



WestConnect Annual Interregional Information

Annual Interregional Coordination Meeting
March 9, 2023
SRP PERA Club, Tempe, AZ

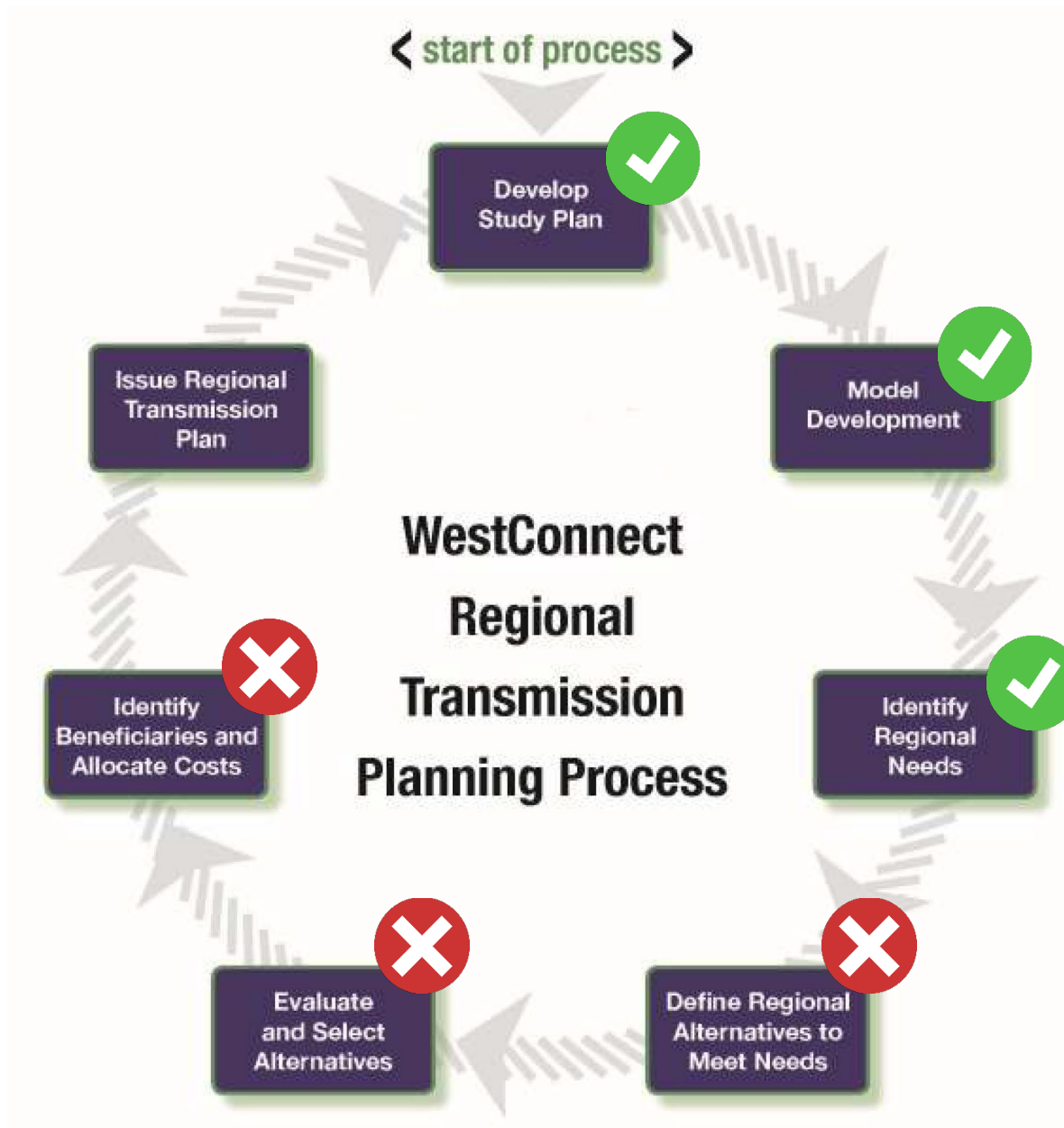
WestConnect Annual Interregional Information

- WestConnect Regional Planning Overview
- 2022-2023 Regional Planning Cycle Update
 - Regional Needs Assessment Results
 - Scenario Study Development
- Upcoming Meetings



WestConnect Regional Planning Overview

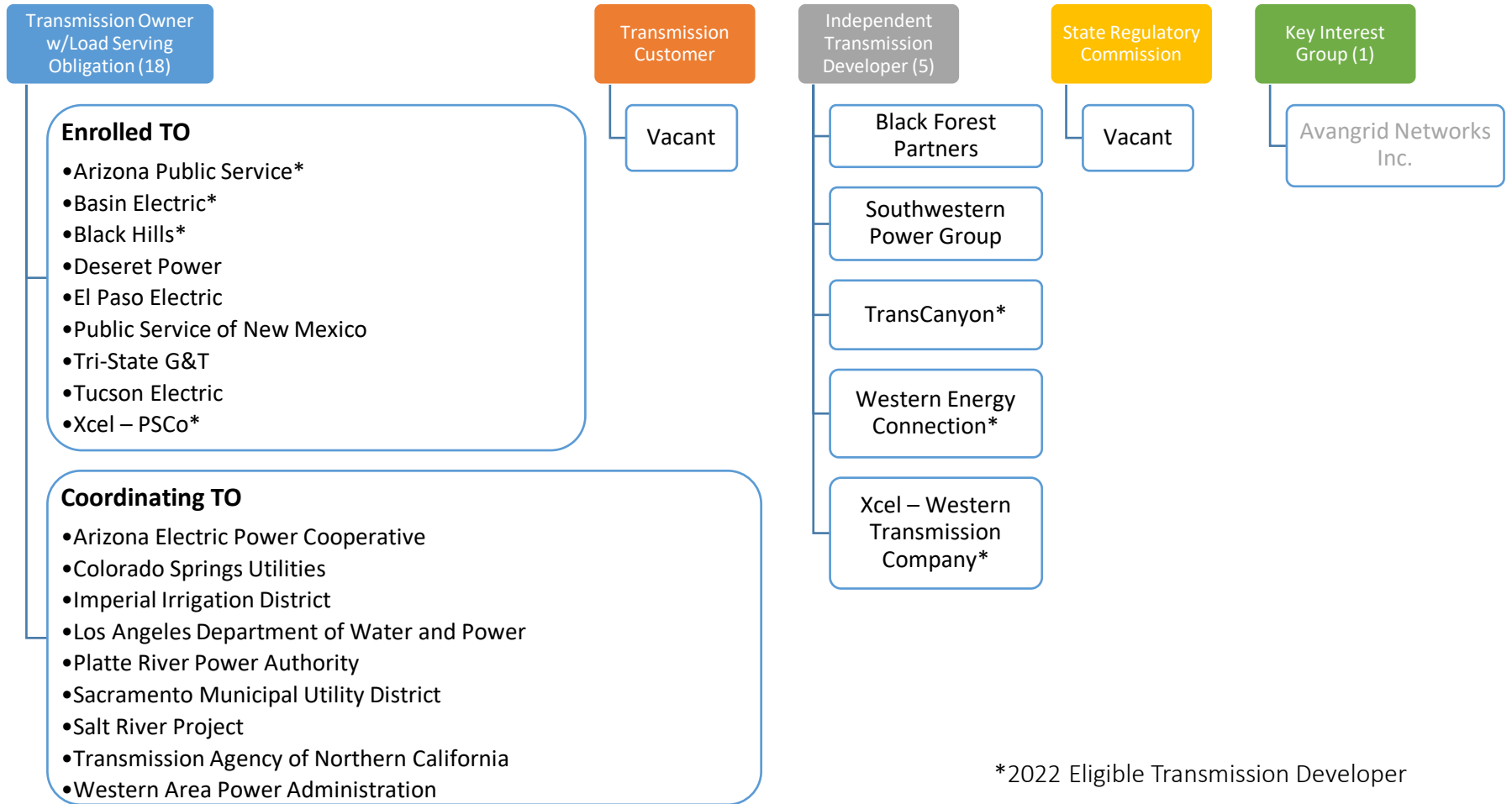
Heidi Pacini, WestConnect



PMC Organization and Activities

- Chaired by David Wiley, APS
 - Vice Chair: Gilbert Flores, Xcel Energy
- Comprised of 24 members :
 - 18 Transmission Owner with Load Service Obligation (TOLSO) Members
 - 5 Independent Transmission Developer Members
 - 1 Key Interest Group Member
- Transmission Customer and State Regulatory Commission sectors are vacant

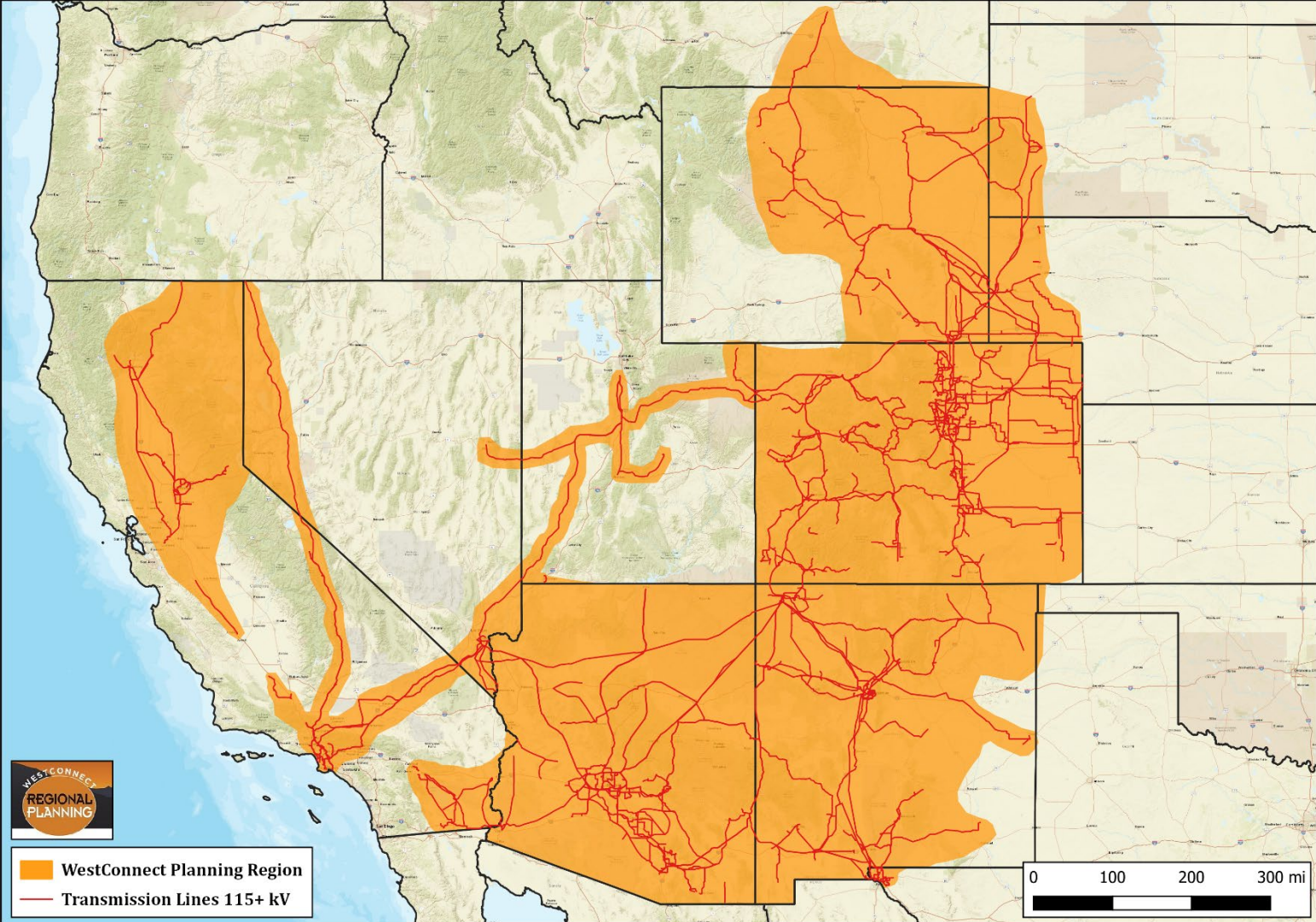
PMC Membership as of 1/1/2023



*2022 Eligible Transmission Developer

Inactive member

WestConnect Planning Region

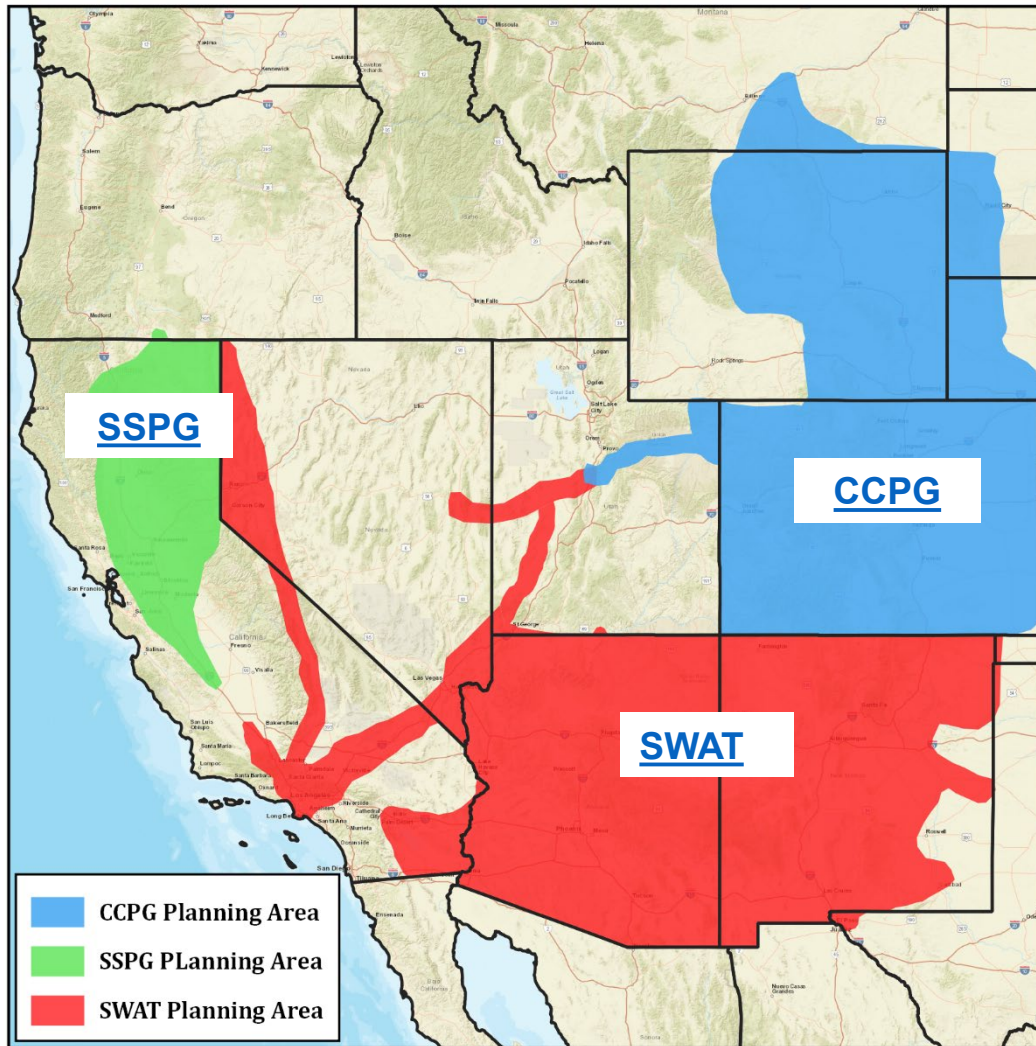


WestConnect Planning Region
Transmission Lines 115+ kV

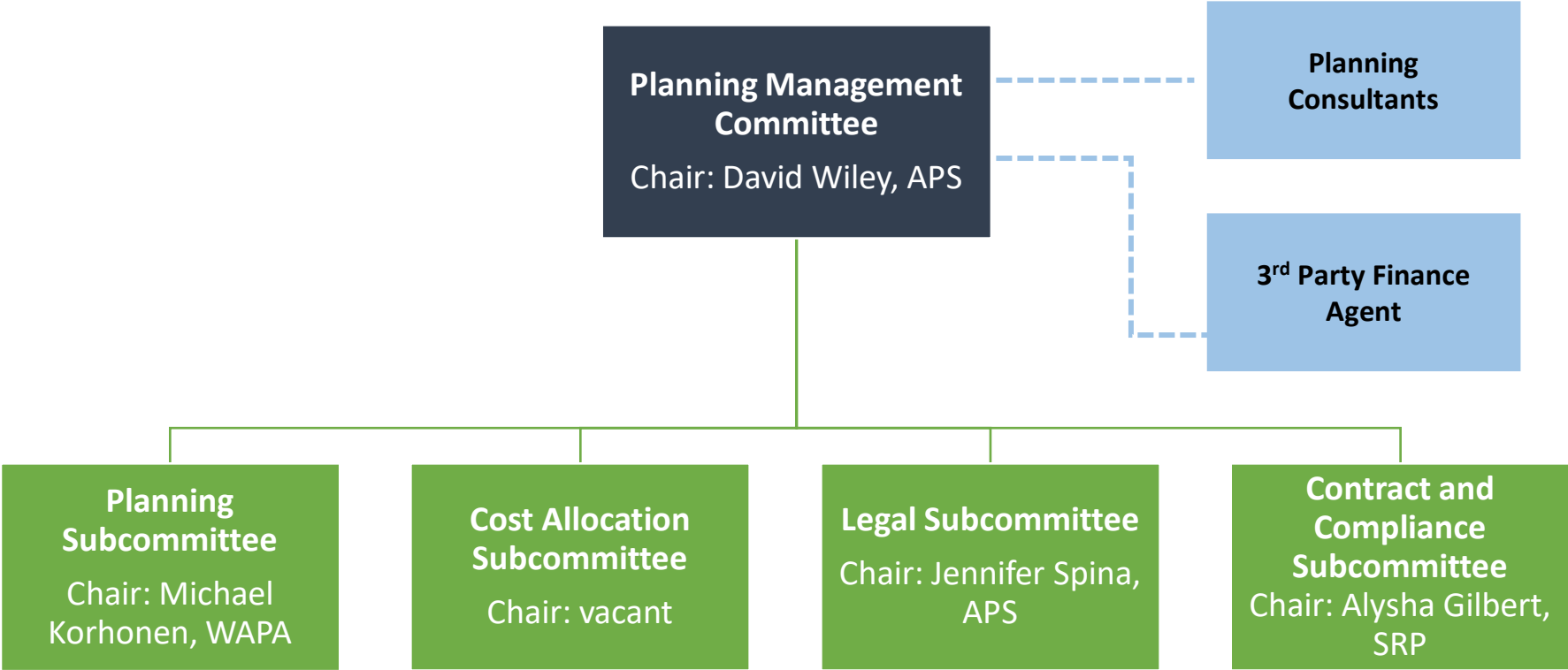
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Subregional Planning Groups



PMC Organization



PMC Activities

- Monthly meetings held via webinar or at rotating member facilities
- Meetings are posted to the [WestConnect Calendar](#)
- Manages the Regional Transmission Planning Process
- Currently reviewing the study assumptions for the regional scenario study

Stakeholder Input & Opportunities

- WestConnect holds at least two stakeholder meetings each year
- PMC & Subcommittee meetings are open with opportunity for stakeholder input
- Annual Interregional Coordination Meeting scheduled for March 9, 2023 (hosted by WestConnect)
- Future WestConnect Stakeholder Meetings at key points of planning cycle – for example:
 - Draft Regional Transmission Plan Report
 - Draft Study Plan
 - All as determined by the PMC
 - Fall 2023 Stakeholder Meeting scheduled for Thursday, November 16th in Westminster, CO



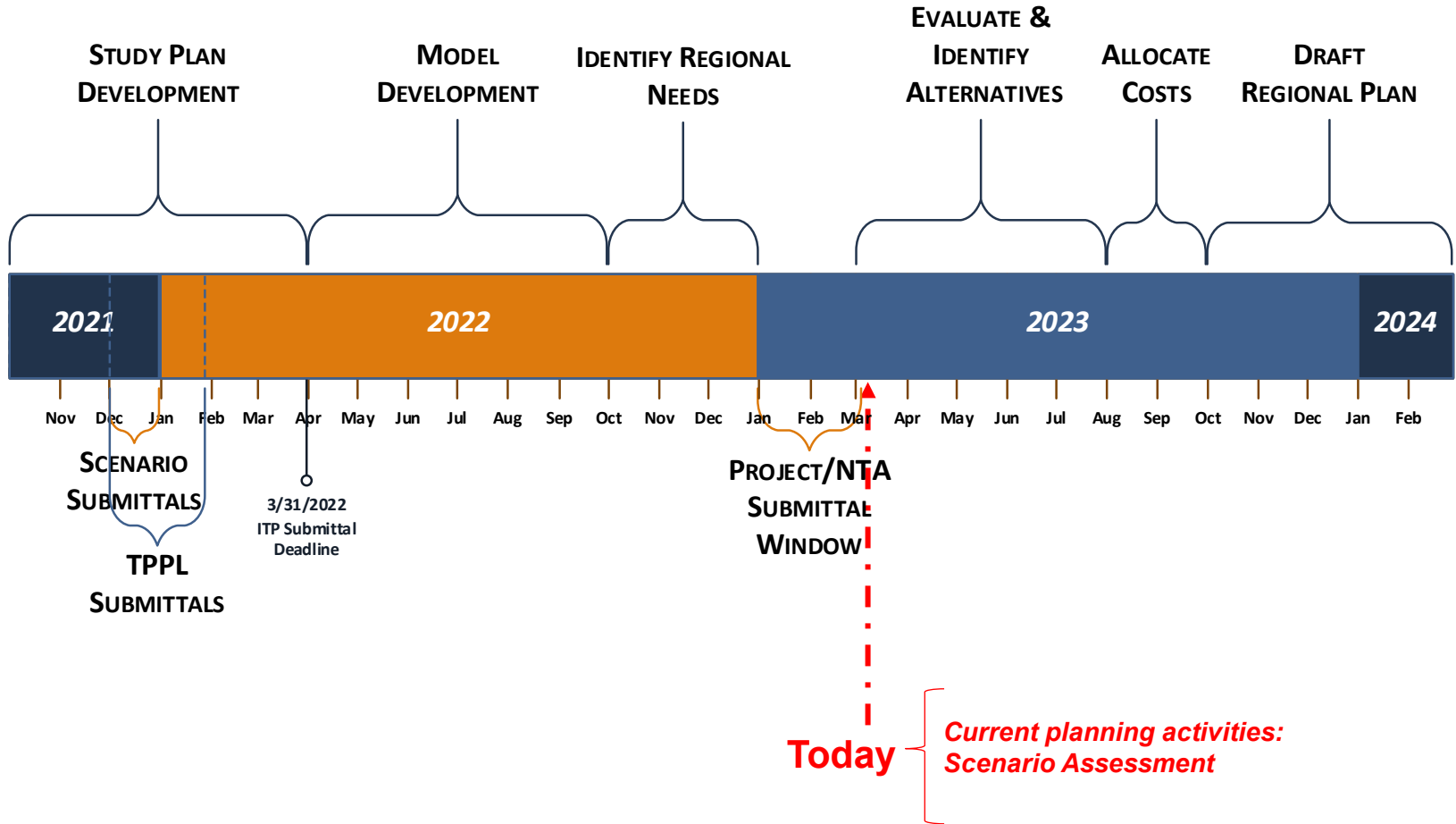
2022-23 Regional Planning Cycle Update

Tom Green, WestConnect Planning Consultant,
Energy Strategies

Overview

- Review of 2022-23 Study Plan
- Regional Needs Assessment Results
- Scenario Study Assumptions

2022-23 Process Timeline





2022-23 REGIONAL STUDY PLAN

2022-23 Study Plan Review

- Study Plan identifies the scope and schedule of the study work to be performed during the planning cycle
- [2022-23 Study Plan](#) was approved by PMC on **March 16, 2022**
 - Numerous drafts made available to stakeholders for comment
 - Final version is available on WestConnect website
- Study Plan identifies the Base Transmission Plan, the Model Development Process, and the scope of the Regional Assessments
 - It also identifies one scenario study that will take place – scenario studies are for information-only and do not result in the identification of regional needs
- The Study Plan also provides guidance on identification of Regional Needs, local vs. regional transmission issues, and explains why regional issues are the focus of the Order 1000 planning process

Base Transmission Plan

- Base Transmission Plan is the transmission network topology that is reflected in the regional planning models.
 - Base Transmission Plan = *Planned TO Projects* + *High probability ITD Projects*
- Inclusion is based on project information gathered in the WestConnect Transmission Plan Project List (TPPL) for the 2022-23 cycle, which was collected in early 2022 and updated during Model Development process
- The Model Development Report provides details about the 2022-23 Base Transmission Plan

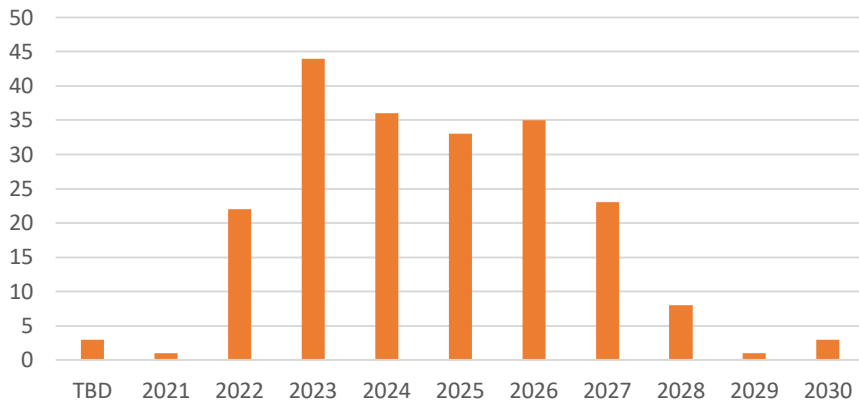
Project Type	Number of Projects
Substation	66
Transmission Line	74
Transmission Line and Substation	31
Transformer	22
Other	16
Total Projects	209

Base Transmission Plan: TO Breakdown

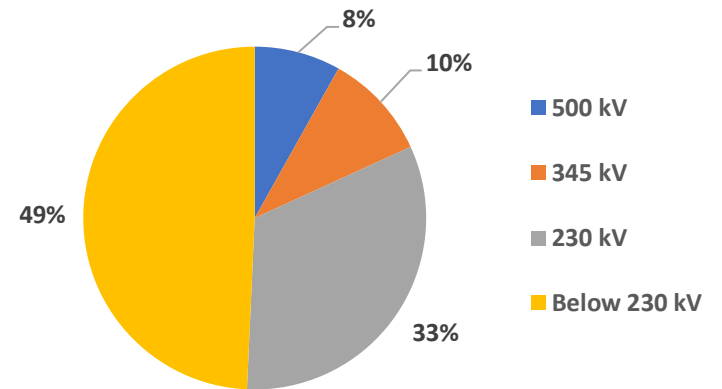
TOLSO	Below 230 kV	230 kV	345 kV	500 kV	Total
Arizona Electric Power Cooperative	2	-	-	-	2
Arizona Public Service	-	10	1	3	14
Black Hills Energy	2	-	-	-	2
Black Hills Power	-	2	-	-	2
Cheyenne Light Fuel and Power	9	6	-	-	15
Colorado Springs Utility	4	3	-	-	7
Deseret Power	-	-	-	-	-
El Paso Electric Company	31	-	9	-	40
Imperial Irrigation District	1	1	-	-	2
Los Angeles Department of Water and Power	-	11	-	7	18
Platte River Power Authority	1	2	-	-	3
Public Service Company of Colorado/ Xcel Energy	2	6	1	-	9
Public Service Company of New Mexico	1	-	2	-	3
Sacramento Municipal Utility District	-	2	-	-	2
Salt River Project	2	9	-	4	15
Transmission Agency of Northern California	-	-	-	-	-
Tri-State Generation and Transmission Association	10	6	1	-	17
Tucson Electric Power	27	7	7	3	44
Western Area Power Administration - DSW	4	-	-	-	4
Western Area Power Administration - RMR	7	3	-	-	10
Western Area Power Administration - SNR	-	-	-	-	-
Total Projects	103	68	21	17	209

Base Plan: Timing of Projects

Planned Projects sorted by In-Service Year
(Number of Projects)



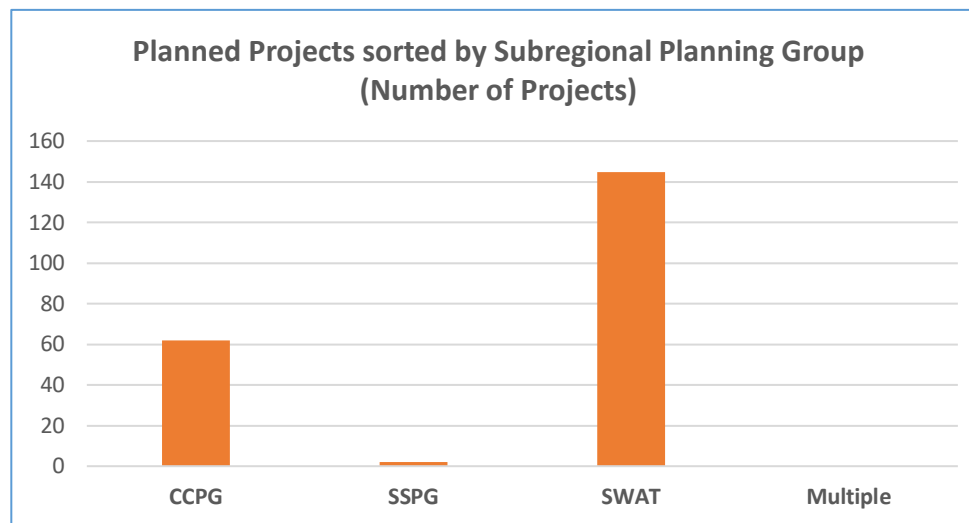
2022-23 Regional Base Transmission Plan Projects by
Voltage, based on the TPPL data



Base Plan: Geography and Drivers

State	Number of Projects
Arizona	49
California	15
Colorado	33
New Mexico	5
South Dakota	1
Wyoming	9
Multiple	97
Total Projects	209

Driver	Number of Projects
Reliability	169
Reliability/Public Policy	15
Public Policy	5
Public Policy/Reliability	3
Other	9
Economic	2
Economic/Reliability	1
Reliability/Economic	5
Total Projects	209



Public Policy Requirements

- TO members identify public policy requirements
- Public Policy Projects are reported in the Base Models
- Policies and requirements are listed in the Study Plan
- If a Regional Need is identified and is determined to be caused by public policy implementation, then the need is defined as a Public Policy-driven Regional Transmission Need.
- Stakeholders encouraged to review public policy requirements and suggest potential public policy needs.

Public Policy Requirements Considered

Public Policy Requirement	Description
Arizona Renewable Energy Standard	Requires IOUs and retail suppliers to supply 15% of electricity from renewable resources by 2025), with a minimum of 30% of the renewable resources provided by distributed generation
California AB398/SB32	Requires the California State Air Resources Board to approve a statewide greenhouse gas emissions limit equivalent to the statewide greenhouse gas emissions level in 1990 to be achieved by 2020 and to ensure that statewide greenhouse gas emissions are reduced to at least 40% below the 1990 level by 2030
California SB100	Requires Investor-owned utilities (IOUs) and municipal utilities to meet a 60% renewable portfolio standard (“RPS”) by 2030
California SB350	Requires IOUs and municipal utilities to meet a 50% RPS by 2030 and requires the establishment of annual targets for energy efficiency savings
Colorado HB 18-1270 (“Energy Storage Procurement Act”)	Directs the Commission to develop a framework to incorporate energy storage systems in utility procurement and planning processes. See C.R.S. § 40-2-201, et seq. The legislation broadly addresses resource acquisition and resource planning, and transmission and distribution system planning functions of electric utilities. Energy storage systems may be owned by an electric utility or any other person. Benefits include increased integration of energy into the grid; improved reliability of the grid; a reduction in the need for increased generation during periods of peak demand; and, the avoidance, reduction, or deferral of investment by the electric utility
Colorado HB 19-1261 and SB 1261 (“GHG Reduction Bills”)	<p>HB 19-1261 requires the Air Quality Control Commission (“AQCC”) to promulgate rules and regulations for statewide greenhouse gas (“GHG”) pollution abatement.</p> <p>Section 1 of SB 1261 states that Colorado shall have statewide goals to reduce 2025 greenhouse gas emissions by at least 26%, 2030 greenhouse gas emissions by at least 50%, and 2050 greenhouse gas emissions by at least 90% of the levels of statewide greenhouse gas emissions that existed in 2005. A clean energy plan filed by a utility is deemed approved if the plan demonstrates an 80% reduction by 2030.</p>

Public Policy Requirements Considered

Public Policy Requirement	Description
Colorado HB10-1001	Established Colorado Renewable Energy Standard (“RES”) to 30% by 2020 for IOUs (Xcel & Black Hills)
Colorado HB10-1365	Requires rate regulated utilities in CO with coal-fired generation to reduce emissions on the smaller of 900 MW of generation of 50% of a company’s coal generation fleet. Full implementation to be achieved by 12/31/2017
Colorado SB 07-100	Requires IOUs to identify Energy Resource Zones, plan transmission to alleviate constraints from those zones, and pursue projects according to the timing of resource development in those zones
Colorado SB 18-009 (“Energy Storage Rights Bill”)	Protects the rights of Colorado electricity consumers to install, interconnect, and use energy storage systems on their property without the burden of unnecessary restrictions or regulations and without unfair or discriminatory rates or fees.
Colorado SB 19-077 (“Electric Vehicles Bill”)	The bill enables a regulatory approval process for electric utilities to invest in charging facilities and provide incentive rebates; thus, the investments and rebates may earn a return at the utility’s authorized weighted-average cost of capital. Where approved, the costs for the investments and rebates may be recovered from all customers of the electric utility similar to recovery of distribution system investments. Natural gas public utilities may provide fueling stations for alternative fuel vehicles as non-regulated services only.
Colorado SB 19-236 (“PUC Sunset Bill”)	The primary purpose of this bill is to reauthorize the CPUC, by appropriations, for a seven-year period to September 1, 2026. Reauthorization is required by the sunset process. Additionally, the bill carries numerous requirements for utilities and the CPUC to achieve an affordable, reliable, clean electric system. Included in the bill are requirements to reduce the qualifying retail utility’s carbon dioxide emissions associated with electricity sales to the qualifying retail utility’s electricity customers by eighty percent from 2005 levels by 2030, and that seeks to achieve providing its customers with energy generated from one-hundred-percent clean energy resources by 2050. The bill also subjects co-ops to Colorado Public Utility Commission rulemaking.
Colorado SB13-252	Requires cooperative utilities to generate 20% of their electricity from renewables by 2020

Public Policy Requirements Considered

Public Policy Requirement	Description
Colorado SB21-072	This bill requires electric transmission utilities in Colorado to join an organized wholesale market (“OWM”) by January 1, 2030, provided that the OWM meets certain criteria set forth in the statute. This bill also creates the Colorado Electric Transmission Authority, a governmental entity that is authorized to independently develop and finance transmission projects.
Colorado HB21-1266	This bill is a broad policy measure to promote environmental justice in disproportionately impacted communities through the creation of an Environmental Justice Task Force. The bill requires wholesale generation and transmission cooperatives to file with the Public Utilities Commission a Clean Energy Plan to achieve 80% emissions reductions by 2030.
Colorado SB 21-246	The primary purpose of this bill is to direct the approval of plans for the electrification of buildings that use fossil fuel-based systems through existing demand side management programs.
Colorado HB21-1238	The primary purpose of this bill is to update the PUC’s rules and decision-making process with respect to natural gas demand-side management programs including the use of the Social Cost of Carbon and Social Cost of Methane.
Colorado SB21-272	The primary purpose of this bill is to update the PUC’s rules and decision-making process to better incorporate the impacts and benefits to underserved or disproportionately impacted communities and groups including workforces impacted by generation acquisition and retirement. Other requirements include how utilities finance resources or investments, the retirement of renewable energy credits, and the inclusion of the Social Cost of Carbon in resource planning decisions.
Executive Order 14057 (EO 14057), Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability (Dec. 8, 2021)	<p>The President’s executive order directs the federal government to use its scale and procurement power to achieve five ambitious goals:</p> <ul style="list-style-type: none"> • 100 percent carbon pollution-free electricity (“CFE”) by 2030, at least half of which will be locally supplied clean energy to meet 24/7 demand; • 100 percent zero-emission vehicle (“ZEV”) acquisitions by 2035, including 100 percent zero-emission light-duty vehicle acquisitions by 2027; • Net-zero emissions from federal procurement no later than 2050, including a Buy Clean policy to promote use of construction materials with lower embodied emissions; • A net-zero emissions building portfolio by 2045, including a 50 percent emissions reduction by 2032; • Net-zero emissions from overall federal operations by 2050, including a 65 percent emissions reduction by 2030.

Public Policy Requirements Considered

Public Policy Requirement	Description
New Mexico Efficient Use of Energy Act	Require utilities to include cost-effective energy efficiency (“EE”) and demand response (“DR”) programs in their resource portfolios and establish cost-effectiveness as a mandatory criterion for all programs
New Mexico Energy Transition Act (2019 SB 489)	<p>Subject to the Reasonable Cost Threshold (“RCT”), the Energy Transition Act defines renewable energy requirements that are a percentage of a utility’s retail energy sales and the type of utility:</p> <ul style="list-style-type: none"> • By 2020, 20% for public utilities and 10% for cooperatives • By 2025, 40% for public utilities and cooperatives • By 2030, 50% for public utilities and cooperatives • By 2040, 80% for public utilities with provisions associated with carbon free generation • 100% carbon-free by 2045 for public utilities and by 2050 for cooperatives
SRP Sustainable Energy Goal	Reduce the amount of CO ₂ emitted per megawatt-hour (MWh) by 65% from 2005 levels by 2035 and by 90% by fiscal year 2050.
Texas RPS	Texas RPS requires a total renewable capacity of 5,880 MW (which has already been achieved) by 2025 be installed in the state which is in turn converted into a renewable energy requirement. The renewable energy requirements are allocated to load serving entities based on their amount of retail energy sales as a percent of the total Texas energy served
Texas Substantive Rule 25.181 (Energy Efficiency Rule)	Require utilities to meet certain energy efficiency targets



2022-23 REGIONAL MODEL DEVELOPMENT

Overview of 2022-23 Model Development

- In order to perform the regional needs assessment, WestConnect develops regional planning models for the 10-year timeframe
- On September 21, 2022, the Planning Subcommittee notified the PMC that the Regional Base Models were complete and could be finalized. The PMC approved the recommendation, thereby initiating the Regional Assessment phase.
- The Study Plan also identified four economic sensitivity cases:
 1. High Load
 2. Low Hydro
 3. System-wide Carbon Emission Cost
 4. High Gas Price
- The following materials summarize key assumptions made in developing the regional models

Base Cases defined in Study Plan

Reliability Base Cases

WestConnect Base Case Name	Case Description	WECC Seed Case
2032 Heavy Summer	Summer peak load conditions during 1500 to 1700 MDT, with typical flows throughout the Western Interconnection.	WECC 2032 Heavy Summer 1 Planning Base Case (32HS1)
2032 Light Spring	Light load conditions during 1000 to 1400 MDT in spring months of March, April, and May with solar and wind serving a significant but realistic portion of the Western Interconnection total load. Case includes renewable resource <i>capacity</i> consistent with any applicable and enacted public policy requirements.	WECC 2033 Light Spring 1-S Base Case (33LSP1S)

Economic Base Cases

WestConnect Base Case Name	Case Description	WECC Seed Case
2032 Base Case	Business-as-usual, expected-future case with (1) median load, (2) median hydro conditions and (3) representation of resources consistent with TOLSO-approved resource plans as of March 2022.	WECC 2032 Heavy Summer 1 Planning Base Case (32HS1) and WestConnect 2030 Base Case from the 2020-21 planning cycle

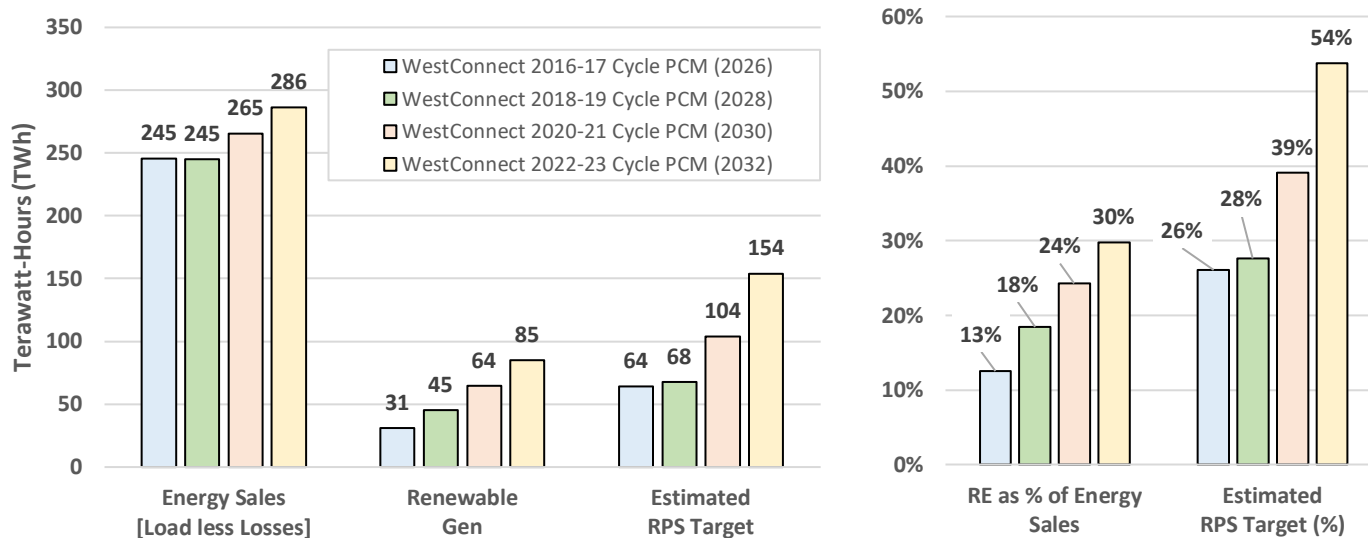
Public Policy Verification

- Public Policy Requirements: state or federal laws or regulations, enacted statutes (i.e., passed by the legislature and signed by the executive) and regulations promulgated by a relevant jurisdiction, whether within a state or at the federal level.
 - Based on language from the final rule on FERC order 1000 [published by FERC](#): “...and allow for consideration of transmission needs driven by public policy requirements established by state or federal laws or regulations (Public Policy Requirements). By “state or federal laws or regulations,” we mean enacted statutes (i.e., passed by the legislature and signed by the executive) and regulations promulgated by a relevant jurisdiction, whether within a state or at the federal level.”
- TOLSO Confirmation: have received responses from all members
 - As part of Section 6 of WestConnect [2022-23 Study Plan](#), each TOLSO must verify they meet all enacted public policies that apply to them.
 - Enacted public policy ... is considered in the regional planning process through its inclusion in regional planning models.
 - The regional base models, including both power flow and production cost, will reflect the enacted public policies...

Draft Renewable Energy Check

- A high-level accounting and comparison of each PCM Area’s energy sales and renewable energy was conducted
- WestConnect renewable generation in 2032 PCM is a 33% increase from the 2030 PCM
- RPS-related generation in 2032 PCM represents more than half of the estimated 2032 RPS target for the WestConnect footprint

Renewable Energy Comparison





2022-23 REGIONAL NEEDS ASSESSMENTS

Regional Needs Assessment Background

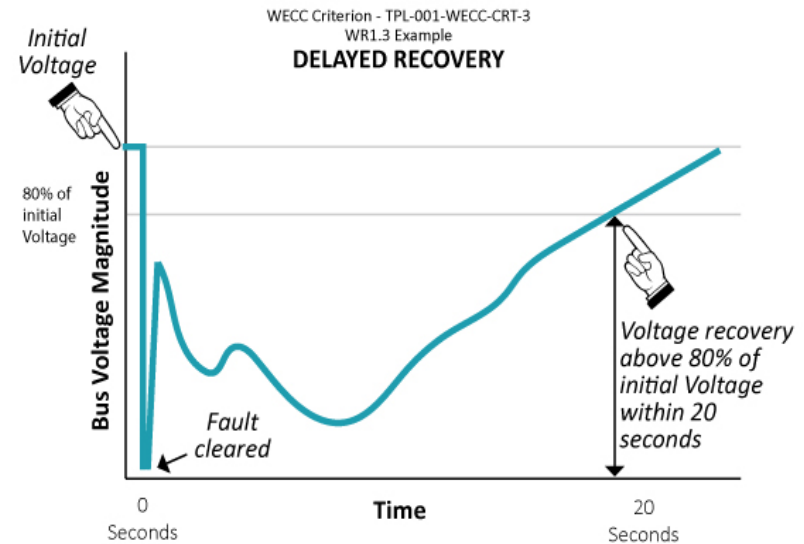
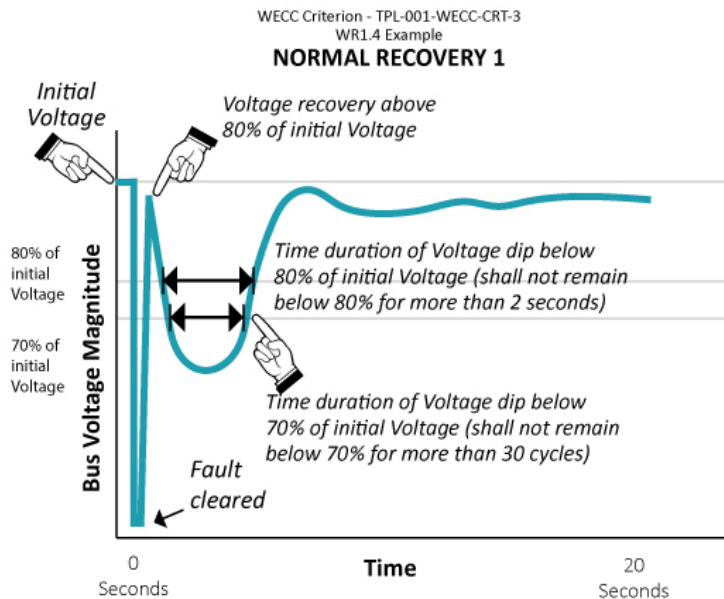
- Needs Assessments used base models developed for year 2032
- Assessment is only for WestConnect footprint
 - Local vs. regional transmission issues
- Planning Subcommittee (PS) identifies potential regional issues and makes recommendations to the PMC
- The PMC made a final determination on regional needs on December 14, 2022, based on the PS recommendations and stakeholder comments (none).
- Regional Needs Assessment Report is posted on the WestConnect website.
- No regional needs found in this cycle
 - **In the absence of a Regional Need, WestConnect will not study any regional or interregional alternatives. As such, WestConnect's ITP will not be evaluated this planning cycle.**

Steady State Assessment

- Ensure WestConnect region complies with applicable North American Electric Reliability Corporation (NERC) standards and WECC criteria
- Assessment include steady state and transient stability analyses
- Transmission elements of 90 kV and above will be monitored for system performance along with any Member specified lower voltage Bulk Electric System (BES) elements
- Contingency Definitions
 1. Started with 2020-21 planning cycle contingency definitions
 2. Auto-inserted every 230kV and above single branch and GSU's > 200 MW Pgen
 3. Added member-submitted contingencies, and operating procedures
- 1,405 contingency runs
- Flagged branch loadings and bus voltages using member-submitted criteria
 - BES monitored only
 - Default for bus voltage is WECC criteria unless superseded by member submitted criteria

Transient Stability Assessment

- WECC Criteria
- Recovery should be stable (not volatile)
- Oscillations (if any) should be damped
- The below plots show acceptable recovery of BES bus serving load



Reliability Assessment Results

▪ HS case

- No Contingency (P-0)
 - 0 branch flagged above Rating A
 - 1 flagged bus voltage issues (PNM 1)
- Contingencies (3 flagged issues)
 - 0 failed solutions
 - 1 flagged loadings above Rating B (APS & WAPA-DSW 1)
 - 1 flagged low bus voltages (PNM 1)
 - 1 flagged voltage deviations (PNM 1)
 - 0 flagged high voltages

▪ LSP Case

- No Contingency (P-0)
 - 0 branch loading issues above Rating G
 - 1 flagged bus voltage issues (PNM 1)
- Contingencies (1 flagged issue)
 - 0 failed solutions
 - 0 flagged loadings above Rating H
 - 0 flagged low bus voltages
 - 1 flagged voltage deviations (PNM 1)
 - 0 flagged high voltages

Transient Stability Results

- Transient Stability Analysis
 - Evaluated 10 disturbances that were run in the previous cycle for the transient stability analysis (7/10/22 PMC)
- Modeling issues resolved
- Criterion Validated
 - TPL-001-WECC-CRT-3.2 Criterion
- Results: No Transient Stability Issues

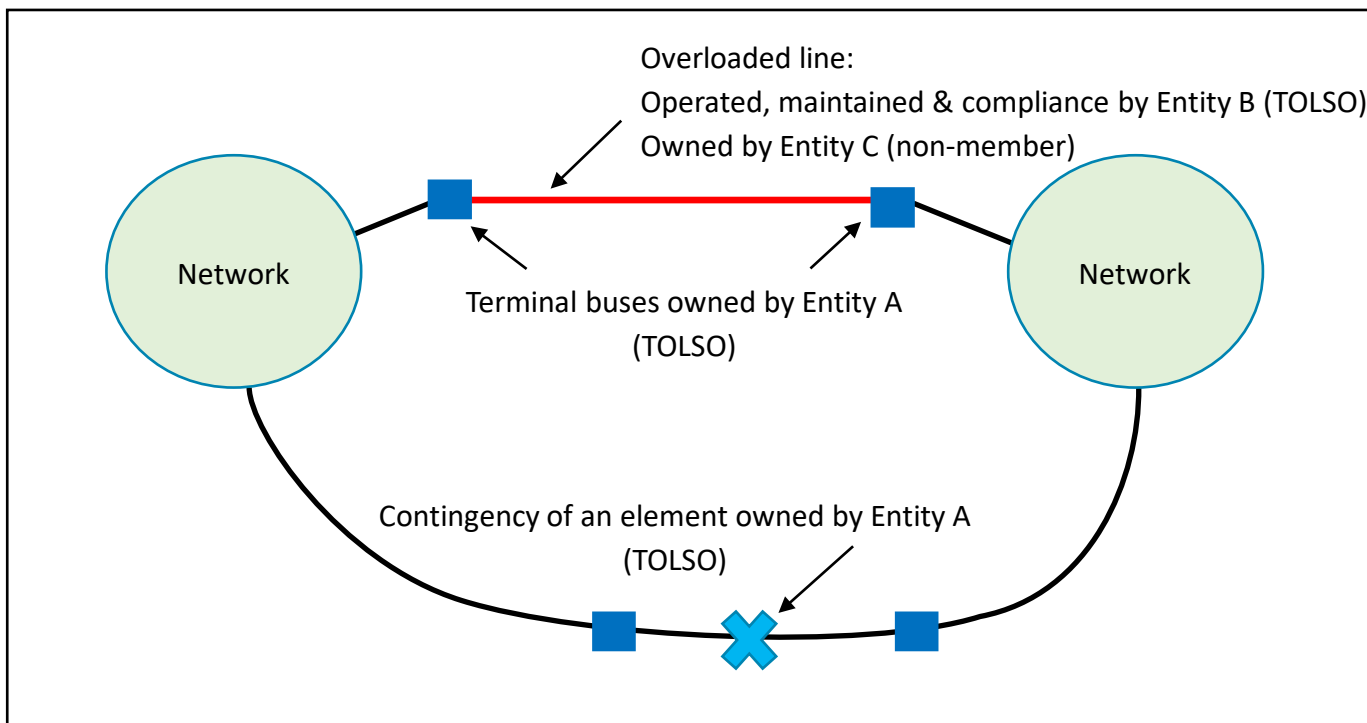
Reliability Issue Assessment

Summary

- A single contingency was found to result in an overload on a transmission element.
- The contingency is a transmission element owned by Entity A.
- The overloaded transmission line is operated, maintained & compliance performed by Entity B.
- The overloaded transmission line is owned by Entity C.
- The substations at both ends of the overloaded transmission line are owned by Entity A.
- Entities A and B are TOLSO members of WestConnect.
- Entity C, the owner of the overloaded line, is not a member of WestConnect.

Reliability Issue Assessment

Simple Drawing



Reliability Issue Recommendation

PS Recommendation

- The reliability issue involves multiple entities in that a contingency on one entity's system causes an overload on another entity's transmission facility.
- However, the overloaded facility is owned by a single entity.
- The PS consensus is that it is a single-entity (local) issue.

The PS recommended that the reliability issue not be considered a regional reliability need and should be referred to the involved entities for resolution.

Economic Assessment Results

- Assessment includes review of metrics such as congested hours and congestion cost for regional transmission elements greater than 200 kV and WECC transfer paths (or other defined interfaces in the WestConnect footprint) along with any Member specified lower voltage BES elements
 - *Monitoring was updated to elements greater than 90kV in WestConnect and greater than 200 kV outside of WestConnect*
- Regional transmission with significant congestion are identified and verified through Planning Subcommittee review, historical benchmarking, and follow-up study
- WestConnect also conducted sensitivity studies on the 2032 Base Case
 - *Sensitivities: High Load, Low Hydro, System-wide Carbon Emission Cost, and High Gas Price*

WestConnect Base Case Name	Case Description	WECC Seed Case
2032 Base Case	Business-as-usual, expected-future case with (1) median load, (2) median hydro conditions and (3) representation of resources consistent with TOLSO-approved resource plans as of March 2022.	WECC 2032 Heavy Summer 1 Planning Base Case (32HS1) and WestConnect 2030 Base Case from the 2020-21 planning cycle

Economic Assessment Results

Branch & Path Congestion					All Year		
Assumed Grouping	Entities Involved	Branch PF Owner(s)	Bus PF Owner(s)	Branch or Path Name	Avg Flow (MW)	Congestion Hours (% Hrs) / Cost (K\$)	Penalty Cost Cost (K\$) / % of Congestion
Multiple WC Entities	PNM TSGT		PN1 New Mexico TSGT New Mexico EPE El Paso Electric Company Tucson Electric Power PN2 New Mexico Arizona Public Service Tri-State G&T	P48 Northern New Mexico (NM2) Interface	112	61 (0.70%) / 1,102	
	TSGT WAPA-RMR		WAPA L.M. DG&T Tri-State G&T	P30 TOT 1A Interface	113	20 (0.23%) / 913	
	TSGT PSCO WAPA-RMR BEPC		Tri-State G&T WAPA L.M. PSColorado Basin Electric Power Coop.	P36 TOT 3 Interface	464	1 (0.01%) / 16	
	BEPC TSGT	Basin Electric Power Coop.		DAVEJOHN - LAR.RIVR 230kV Line #1 (65420_73107_1)	-125	2 (0.02%) / 0.57	
Possibly Multiple WC Entities	PSCO TSGT	PSColorado		STORY - PAWNEE 230kV Line #1 (73192_70311_1)	-196	1 (0.01%) / 7	

Branch & Path Congestion					All Year		
Assumed Grouping	Entities Involved	Branch PF Owner(s)	Bus PF Owner(s)	Branch or Path Name	Avg Flow (MW)	Congestion Hours (% Hrs) / Cost (K\$)	Penalty Cost Cost (K\$) / % of Congestion
Single WC Entity, Multi-Regional	LADWP IPA		Intermountain Power Agency	P27 Intermountain Power Project DC Line Interface*	1,128	1,243 (14%) / 5,132	2,772 / 54%
	LADWP NorthernGrid IPA	Intermountain Power Agency		INTERMT-MONA 345kV Line Ckt 1&2 (26043_65995_1&2)	-4	63 (0.72%) / 3,434	
	LADWP CAISO		Southern California Edison City of Los Angeles	P61 Lugo-Victorville 500 kV Line Interface	667	56 (0.64%) / 2,080	
	LADWP IPA NorthernGrid		Intermountain Power Agency Sierra Pacific Power Co.	P32 Pavant-Gonder InterMtn-Gonder 230 kV Interface	55	3 (0.03%) / 204	
	LADWP CAISO		City of Los Angeles Southern California Edison	P41 Sylmar to SCE Interface	-371	8 (0.09%) / 35	
	DG&T NorthernGrid		PacifiCorp - East DG&T	P33 Bonanza West Interface	-289	2 (0.02%) / 2	

*Congestion cost driven by GridView enforcing the minimum flow limit on P27 via a conditional constraint. Congestion costs associated with flows reaching/violating flow limits is zero.



Economic Issue Evaluation

Summary

- 2022-23 Assessment
 - Five occurrences of congestion were found involving multiple entities
 - All entities are TOLSO members of WestConnect
- October 11, 2022, PS Meeting
 - Final economic (congestion) results presented to PS
 - Examples provided for potential narratives
- November 3, 2022, Memo from Mike Korhonen
 - The PS is responsible to address regional assessment issues
 - The PS makes recommendations to the PMC regarding regional needs.
 - Historically, PS addresses congestion issues on a case-by-case basis
 - Entities requested to present reasoning to PS regarding each issue.
 - PS final decisions and reasoning documented in WestConnect reports

Economic Issues

Member Responses

Branch or Path Name	Entities Involved	Member Response
P48 Northern New Mexico (NM2) Interface	PNM TSGT	The limited number of hours of congestion seen for these interfaces do not indicate a regional need.
P30 TOT 1A Interface	TSGT WAPA-RMR	This result does not warrant establishing a regional need. The 20 hours or .23% of congestion for TOT1A can be considered noise and is less than previous study cycle results.
P36 TOT 3 Interface	TSGT PSCO WAP A-RMR BEPC	This result does not warrant establishing a regional need. The 1 hour of congestion for TOT3 can be considered noise and is less than previous study cycle results.
STORY - PAWNEE 230kV	PSCO TSGT	The limited number of hours of congestion seen for these interfaces do not indicate a regional need.
DAVEJOHN - LAR.RIVR 230kV	BEPC TSGT	The 2 hours of congestion on the LRS-DJ 230kV line does not warrant establishing a regional need

Economic Issues Recommendation

PS Recommendation

- A response for each issue was provided by affected entities.
- None of the responses indicated a regional need.
- The PS concurred with the responses provided.

The PS recommended that the economic issues not be considered regional economic needs.

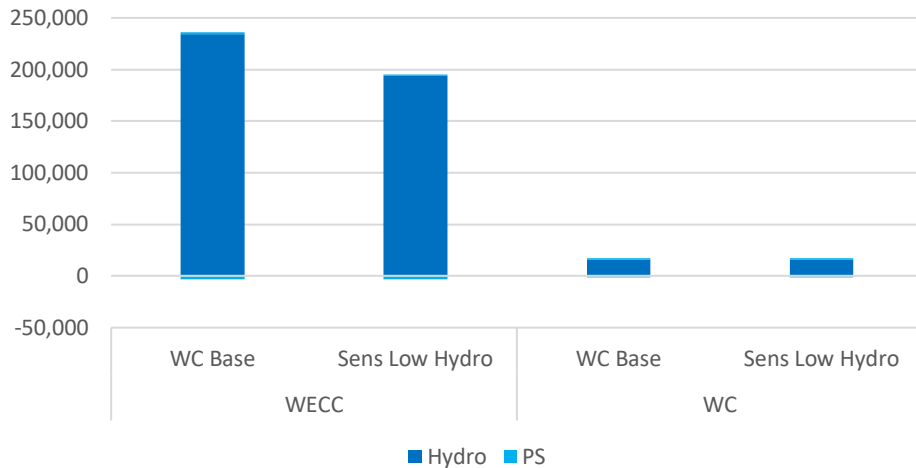
Economic Sensitivities

- Plan:
 - WestConnect will conduct sensitivity studies on the 2032 Base Case economic model to better understand whether regional transmission congestion may be impacted by specific input uncertainty
 - Energy Strategies will evaluate the four sensitivities that were looked at in the previous cycle
- Sensitivities:
 - Hydro conditions
 - Natural gas prices
 - Load forecast
 - Emissions cost

Low Hydro

- The 2032 WCPCM Base Case uses a median year hydro condition. Hydro conditions from 2001 provide the best representation of hydro operations for a low water year
- WECC developed the associated PCM inputs, which reflect the appropriate energy targets in addition to the hydro system's reactivity to price and load movement when the water supply is lower than normal

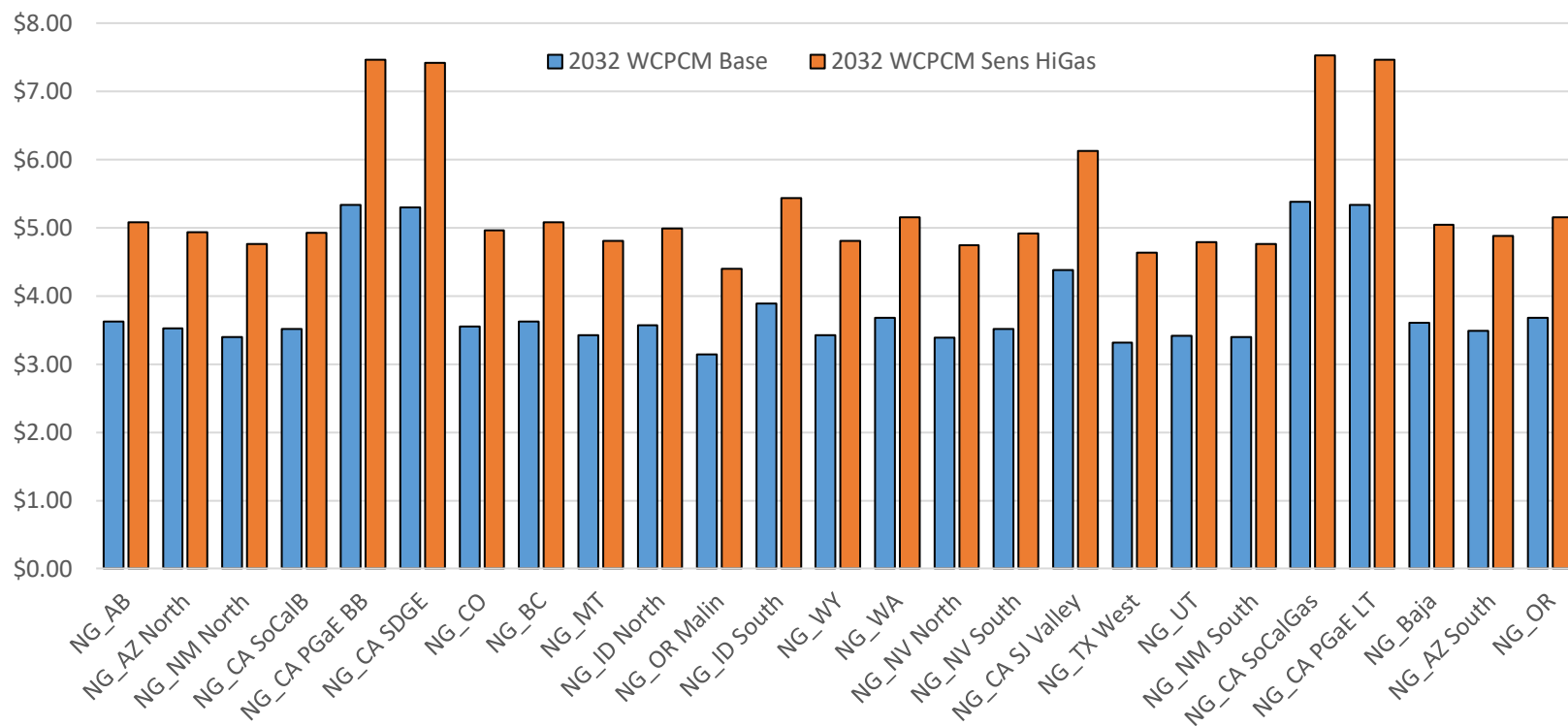
2032 Hydro Generation Summary (GWh)



Metric	Fleet	Case	Hydro	PS	PS Pump
Generation (GWh)	WECC	WC Base	234,508	1,666	-3,098
		Sens Low Hydro	193,625	1,698	-3,110
	WC	WC Base	16,009	985	-1,516
		Sens Low Hydro	16,298	1,034	-1,551
Capacity (MW)	WECC	WC Base	63,433	4,054	
		Sens Low Hydro	63,433	4,054	
	WC	WC Base	4,991	2,311	
		Sens Low Hydro	4,991	2,311	
Capacity Factor	WECC	WC Base	42.1%	4.7%	-8.7%
		Sens Low Hydro	34.8%	4.8%	-8.7%
	WC	WC Base	36.5%	4.9%	-7.5%
		Sens Low Hydro	37.2%	5.1%	-7.6%

High Gas Prices

Average Annual Natural Gas Prices (\$/MMBtu)



- Assumed natural gas prices 40% higher than the base case
 - Base Case annual average gas price: \$3.84/MMBtu
 - Sensitivity Case annual average gas price: \$5.37/MMBtu

High Load Forecast

LoadAreaName	RegionName	2032 WPCPM Base		2032 WPCPM sens High Load Forecast			
		Peak (MW)	Energy (GWh)	Peak Inc %	Energy Inc %	Peak (MW)	Energy (GWh)
AZPS	SW_AZPS	8,991	42,945	120%	120%	10,789	51,534
BANC	CA_BANC	5,491	21,074	120%	120%	6,589	25,289
EPE	SW_EPE	2,651	12,240	100%	100%	2,651	12,240
IID	CA_IID	1,319	4,600	120%	120%	1,583	5,520
LDWP	CA_LDWP	10,313	45,250	120%	120%	12,376	54,300
PNM	SW_PNM	3,053	16,860	120%	120%	3,664	20,232
PSCO	RM_PSCO	11,702	54,608	120%	120%	14,042	65,530
SRP	SW_SRP	10,543	46,969	120%	120%	12,652	56,363
TEPC	SW_TEPC	4,136	19,190	105%	105%	4,343	20,149
WACM	RM_WACM	4,794	27,762	120%	120%	5,753	33,314
WALC	SW_WALC	1,863	9,738	120%	120%	2,236	11,686

- Sensitivity case assumed peak loads and annual energy 20% higher than the base case unless member feedback stated otherwise

System Carbon Price

Base Case

No assumed carbon price outside of California
\$0/MT

Carbon cost of CA in-state generators based on emission intensity and \$/ton price forecast:
\$64/MT

Unspecified import rate calculated based on in-state carbon cost and assumed import emission rate per AB32
\$28/MWh

Carbon Sensitivity

Assumed carbon price for all of WECC. Based on average 2030 carbon price sourced from a survey of 11 IRP's, adjusted to 2032
\$44/MT

Carbon cost for CA in-state generators adjusted downward so net price is unchanged:
\$20/MT

Unspecified import rate adjusted downward to avoid double counting emission costs of out-of-state generators importing to CA
\$9/MWh

CA In-state/Specified Resources: **\$64/MT**
 CA Imports: **\$64/MT (\$28/MWh)**
 WECC System adder: **\$0/MT**

$\$20/MT + \$44/MT = \$64/MT$
 $\$20/MT (\$9/MWh) + \$44/MT = \$64/MT$
\$44/MT

Economic Sensitivities - Congestion

		Congestion Hours (% Hrs) / Cost (K\$)				
Assumed Grouping	Branch or Path Name	Base	Low Hydro	High Gas	High Load	System Carbon Price
Multiple WC Entities	P48 Northern New Mexico (NM2) Interface	61 (0.70%) / 1,102	60 (0.68%) / 1,041	53 (0.61%) / 987	8 (0.09%) / 45	58 (0.66%) / 1,387
	P30 TOT 1A Interface	20 (0.23%) / 913	19 (0.22%) / 788	12 (0.14%) / 1,344	248 (3%) / 123,357	5 (0.06%) / 626
	P36 TOT 3 Interface	1 (0.01%) / 16		1 (0.01%) / 32	96 (1%) / 159,513	1 (0.01%) / 68
	DAVEJOHN - LAR.RIVR 230kV Line #1 (65420_73107_1)	2 (0.02%) / 0.57	3 (0.03%) / 4	1 (0.01%) / 8	3 (0.03%) / 1,390	
	P39 TOT 5 Interface				13 (0.15%) / 12,675	
	TRCY PMP-HURLEYS 230kV Line Ckt 1&2 (37585_37010_1&2)		3 (0.03%) / 1,088		25 (0.29%) / 7,170	
	W.RV.CTY - CALAMRDG 138kV Line #1 (79264_79265_1)				1 (0.01%) / 71	
	WESTWNGW - PINPK 230kV Line #1 (14231_19062_1)				7 (0.08%) / 3,736	
Possibly Multiple WC Entities	STORY - PAWNEE 230kV Line #1 (73192_70311_1)	1 (0.01%) / 7	3 (0.03%) / 7	1 (0.01%) / 31		
	DEERVALY - WESTWNGE 230kV Line #1 (14207_14259_1)				14 (0.16%) / 3,255	
	HESPERUS - WATRFLW 345kV Line #1 (79072_79990_1)				11 (0.13%) / 4,420	
	MIDWAYBR - RD_NIXON 230kV Line #1 (73413_78857_1)				4 (0.05%) / 55	
	SAN_JUAN - SANJN PS 345kV Line #1 (10292_79060_1)				12 (0.14%) / 4,396	
	ST.VRAIN - LONGPEAK 230kV Line #1 (70410_78105_1)				2 (0.02%) / 25	
	TRCY PMP-HURLEYS 230kV Line Ckt 1&2 (37585_37010_1&2)		3 (0.03%) / 1,088		25 (0.29%) / 7,170	
Single WC Entity, Multi-Regional	P27 Intermountain Power Project DC Line Interface	1,243 (14%) / 5,132	2,239 (26%) / 7,896	847 (10%) / 3,786	317 (4%) / 1,542	1,520 (17%) / 8,173
	INTERMT-MONA 345kV Line Ckt 1&2 (26043_65995_1&2)	63 (0.72%) / 3,434	290 (3%) / 17,638	75 (0.86%) / 3,511	207 (2%) / 31,930	496 (6%) / 8,465
	P61 Lugo-Victorville 500 kV Line Interface	56 (0.64%) / 2,080	32 (0.37%) / 1,498	42 (0.48%) / 2,311	143 (2%) / 13,286	51 (0.58%) / 2,832
	P32 Pavant-Gonder InterMtn-Gonder 230 kV Interface	3 (0.03%) / 204	5 (0.06%) / 825	2 (0.02%) / 82	20 (0.23%) / 3,366	3 (0.03%) / 273
	P33 Bonanza West Interface	2 (0.02%) / 2	1 (0.01%) / 0.57		3 (0.03%) / 116	
	P41 Sylmar to SCE Interface	8 (0.09%) / 35	6 (0.07%) / 28	10 (0.11%) / 50	267 (3%) / 19,532	21 (0.24%) / 81
	P28 Intermountain-Mona 345 kV Interface				8 (0.09%) / 5,733	
	P29 Intermountain-Gonder 230 kV Interface				10 (0.11%) / 526	
	PHSHFT XOVER - YELLOWTL WST 230kV Line #1 (630041_73632_1)				9 (0.10%) / 2,727	
Total Multi-TO Congestion (\$):		2,031,988	2,921,181	2,369,840	300,787,318	2,080,823
Total Single-TO Congestion (\$):		197,607,522	336,882,640	203,202,098	2,289,773,193	229,468,694
Total Non-WestConnect Congestion (\$):		1,182,675,221	1,253,269,842	1,302,681,380	1,819,432,129	1,102,098,354
Total Multi-TO Congestion (% Change):			44%	17%	14703%	2%
Total Single-TO Congestion (% Change):			70%	3%	1059%	16%
Total Non-WestConnect Congestion (% Change):			6%	10%	54%	-7%

Economic Sensitivities - Congestion

Assumed Grouping	Branch or Path Name	Avg Flow (MW)				System Carbon Price
		Base	Low Hydro	High Gas	High Load	
Multiple WC Entities	P48 Northern New Mexico (NM2) Interface	112	115	123	396	117
	P30 TOT 1A Interface	113	108	96	-29	39
	P36 TOT 3 Interface	464		475	569	303
	DAVEJOHN - LAR.RIVR 230kV Line #1 (65420_73107_1)	-125	-152	-122	-76	
	P39 TOT 5 Interface				221	
	TRCY PMP-HURLEYS 230kV Line Ckt 1&2 (37585_37010_1&2)		141		181	
	W.RV.CTY - CALAMRDG 138kV Line #1 (79264_79265_1)				-16	
Possibly Multiple WC Entities	WESTWNGW - PINPK 230kV Line #1 (14231_19062_1)				205	
	STORY - PAWNEE 230kV Line #1 (73192_70311_1)	-196	-220	-194		
	DEERVALY - WESTWNGE 230kV Line #1 (14207_14259_1)				-195	
	HESPERUS - WATRFLW 345kV Line #1 (79072_79990_1)				-94	
	MIDWAYBR - RD_NIXON 230kV Line #1 (73413_78857_1)				24	
	SAN_JUAN - SANJN PS 345kV Line #1 (10292_79060_1)				94	
	ST.VRAIN - LONGPEAK 230kV Line #1 (70410_78105_1)				265	
Single WC Entity, Multi-Regional	TRCY PMP-HURLEYS 230kV Line Ckt 1&2 (37585_37010_1&2)		141		181	
	P27 Intermountain Power Project DC Line Interface	1,128	847	1,304	1,619	819
	INTERMT-MONA 345kV Line Ckt 1&2 (26043_65995_1&2)	-4	50	-110	-73	601
	P61 Lugo-Victorville 500 kV Line Interface	667	573	749	588	423
	P32 Pavant-Gonder InterMtn-Gonder 230 kV Interface	55	77	55	36	50
	P33 Bonanza West Interface	-289	-262		-207	
	P41 Sylmar to SCE Interface	-371	-310	-393	-600	-402
	P28 Intermountain-Mona 345 kV Interface				-73	
P29 Intermountain-Gonder 230 kV Interface				8		
PHSFT XOVER - YELLOWTL WST 230kV Line #1 (630041_73632_1)				102		

Public Policy Assessment

- WestConnect begins evaluation by identifying a list of enacted public policies that impact the local TOs (see study plan)
- The regional base models reflect the enacted public policies driving local transmission needs
- If the assessments identify regional issues that are related to enacted public policy these may constitute a public policy-driven transmission need
- There is also an opportunity to make suggestions as to whether a TO's local policy-driven project may constitute a regional public policy-driven transmission need
 - Stakeholders were invited to make a recommendation to the Planning Subcommittee following the November 17th Stakeholder Meeting, however, no public policy-driven needs were submitted by stakeholders

Map of local public policy-driven transmission projects

Draft WestConnect 2022-23 Public Policy Driven Projects



Regional Needs Determination

- WestConnect has determined there are no reliability or economic issues that are regional in nature based on a review of the below results.
 - Contingency and transient stability analysis results from the Base Cases
 - Congestion results from the base economic model
 - PS Recommendation
 - Stakeholder opportunity for comment
 - PMC Final Approval



2022-23 PLANNING PROCESS NEXT STEPS AND SCHEDULE



2022-23 SCENARIO ASSESSMENT

2022-23 Scenario Study

- In addition to the regional needs assessment, WestConnect also conducts information-only scenario studies that look at alternate but plausible futures.
- Scenarios represent futures with resource, load, and public policy assumptions that are different in one or more ways than what is assumed in the Base Cases.

High Clean Energy Penetration Scenario Study

Purpose: Evaluate the regional congestion in and reliability of a 2032 future in which the renewable and clean energy target-focused Public Policy Requirements of that study year are satisfied within the WestConnect footprint, as well as use the models representing this future to understand the gap between this future and a future in which the WestConnect footprint is carbon free.

Assumptions: First, the congestion in the case will be evaluated using the same method as the Regional Economic Assessment. WestConnect may choose to conduct sensitivity studies on the 2032 High Clean Energy Penetration PCM. Second, the results will be used to perform a “carbon free gap analysis”, which will involve an accounting of the carbon emissions attributed to the WestConnect footprint in the 2032 High Clean Energy Penetration PCM in order to approximate the amount of further carbon reduction that would be necessary to make the WestConnect footprint carbon free by 2032.

The reliability of the system condition exported from the 2032 High Clean Energy Penetration PCM case will be evaluated using the same steady state contingency analysis as the Regional Reliability

Scenario Study – Administration

- PMC decides how to treat any assessment issues
- May constitute additional investigation by the PS (but not required...“informational”)
- Useful if scenario appears likely to become an expected future
- May help region identify emerging opportunities for infrastructure
- No obligation to treat as Order 1000 need

Scenario – Study Plan Scope

- **Objective of Study**

- The purpose of the High Clean Energy Penetration Scenario Study is to evaluate congestion and reliability of a future in which the renewable and clean energy target-focused Public Policy Requirements of that study year are satisfied (2032)
- Use the models representing this future to understand the gap between this future and a future in which the WestConnect footprint is carbon free
 - NOTE: WestConnect will not study a carbon-free portfolio, per the scope

- **Methodology Summary - Economic**

- Update the PCM so that the resource portfolio reasonably satisfies the renewable and clean energy target-focused Public Policy Requirements applicable to year 2032, confirmed by TOLSO Members.
 - This may take several iterative rounds of review and model runs to add sufficient resources
- Focus on regional vs. local impacts in developing this case and performing the study
 - This could mean un-monitoring certain lower-voltage transmission lines
- Leverage members' studies if available
- Perform “carbon free gap analysis”
 - This does not include running a model to evaluate reliability/congestion

- **Methodology Summary – Reliability**

- Export reliability case from scenario PCM
- Contingency analysis – same as base
 - May need to modify scope to focus on higher-voltage transmission elements

Scenario – Tasks

Task 1: Base Economic Model Benchmark

Task 2: Economic Scenario Development

Task 3: Economic Carbon Free Gap Analysis

Task 4: Create Reliability Model(s)

Task 5: Perform Reliability Analyses

Task 6: Document the Scenario Study

Scenario – Economic Workplan

TASK 1: Base Model Benchmark

Goal: review results from WC Base PCM model and determine, by state, what if any “gaps” exist between simulated clean energy levels and assumed state policy objective “targets”. Task could involve adjusting “target” as needed, based on direction from members.

Task 1: Base Model Benchmark	Entity	Date/Status
1.1. Compile and provide workbook to members	ES	✓
1.1.A. Assist members with understanding workbook - tutorial	ES	March 1
1.1.B. Members get feedback from resource planners to true-up plans	Members	March 14
1.2. Review policies and assumptions used to inform “target” for each state. Also review how state targets were applied to member BAs.	Members	April 1
1.3. Review resources assumed to contribute to meeting state target.	Members	April 1
1.4. Provide adjustments to (1) and (2) above to Energy Strategies.	Members	April 1
1.5. Implement adjustments and provide members with GWh and MW “gaps” for each state. Include state-by-state proposal for reasonable approach to fill gap based on procurement trends in region.	ES	April 18
1.6. Member sign-off that “resource plan” to address gap is reasonable and sufficient for moving onto next phase	Members	April 18

Scenario Next Steps

Task 2: Economic Analysis

Task 3: Economic Carbon-free Gap Analysis

Task 4: Reliability Benchmark

Task 5: Reliability Analysis

Task 6: Documentation

- Scope and schedule for remaining scenario tasks will be determined during Planning Subcommittee meetings
- The scenario is expected to be completed by Q3
- The scenario will be documented and will be made available to stakeholders
- Stakeholders are invited to participate in the scenario development through participation in open Planning Subcommittee (PS) meetings
 - PS meetings are posted to the WestConnect [calendar](#)



Upcoming Meetings

Heidi Pacini, WestConnect

Next Meetings

- WestConnect March 2023 meetings will be held via webinar
 - PS Meeting: Tuesday, March 14th, 9:00 a.m. – 12:00 p.m. MDT
 - PMC Meeting: Wednesday, March 15th, 9:00 a.m. – 12:00 p.m. MDT
- The complete 2023 WestConnect PMC meeting schedule is posted to the WestConnect [calendar](#)

QUESTIONS

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