LS Power

Southwest Intertie Project (SWIP) North

Overview of March 2016 ITP Submissions to

CAISO, NTTG & WestConnect

Bringing Energy Forward

LS Power

- LS Power is a power generation and transmission group

Power Generation

- Over 32,000 MW of development, construction, or operations experience
- Active development of renewable and fossil generation resources

Transmission

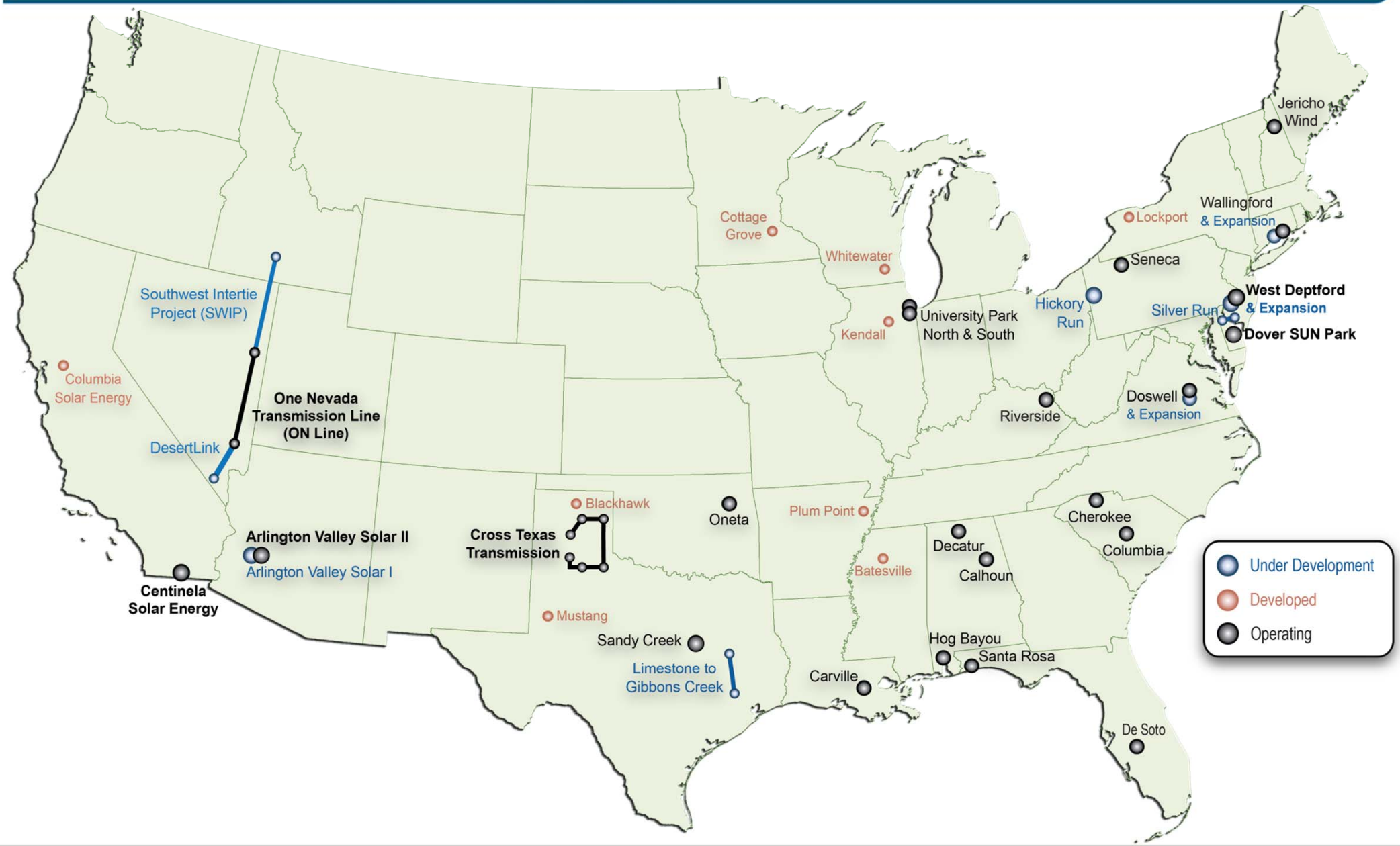
- Over 470 miles of 345-500kV development, construction or operations experience
- Rate regulated transmission utility in the State of Texas
- Active development of high-voltage transmission throughout North America

Acquisition

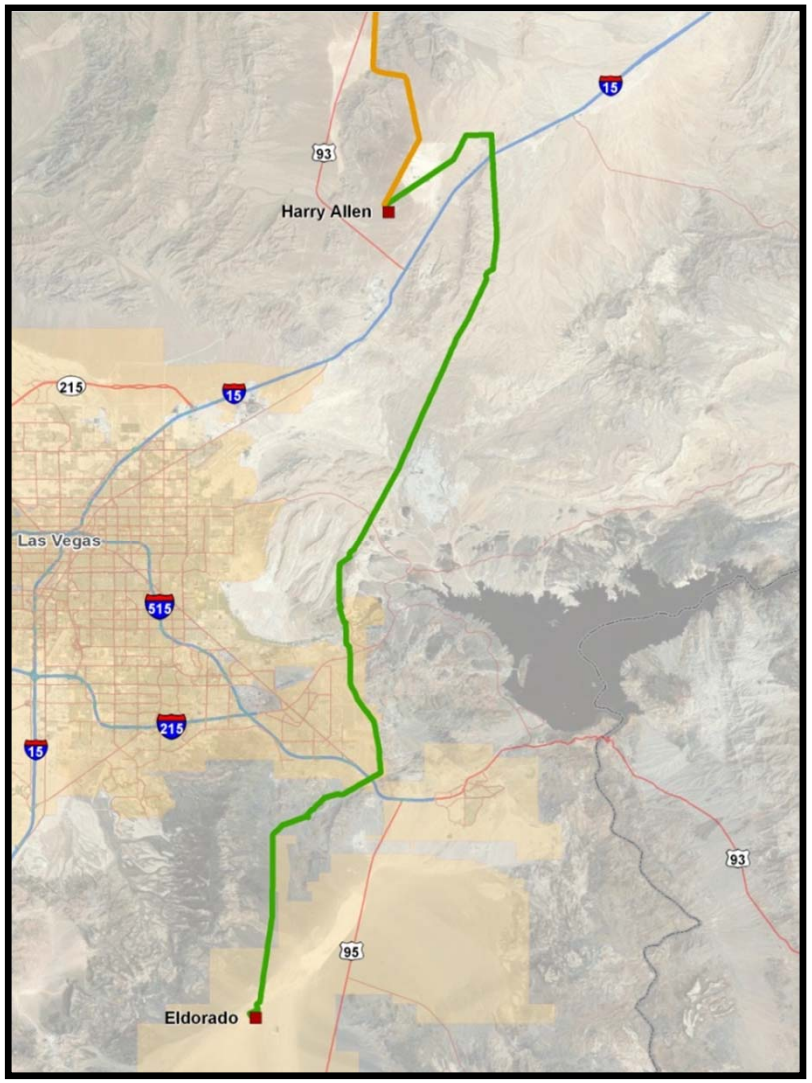
- Over $6 billion in private equity capital dedicated to energy sector
- Acquired over 20,000 MW of power generation

Functional Expertise			
Project Development	Transmission	Licensing & Environmental	Project Finance & Execution
Regulatory, Legal & Compliance	Power Marketing & Energy Management	Engineering & Construction	Operations Management

Project Portfolio



DesertLink (Harry Allen to Eldorado)

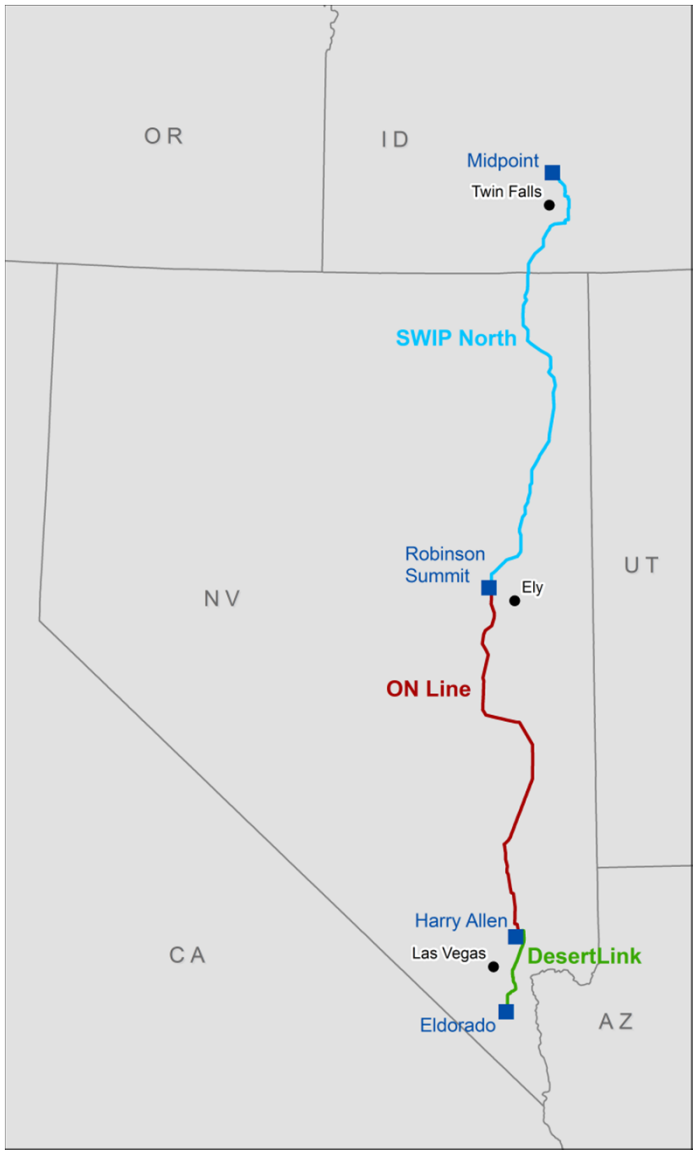


- 60-mile 500 kV transmission line near Las Vegas, Nevada
- Approved by California ISO as economic project in December 2014
- Released for competitive solicitation pursuant to FERC Order 1000 in January 2015
- LS Power affiliate DesertLink, LLC, selected as Approved Project Sponsor in January 2016
- Scheduled to be in service by 2020
- DesertLink selected based on low risk profile:
  - Recent experience permitting and constructing ON Line project which shares a terminus at Harry Allen
  - Advanced development progress including federal rights of way through congested corridor and state permit
  - Robust cost containment package

One Nevada Transmission Line (ON Line)

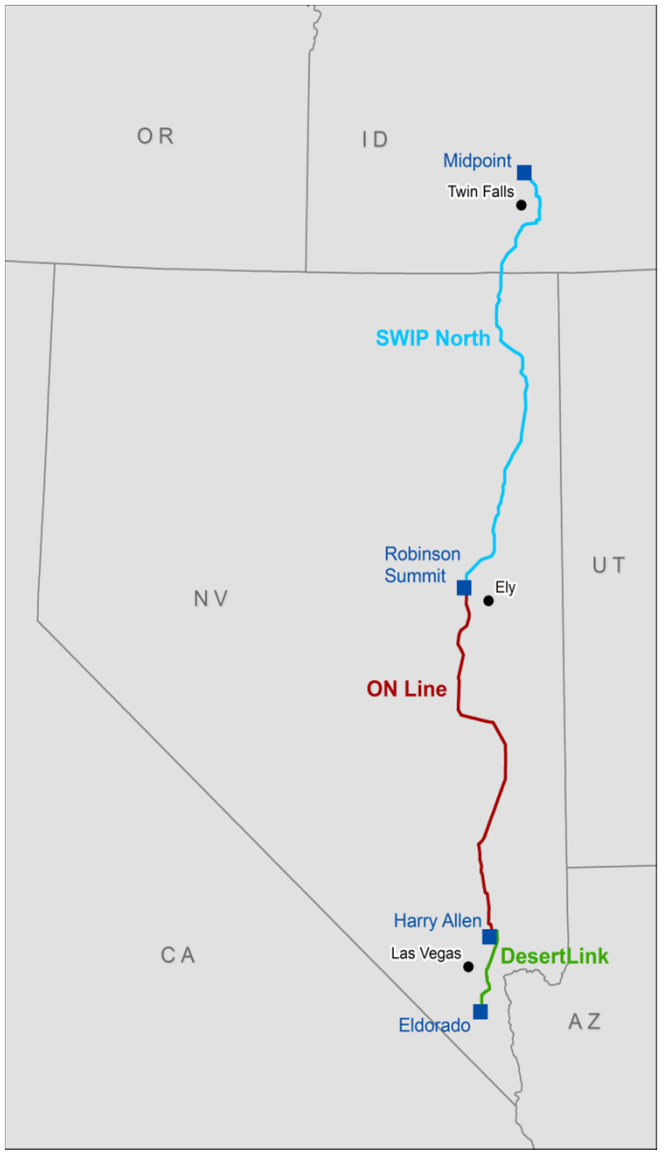
- 231-mile 500 kV transmission line in Nevada
- Operations began January 2014
- Partnered with NV Energy
  - LS Power owns 75% with capacity leased to NV Energy
  - Operates under NV Energy OATT
- 500/345 kV substation and 345 kV series compensation
- First ever connection between Nevada Power Company and Sierra Pacific Power Company
- Financing through the U.S. Department of Energy Loan Guarantee Program

Southwest Intertie Project



- Midpoint to Robinson Summit 500 kV line (SWIP North)
  - ~275 miles
  - NEPA complete
  - BLM issued Notice to Proceed
  - 24 months Construction
  - Target In-service 2021
- Robinson Summit to Harry Allen 500 kV line (ON Line)
  - ~231 miles
  - Currently In service
  - 100% capacity NVE until SWIP North completion, capacity sharing thereafter
- Harry Allen to Eldorado 500 kV line (DesertLink line for CAISO)
  - ~60 miles
  - FERC Order 1000 competitive project
  - In service by 2020

SWIP Capacity and Cost Allocation



Phase 1 - ON Line (231 miles, Robinson to Harry Allen)

- Co-ownership NVE and an LS Power affiliate
- 100% of cost related to ON Line borne by NVE
- 100% capacity to NVE, under NVE OATT

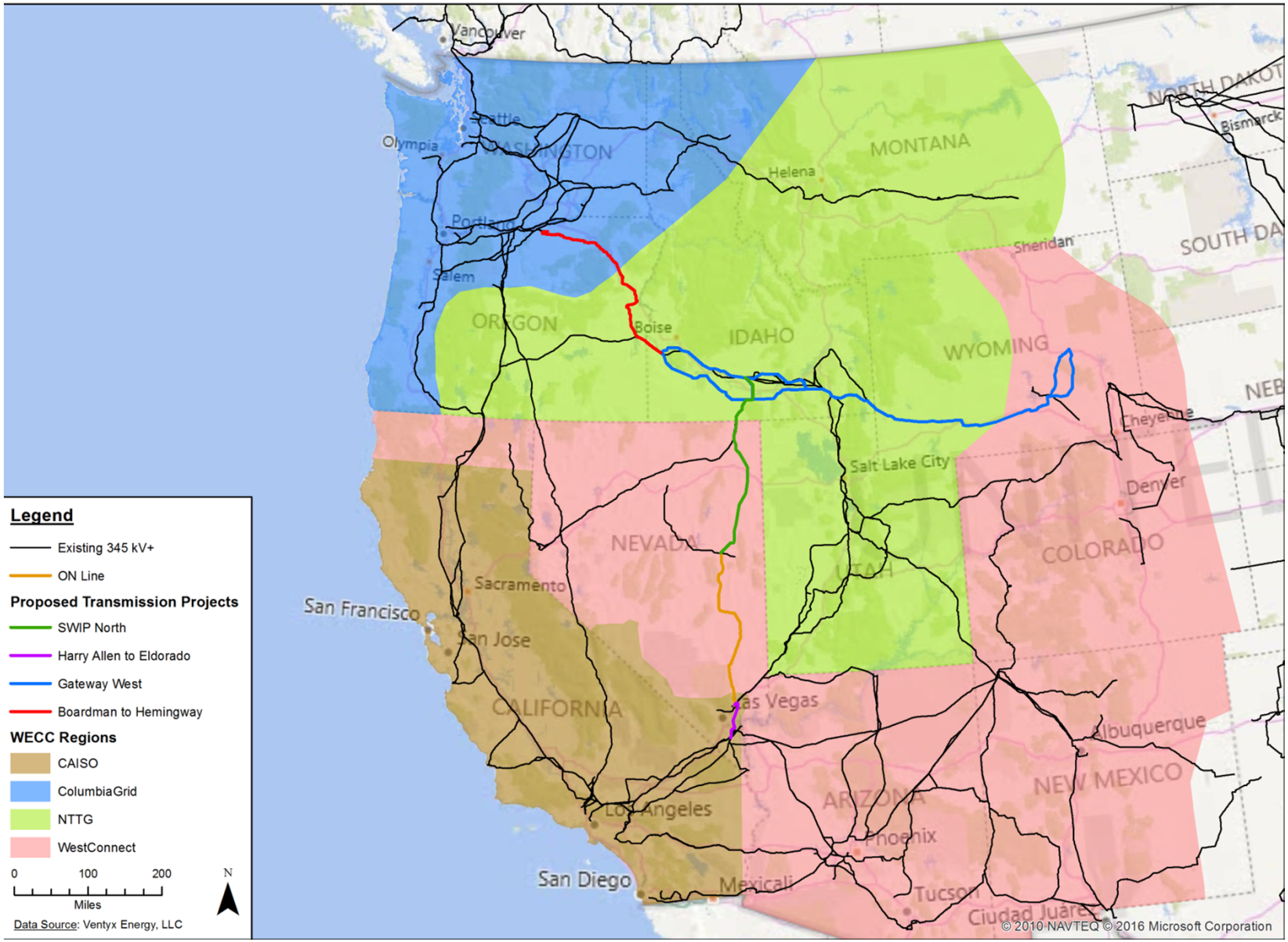
Phase 2 – SWIP North (275 miles, Midpoint to Robinson)

- New path from Midpoint to Robinson Summit
- Uprate of ON Line path
- Owned 100% by LS Power affiliate GBT
- 100% of cost related to SWIP North borne by GBT
- Capacity exchange on both segments, estimated to be:

	NVE Capacity (MW)	LSP Capacity (MW)
SWIP-N (Midpoint-Robinson)	700	1,000
ON Line (Robinson-Harry Allen)	1,000	1,000

(actual value will be function of path rating, other factors)

WECC Planning Regions



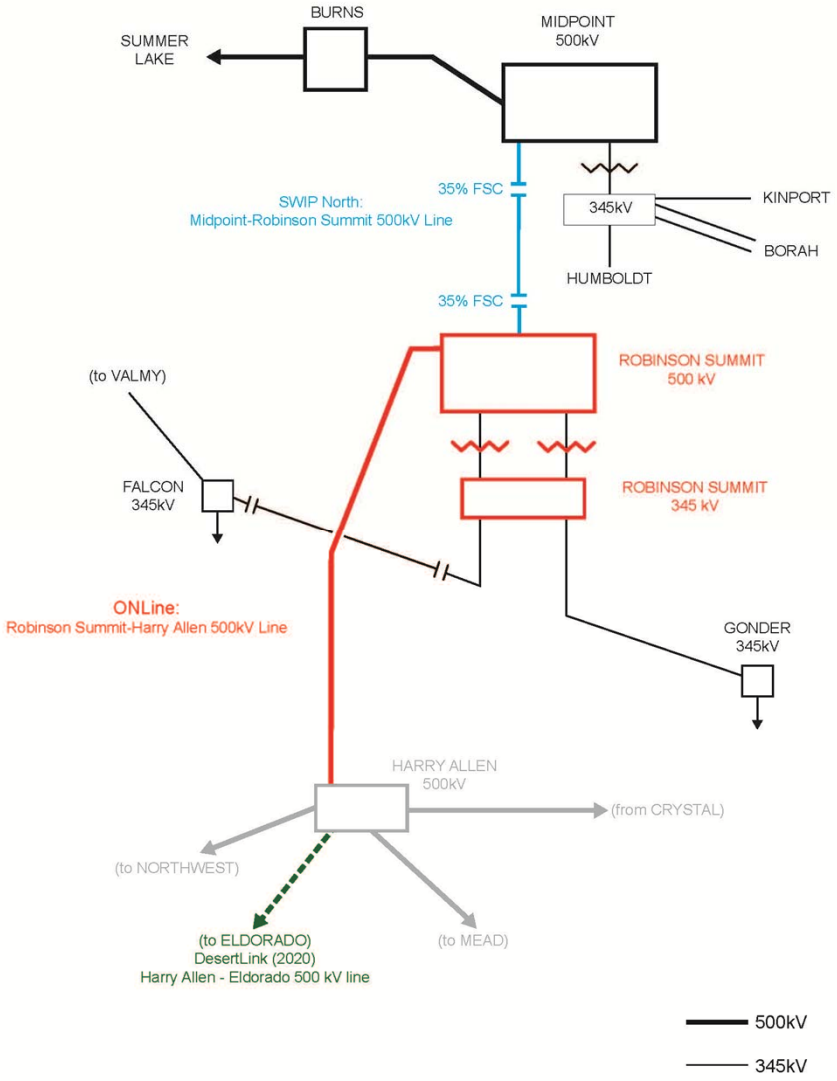
Region boundaries are approximate for illustrative purposes only

SWIP North ITP Submissions

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

- LS Power Submission Entities
  - Great Basin Transmission, LLC: CAISO, NTTG
  - Western Energy Connection, LLC: WestConnect
- Study as an economic/policy ITP with cost allocation
- Includes two new studies demonstrating substantial benefits estimated at >$200-$300 million per year
- Studies identify economic, policy and reliability 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

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 system 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
  - White Pine County Special Use Permit and Development Agreement Approved
  - Key permits to be obtained
    - Elko County 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

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 against unforeseen events such as Aliso Canyon
- Enhanced Benefits for CAISO/PacifiCorp integration
  - Overcomes 776 MW transfer limit identified in E3 integration study
  - Resource procurement savings
  - Lower peak capacity needs
  - More efficient unit commitment and dispatch

SWIP North Previous Studies

- CAISO
  - Evaluated as regional economic project in 2015-16 annual plan
  - 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 biennial plan
  - Not selected into the Draft Final RTP as a more efficient or cost-effective solution for the regional needs identified in that particular plan.
- 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 New 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

- Results
  - Base Case ~$65 million (2014$) annual benefits by adding SWIP-North
  - Sensitivity Case ~$107 million (2014$) 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.
  - Reduction in flows on COI & Path 26 were noted with SWIP North
- Analysis
  - Results are for a single plausible scenario in 2030
  - Many more sensitivities could be performed on various renewable portfolios, load assumptions, gas prices, carbon prices, etc.
  - Zonal analysis in LCGS performed many of these sensitivities showing robust flows on SWIP North
  - Allocation of benefits among the regions would require additional study
  - Capacity and reliability benefits were not quantified
  - PacifiCorp/CAISO integration would result in increased benefits from SWIP North

Brattle Study

- Results

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

  - 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

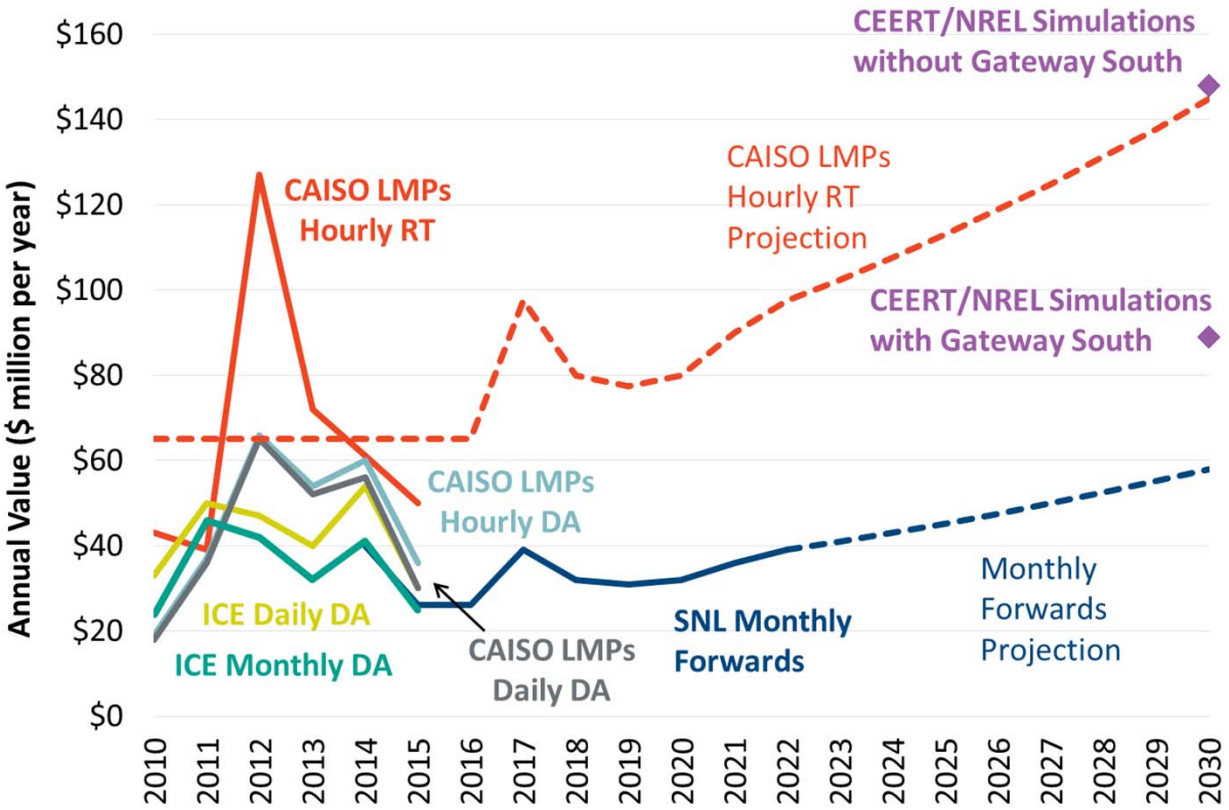
  Total Benefits estimated in excess of $200-$300 million per year.

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

Brattle Study (cont.)

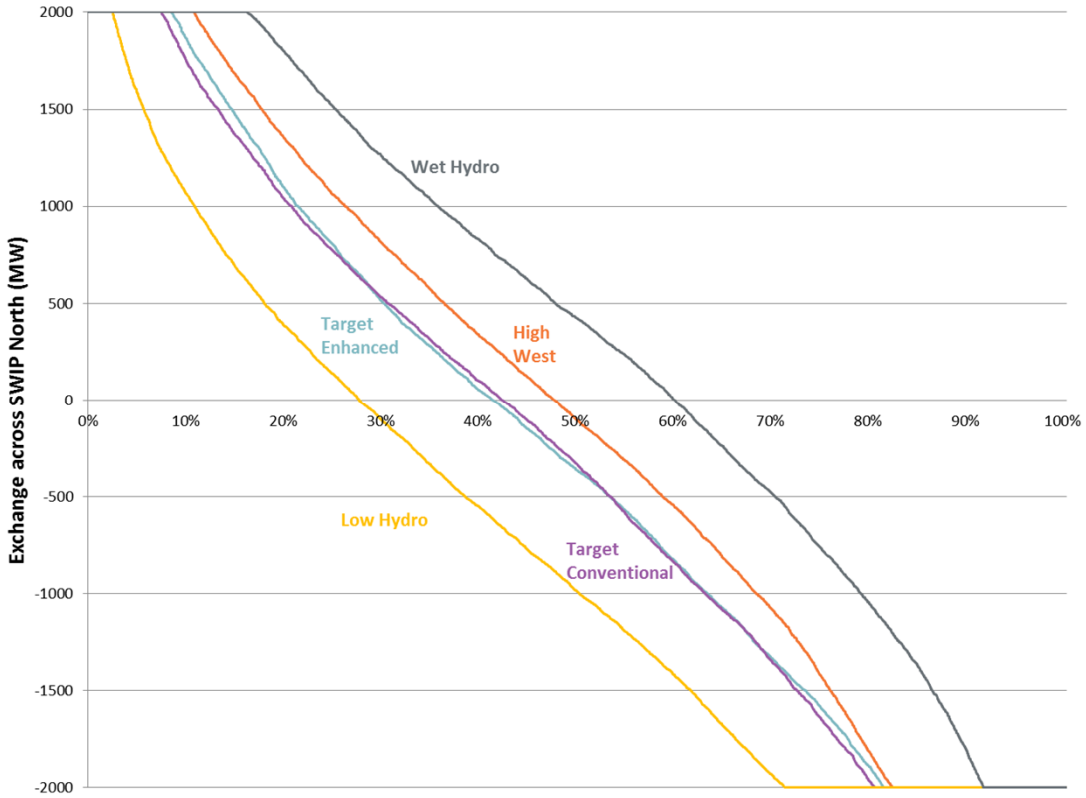
- Energy Market Value
  - Bookend estimate of production cost savings >$110-$150 million
  - Based on real time LMPs at Malin & Eldorado

Historical and Projected Annual Energy Market Value and Estimated Production Cost Savings (2030$)



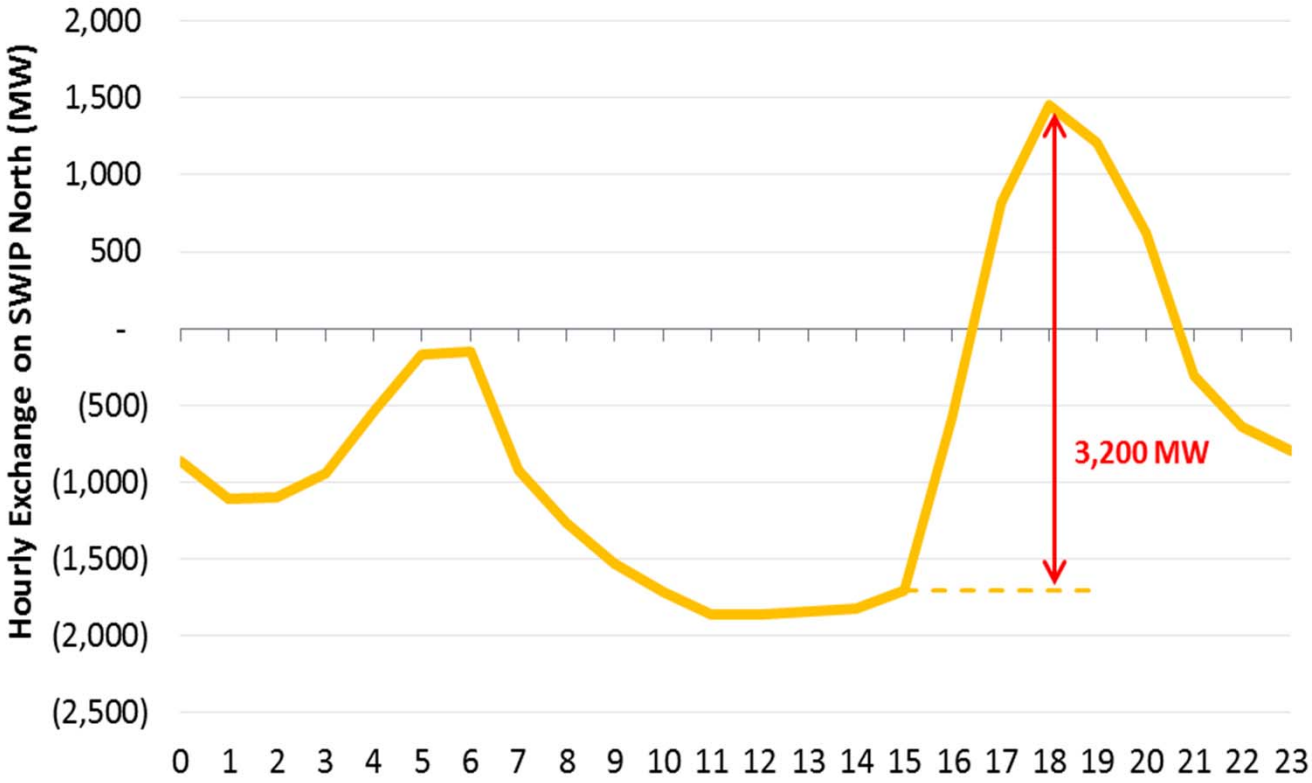
Brattle Study (cont.)

- Energy Market Value
  - Low Carbon Grid Study shows SWIP-N highly utilized for wide range of future renewable portfolios and Northwest hydro conditions



Brattle Study (cont.)

- Energy Market Value
  - Low Carbon Grid Study shows SWIP-N provides noteable ramping benefits, particularly CAISO daily afternoon transitions from high solar (south-to-north flow) to peak load (north-to-south flow)
  - Value of these additional benefits not quantified in this study



Brattle Study (cont.)

- COI Congestion Relief
  - 300 MW of congestion relief from SWIP North
  - CAISO's normal simulation approach underestimates actual congestion
  - CAISO 2015-16 Plan estimates $0.3 million in 2025
  - Actual congestion costs $60-$150 million in 2012-2014
  - CAISO 2015-16 Plan found SWIP-N reduces congested hours by 39%
  - Benefits of 300 MW valued at $23-$59 million per year
- EIM Benefits
  - PacifiCorp EIM study showed $26 million per year for 400 MW increase in transfer capability
  - SWIP North will create >1000 MW of new transfer capability
- Wheeling Revenues
  - Each 1000 MW of p-to-p transmission service sold by NTTG or WestConnect utilities to access SWIP-North would generate an estimated $28 million per year
  - Current PacifiCorp tariff rates used as a proxy

Brattle Study (cont.)

- Load Diversity/Capacity Sharing
  - Interconnects regions with divergent load patterns
  - Reduced RA requirements by aligning coincident peaks
  - Used conservative estimates of avoided costs
  - Benefits valued at $15-$45 million per year
  - Additional benefits not quantified due to peak differences between IPC and PacifiCorp, estimated 600 MW of capacity sharing

- Reliability Benefits
  - Helps prevent WECC NE/SE separation in the event of loss of COI lines
  - Reinforces 345 kV system, shifts flows away from 345 kV constraints
  - Regional backbone to 500 kV system
  - Operational flexibility during outages
  - Benefits not quantified in this study

Brattle Study (cont.)

- Insurance Value
  - Mitigate energy price spikes associated with extreme events and market fluctuations
  - Short Term Uncertainties such as extreme contingencies, constrained fuel supplies, weather conditions leading to operational variations and outages
  - Long Term Uncertainties such as fuel pricing shifts, technology costs, environmental regulations, public policy changes
  - Examples:
    - During 2012 energy price spike, energy market value of SWIP-North would have been $127 million vs. $53 million during normal conditions in the several years prior to and following 2012
    - Aliso Canyon gas leakage
    - North-South path outages
  - Benefits not quantified in this study