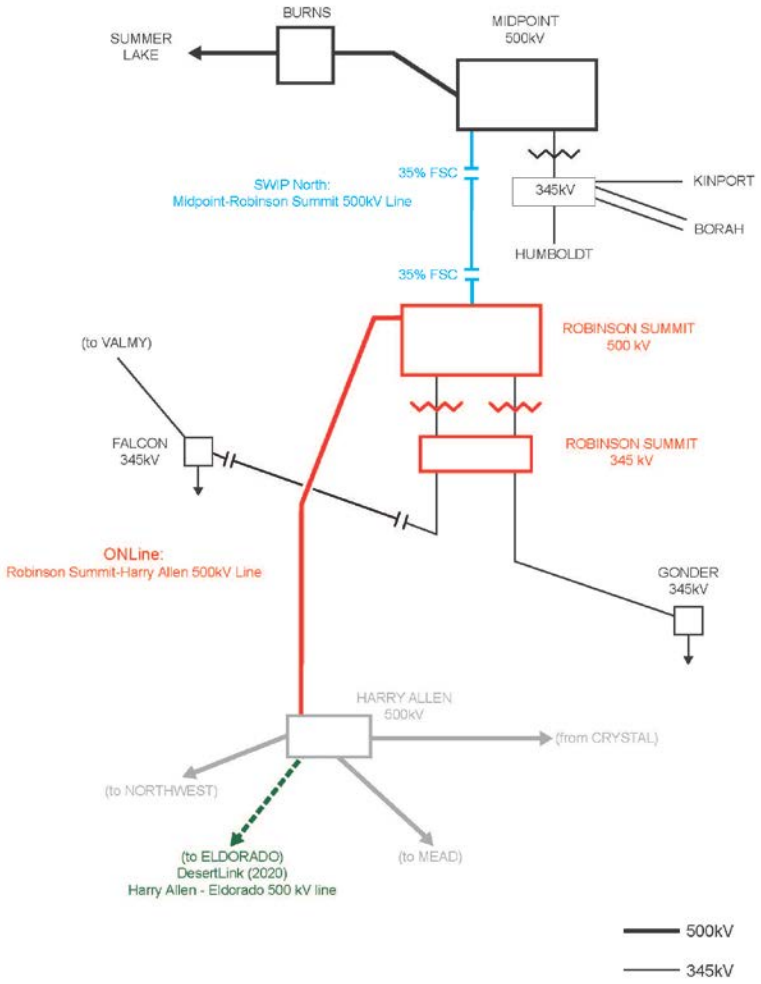
SWIP North Overview

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 One Line

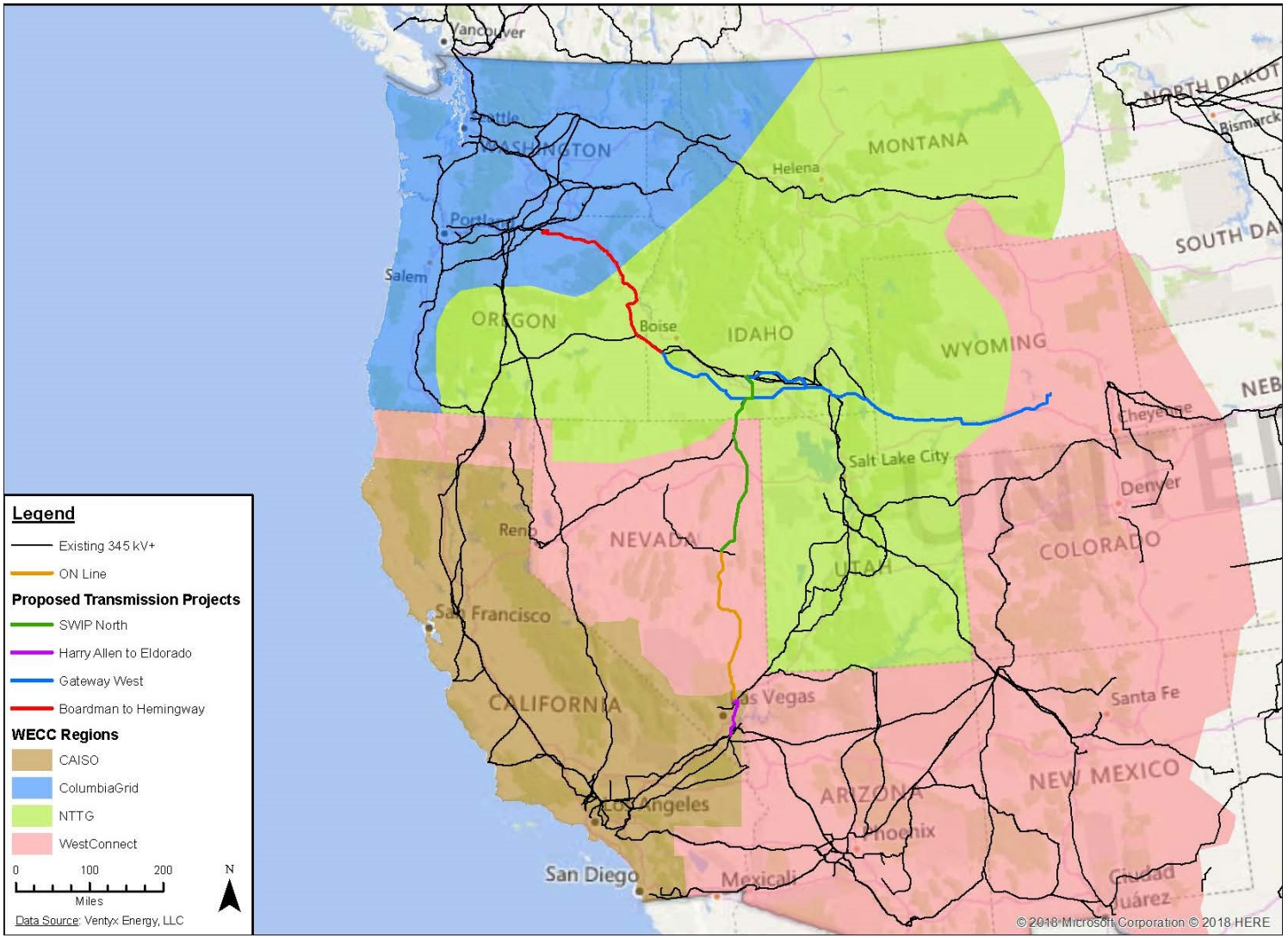


- 2021 In-Service Date
- 500 kV AC Single Circuit
- 1590 ACSR Lapwing Conductor
- Guyed/Self-Supporting Steel Structures
- 35% series compensation at or near Midpoint 500 kV
- 35% series compensation at or near Robinson 500 kV
- Additional network upgrades on ON Line and 345 kV system TBD

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

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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.

The Brattle Group Supplemental Study

Brattle conducted a supplemental study focused on resolving COI congestion.

- CAISO DMM Reports show $50-$147 million of annual congestion costs for California ratepayers at the California-Oregon Intertie (COI)
- Previous Brattle Report identified COI congestion relief of $23-$59 million per year if SWIP-North is constructed
- CAISO's planning model does not currently have the capability to model contract paths and associated scheduling constraints in a way that captures the realities of bilateral transactions (e.g., using point-to-point transmission service)
- Brattle identified adjustments that can be made to CAISO planning models to help resolve this discrepancy
- If CAISO models can be corrected to reflect actual projected congestion, SWIP-North becomes an economic solution for CASIO, with all the other benefits of SWIP-North described herein as "free" benefits