Western Planning Regions (WPR) Interregional Coordination Meeting

Tempe, Arizona

February 25, 2016

Introductions & Meeting Logistics

Charlie Reinhold,
WestConnect Project Manager

Agenda for Today

- Meeting Objectives
- WPR Annual Interregional Information & ITP Proposals
  - WestConnect
  - ColumbiaGrid
  - Northern Tier Transmission Group ("NTTG")
  - California ISO
- WPR Engagement with TEPPC Review Task Force
- Overview of RETI 2.0
- Open Discussion
- ITP Submittal Overview
- Closing Remarks & Next Meeting

Meeting Objectives

- Describe interregional coordination activities
- Briefly summarize each Planning Region's annual interregional information
- Briefly describe submitted ITP proposals, if any
- Discuss interregional solutions that may meet regional transmission needs
- Open Discussion

WPR Annual Interregional Information & ITP Proposals

WestConnect

ColumbiaGrid

NTTG

California ISO

WestConnect
Regional Planning Update

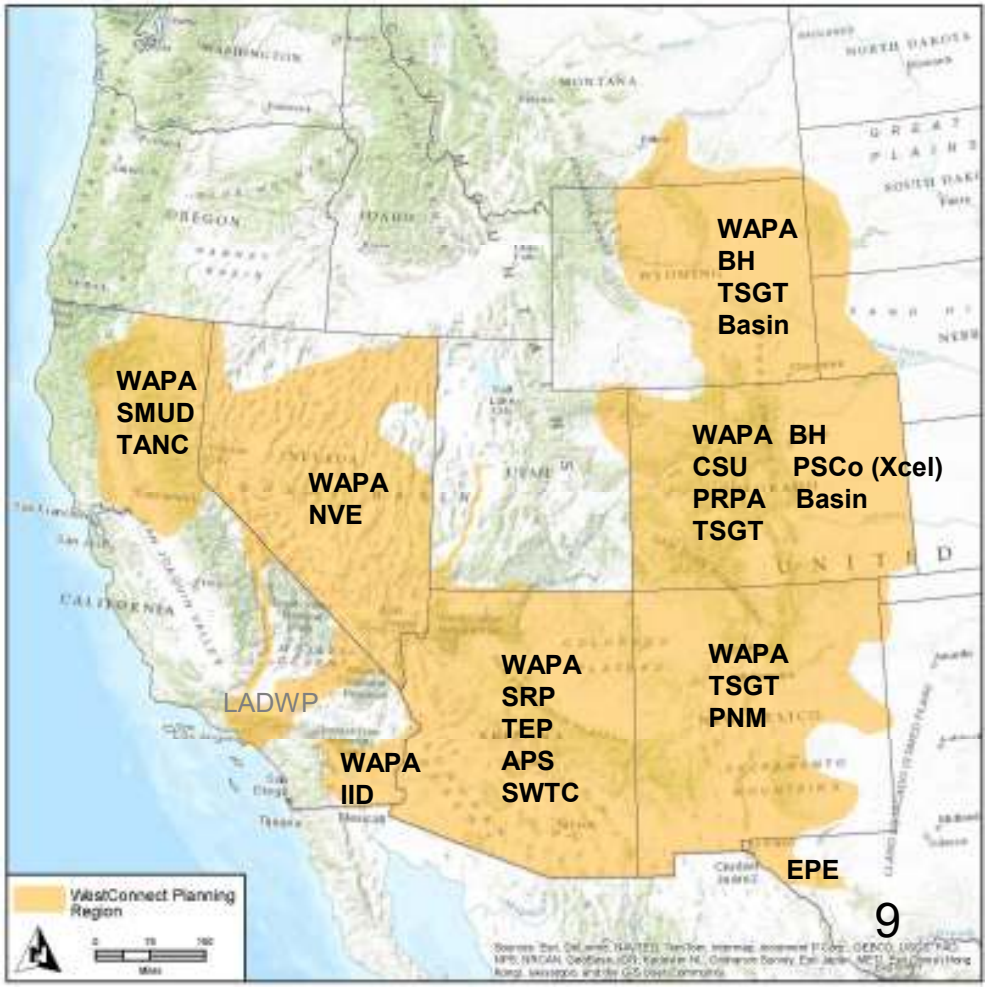
Annual Interregional Coordination Meeting

February 25, 2016

Agenda

- WestConnect Regional Planning Overview
- 2015 Regional Transmission Plan
- 2016-17 Planning Cycle Schedule and Overview
- Draft 2016-17 Study Plan
  - Scenario submittals
  - 2016-17 Base Transmission Plan
- Interregional Transmission Project Submittals
- Upcoming meetings

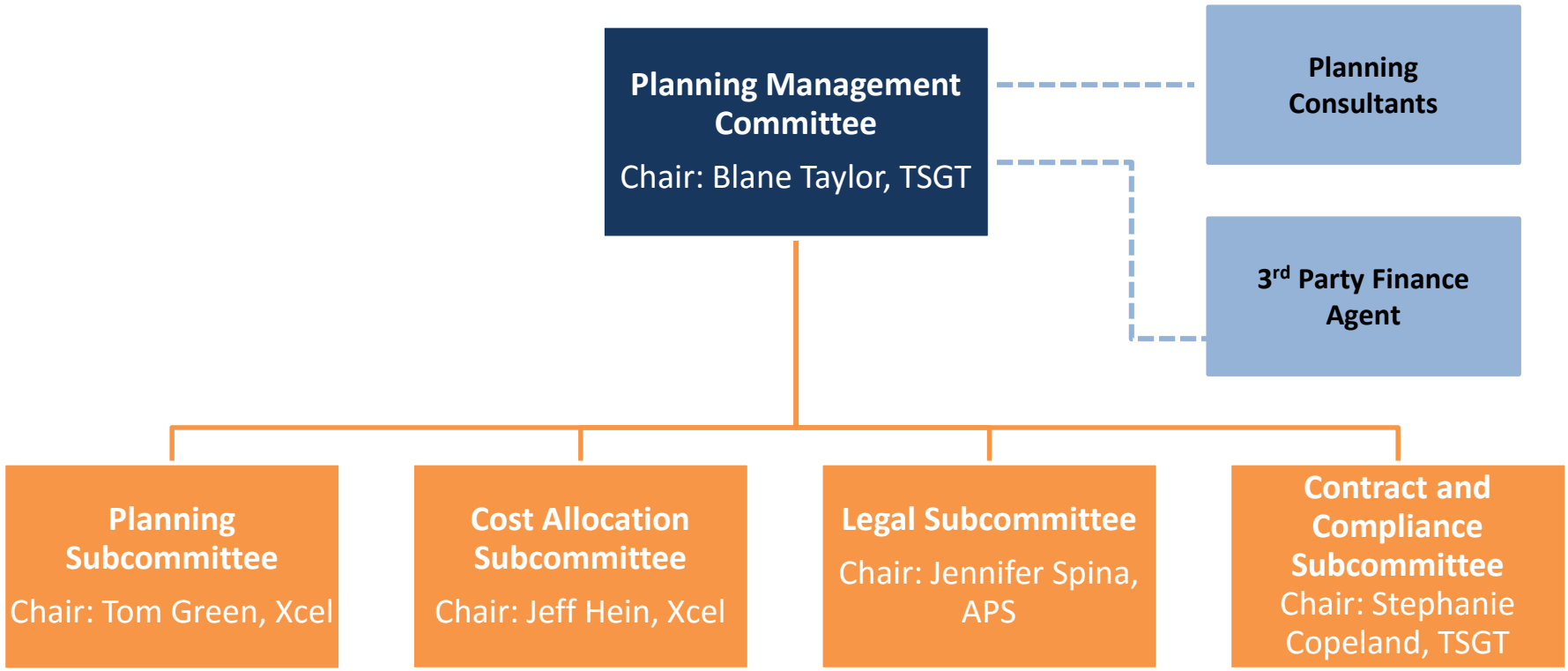
WestConnect Regional Planning Overview



WestConnect Planning Region

Entities in **grey** text are transmission providers that participate in the WestConnect Order 890 planning process but have not yet signed the Order 1000 PPA

PMC Organization



PMC Membership as of 1/1/2016

Transmission Owner w/Load Serving Obligation (17)

Enrolled TO
- Arizona Public Service
- Black Hills
- El Paso Electric
- NV Energy
- Public Service of New Mexico
- Tucson Electric
- Xcel - PSCo

Coordinating TO
- Basin Electric
- Colorado Springs Utilities
- Imperial Irrigation District
- Platte River
- Sacramento Municipal Utility District
- Salt River Project
- Southwest Transmission Cooperative
- Transmission Agency of Northern California
- Tri-State G&T
- Western Area Power Administration

Transmission Customer
- Vacant

Independent Transmission Developer (6)
- Southwestern Power Group
- TransCanyon
- Xcel – Western Transmission Company
- American Transmission Company
- Blackforest Partners
- Western Energy Connection

State Regulatory Commission
- Vacant

Key Interest Group (1)
- Natural Resources Defense Council

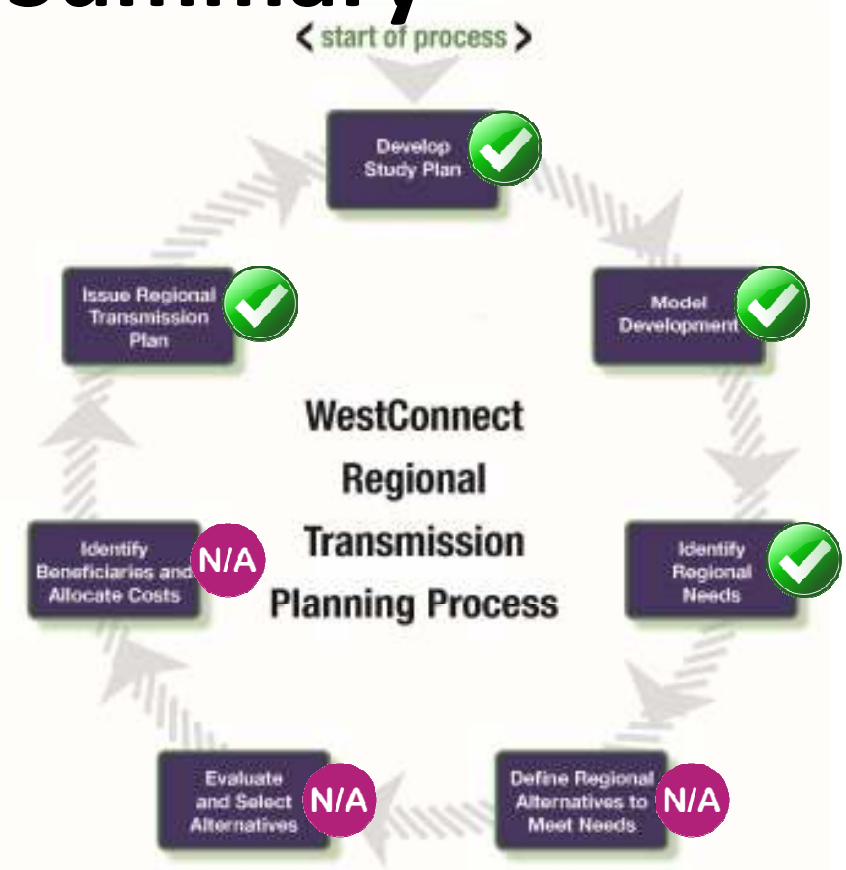
PMC Member Reps

Updated 1/20/16

2015 Regional Transmission Plan

2015 Process Summary

- Initial regional planning effort for WestConnect
  - Technical differences between Order 890 versus Order 1000
  - Shake-down cruise for full cycle
- 2015 Abbreviated Cycle
  - Based on studies conducted in needs assessment, no regional transmission needs identified in 2015
  - PMC elected not to have project solicitation window based on this finding
  - Currently Finalizing Regional Transmission Plan



2015 Study Plan

- Major components…
  - Regional Model Development
    - Reliability: 2024 Heavy Summer Regional power flow case
    - Economic: 2024 WestConnect Regional Production Cost Model (PCM)
    - Public Policy: Verify RPS in powerflow model
  - Identification of Regional Needs
    - Reliability assessment: Steady state N-1 evaluation
    - Economic assessment: limited, focused on model development
    - Policy: RPS driven needs from powerflow model
- PMC approved 2015 Study Plan on January 6, 2015 (link to report)

2024 Regional Base Transmission Plan

- Base transmission plan is the transmission network topology that is reflected in regional models
- **TO Projects:** Included all "planned" projects, including those proposed to meet NERC TPL standards
  - Planned = sponsor + regulatory filings + commitment to construct + permitting has or will be sought
- **Independent Transmission Developer (ITD) projects:** Based on information provided, the PS did not identify any ITD projects that warranted inclusion in the base transmission plan. Inclusion criteria is outlined in the WestConnect BPM.
- **CAISO projects:** Included Delaney – CR 500 kV and Harry Allen – Eldorado 500 kV based on CAISO BOD approval and inclusion in CAISO planning models

2015 Regional Model Development

- Developed 2024 Heavy Summer Regional powerflow case
  - Performed RPS (public policy) assessment for each WestConnect TO
- Conducted preliminary review of 2024 Common Case (production cost) data
- WestConnect approved Model Development Report on May 19th (link to report)

Modeling Type	Case Name	Description
Power Flow Model (PFM)	2024 HS Regional PFM	10-year, 2024 heavy summer (HS) regional PFM based on the WECC 2024 Heavy Summer 1 Scenario Base Case (24HS1SA) and created with assistance from the SPGs and TOs
Production Cost Model (PCM)	2024 Regional PCM	10-year, 2024 regional PCM dataset based on the WECC TEPPC 2024 Common Case and, per areas of improvement identified by the Planning Subcommittee, was developed throughout 2015

2015 Regional Transmission Needs Assessment

- Reliability assessment performed using PMC-approved 2024 Heavy Summer Regional powerflow base case
  - Any issues driven by RPS resources in powerflow model could drive Public Policy need
- Explored congestion metrics for Economic-driven Needs
- Based on studies conducted in needs assessment, no regional transmission needs identified in 2015
  - Open window for alternatives to meet identified needs not necessary
- WestConnect PMC approved Needs Assessment Report on August 17th

2015 Regional Transmission Plan

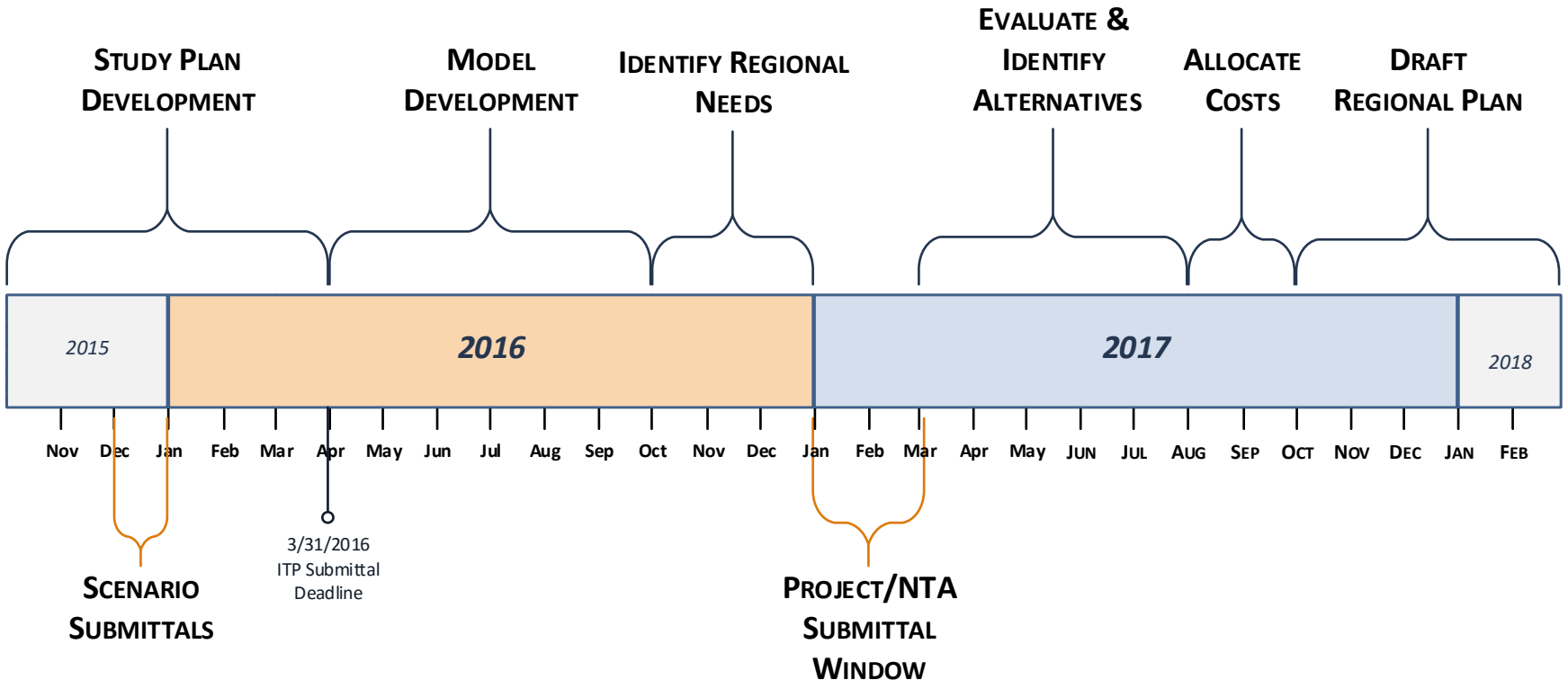
- Reports from 2015 compiled and enhanced to create 2015 Regional Transmission Plan
- Outline of 2015 Regional Transmission Plan:
  - 1.0 Summary and Introduction
  - 2.0 Regional Planning Model Development
  - 3.0 Regional Transmission Needs Assessment
  - 4.0 Stakeholder Involvement and Regional Coordination
  - 5.0 Conclusions

2015 Regional Transmission Plan (cont.)

- Appendices worth noting:
  - Appendix B – Results of 2015 Reliability Needs Assessment: Final Issues Flagged in the Steady-State Analysis
  - Appendix C – Incremental Projects in the 2024 Regional Base Transmission Plan (2015-2024 Projects)
  - Appendix D – 2024 Public Policy Documentation
- **Based on assessment (10-year heavy summer powerflow base case), no regional transmission needs were identified**
- 2015 Regional Transmission Plan approved by PMC on December 16,2015 and is posted to website

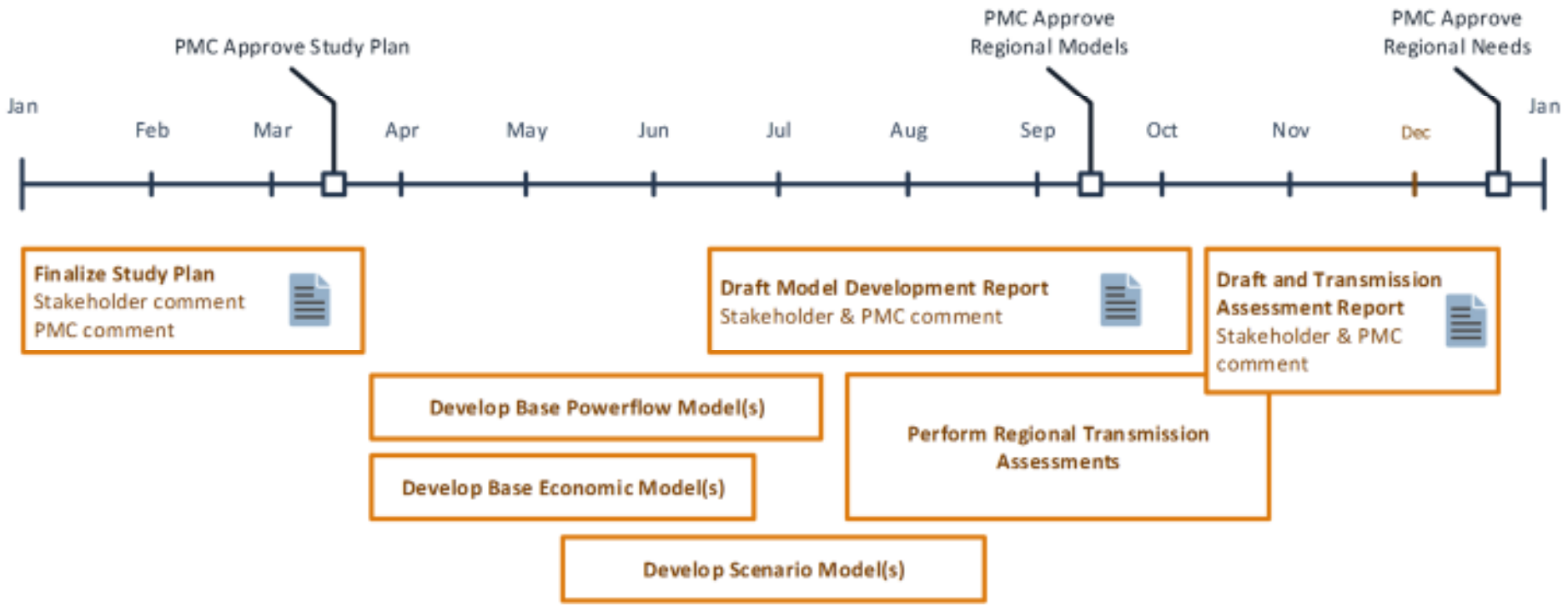
2016-17 Planning Cycle Schedule and Overview

2016-17 Planning Cycle Schedule



WESTCONNECT REGIONAL PLANNING

2016 Technical Schedule



Draft 2016-17 Regional Study Plan

Study Plan Schedule and Process to Date

Milestone	Date
Review Draft 1 at PS	January 19
Status Report to PMC	January 20
Prepare Draft 2	January 25-26
PS / SPTF Review	Jan 26-Feb 4
PS / SPTF Meeting	February 4
Post for Stakeholders / Other Regions	February 5
PS Finalize	February 16
Stakeholder comment due	**March 2**
PMC Approval	**March 16**

2016-17 Study Plan Outline

1.0 Introduction
2.0 Overview of 2016-17 Regional Transmission Planning Activities
3.0 The Planning Process
4.0 Regional Transmission Assessment Methodology
5.0 Alternatives to Meet Regional Needs
6.0 Evaluation and Selection of Regional Alternatives
7.0 Regional Cost Allocation
8.0 Issuance of a Regional Plan

2016-17 Study Plan Outline (Appendices)

Appendix A – Draft WestConnect Stakeholder Project Submittal Form
Appendix B – Draft WestConnect Scenario Submittal Form
Appendix C – Other Regional Planning Process Activities
Appendix D – Base Transmission Plan Process
Appendix E – Base Transmission Plan (2016-2026 Projects)
Appendix F – Regional Model Case Details
Appendix G – Data Exchange Procedures for Model Development

3.0 The Planning Process

- Three assessments are performed using two regional models
  - Assessments: reliability, economic, public policy
  - Models: powerflow (reliability) and production cost (economic)
  - Public policy assessments are handled via spreadsheet models, leveraging data from powerflow and production cost as needed
- Models developed for 2026 timeframe, use WECC models as starting point
- Regional Base Transmission Plan will be consistent among all models
  - Anticipated 10-year network topology used as starting point for planning purposes

Base Transmission Plan Summary

TOLSO	230 kV	345 kV	500 kV	Total
Arizona Public Service	3		1	4
Black Hills Power	2			2
El Paso Electric Company		1		1
Imperial Irrigation District	1			1
Los Angeles Department of Water and Power	11		2	13
NV Energy		1		1
Platte River Power Authority	3			3
Public Service Company of Colorado/ Xcel Energy	5	1		6
Public Service Company of New Mexico		3		3
Salt River Project	5		1	6
Southwest Transmission Cooperative	2			2
Tri-State Generation and Transmission Association	3			3
Tucson Electric Power		2	1	3
Western Area Power Administration - DSW	1			1
Western Area Power Administration - RMR		1		1
Western Area Power Administration - SNR	4			4
Grand Total	40	9	5	54

Base Transmission Plan Summary

500 kV Projects

Sponsor	Project Name	Development Status	Voltage	SPG
Arizona Public Service	Morgan - Sun Valley 500kV Line	Planned	500 kV AC	SWAT
Los Angeles Department of Water and Power	Victorville 500/287 kV auto-transformer installation	Planned	500 kV AC	SWAT
Los Angeles Department of Water and Power	Upgrade Toluca 500/230 kV Bank H	Planned	500 kV DC	SWAT
Salt River Project	Hassayampa - Pinal West #1 Jojoba line loop	Planned	500 kV AC	SWAT
Tucson Electric Power	Tortolita 500 kV Switchyard	Planned	500 kV AC	SWAT

*Plus NV Energy Harry Allen 500/230 kV Transformer

Base Transmission Plan Summary

345 kV Projects

Sponsor	Project Name	Development Status	Voltage	SPG
Public Service Company of Colorado/ Xcel Energy	Pawnee - Daniels Park 345 kV Transmission Project	Planned	345 kV	CCPG
Western Area Power Administration - RMR	Ault 345/230 kV XFMR Replacement	Planned	345 kV	CCPG
NV Energy	Carlin Trend 120 kV Separation Scheme (RAS) to mitigate thermal overloading	Planned	345 kV	SSPG
El Paso Electric Company	Afton North Autotransformer	Planned	345 kV	SWAT
Public Service Company of New Mexico	Second Yah-Ta-Hey 345/115 kV Transformer	Planned	345 kV	SWAT
Public Service Company of New Mexico	Guadalupe SVC	Planned	345 kV	SWAT
Public Service Company of New Mexico	Cabezon Switching Station	Planned	345 kV	SWAT
Tucson Electric Power	South Loop 345 kV, Conversion to breaker-and-a-half substation	Planned	345 kV	SWAT
Tucson Electric Power	Greenlee 345 kV, Conversion to breaker-and-a-half substation	Planned	345 kV	SWAT

3.0 The Planning Process (cont.)

- Scenarios in the Planning Process
  - Base Cases are intended to represent “business as usual”, “current trends”, or the “expected future”
  - Scenarios complement Base Cases by looking at alternate but plausible futures
- Scenarios suggestions enter the planning process through a 30-day open submittal window (closed December 31st)
- PS has been evaluating scenario suggestions and intends to recommend a scenario study package to the PMC for approval

Economic Studies

Case Name	Case ID	Case Description and Scope
2026 Base Case	WC26-PCM-REF	Business-as-usual case based on WECC 2026 Common Case with additional regional updates from WestConnect members.
High Renewables	WC26-PCM-HR	California 50% RPS with regional resources (Wyoming wind and New Mexico wind) *and* increase WestConnect state RPS requirement beyond enacted with other resources
CPP – WestConnect Utility Plans	WC26-PCM-CPP1	Reflect individual WestConnect member utility plans for CPP compliance
CPP – Market-based Compliance	WC26-PCM-CPP2	Model CO_2 price in WestConnect to achieve mass-based regional CPP compliance
CPP – Heavy RE/EE Build Out	WC26-PCM-CPP3	Additional coal retirements, additional RE/EE, minimal new natural gas generation

Reliability Studies

Case Name	Case ID	Case Description and Scope
2026 Heavy Summer Base Case	WC26-HS	Summer peak load conditions during 1500 to 1700 MDT, with typical flows throughout the Western Interconnection – ***traditional case build***
2026 Light Spring Base Case	WC26-LS	Light load conditions with high wind generation – ***traditional case build***
CPP – WestConnect Utility Plans	WC26-CPP1	Reflect individual WestConnect member utility plans for CPP compliance - ***export stressed hour from PCM***
CPP – Heavy RE/EE Build Out	WC26-CPP3	Additional coal retirements, additional RE/EE, minimal new natural gas generation – ***export stressed hour from PCM; include transient study for frequency response check***

4.0 Regional Transmission Assessment Methodology

- Initiated in Q4 of first year in the planning cycle
- Assessments performed on both base case and scenarios included in Study Plan
- Local versus Regional transmission issues
  - Regional needs impact more than one TOLSO

4.0 Regional Transmission Assessment Methodology (cont.)

- Regional Reliability Assessment
  - Violations of NERC TPL-001-004 reliability standards on more than one TOLSO Member system may constitute a regional need
  - Assessment will evaluate system performance with:
    - No contingencies under normal initial system conditions (P0)
    - Single contingencies under normal initial system conditions (P1, P2)
    - Multiple contingencies (P4, P5, P7) may be considered on case-by-case basis
  - Evaluate contingencies >200kV, unless specified by TO
  - Monitor elements >100kV for performance, unless specified by TO

4.0 Regional Transmission Assessment Methodology (cont.)

- Regional Public Policy Assessment
  - Enacted public policies are represented in regional base models
    - Reflected in local TO plans
  - Proposed public policies are considered as a part of scenario planning process
    - Includes those enacted public policies with significant uncertainty (i.e. Clean Power Plan)
  - Assessment is initiated by gathering list of public policies with input from stakeholders and TOs

4.0 Regional Transmission Assessment Methodology (cont.)

- After completing assessments, PS will make recommendation as to if any issues resulting from the studies should constitute a regional transmission need
  - Described in Regional Transmission Assessment Report
- May also include recommendation about any regional "opportunities" identified in via scenario studies

5.0 Alternatives to Meet Regional Needs

- There will be an open submission period for proposals to address identified regional transmission needs
  - 30-days long, completed by end of Q5
  - Only PMC members may submit projects
- Categories of projects that may be submitted:
  - Transmission projects not seeking cost allocation;
  - Transmission projects seeking cost allocation;
  - Non-transmission alternatives
- If no projects are submitted for a regional need, the PMC will seek to develop a transmission or non-transmission alternative to resolve the regional need

5.0 Evaluation and Selection of Regional Alternatives

- Regional models used to determine if proposed solutions resolve regional need
  - Occurs in Q5, Q6, Q7
- Identify more cost-effective or efficient solution
- System reliability may not be compromised by solution
- Projects seeking cost allocation must be determined to be the more cost-effective or efficient solution before entering cost allocation process

6.0 Regional Cost Allocation

- All categories of benefits considered when benefits are calculated
  - If project doesn't pass threshold on one metric alone (e.g. reliability, economic, public policy) then sums of benefits may be considered
- **Projects that:**
  1. seek cost allocation;
  2. are identified as the more efficient or cost effective solution; and
  3. pass applicable B/C thresholds;

  …will be selected into the regional plan for the purposes of cost allocation
- Cost allocation process includes sensitivities to ensure that benefits are accrued with relative certainty

6.0 Issuance of Regional Plan

- Compiled in Q8 of planning process
- Projects identified in WestConnect Regional Plan include:
  - The base transmission plan;
  - Transmission facilities and NTAs selected as the more efficient or cost effective regional solutions to identified regional need(s);
  - Transmission facilities selected as the more efficient or cost effective regional solutions to identified regional need(s) that have been selected for the purposes of cost allocation

WestConnect Interregional Transmission Project (ITP) Proposals

- Proponents of an Interregional Transmission Project for which WestConnect is a Relevant Planning Region must submit the project to WestConnect by *March 31, 2016*
  - *Link to project submittal form*
  - The project will be evaluated together with regional alternatives submitted following the identification of WestConnect's 2016/2017 regional transmission needs
- At this time, WestConnect has not received any ITP proposals

Upcoming Meetings

- PMC Meetings:
  - March 16 - 9:00 a.m. to 3:00 p.m., Salt Lake City (ES office)
  - April 20 - 9:00 a.m. to 3:00 p.m., Denver
  - May 18 - 9:00 a.m. to 3:00 p.m., Salt Lake City (ES office)
- WestConnect Stakeholder Meeting:
  - TBD (after regional assessments)

Additional Information Regarding the Regional Planning Process can be Accessed at:

www.WestConnect.com

Thank You!

Presenter Contact Information:

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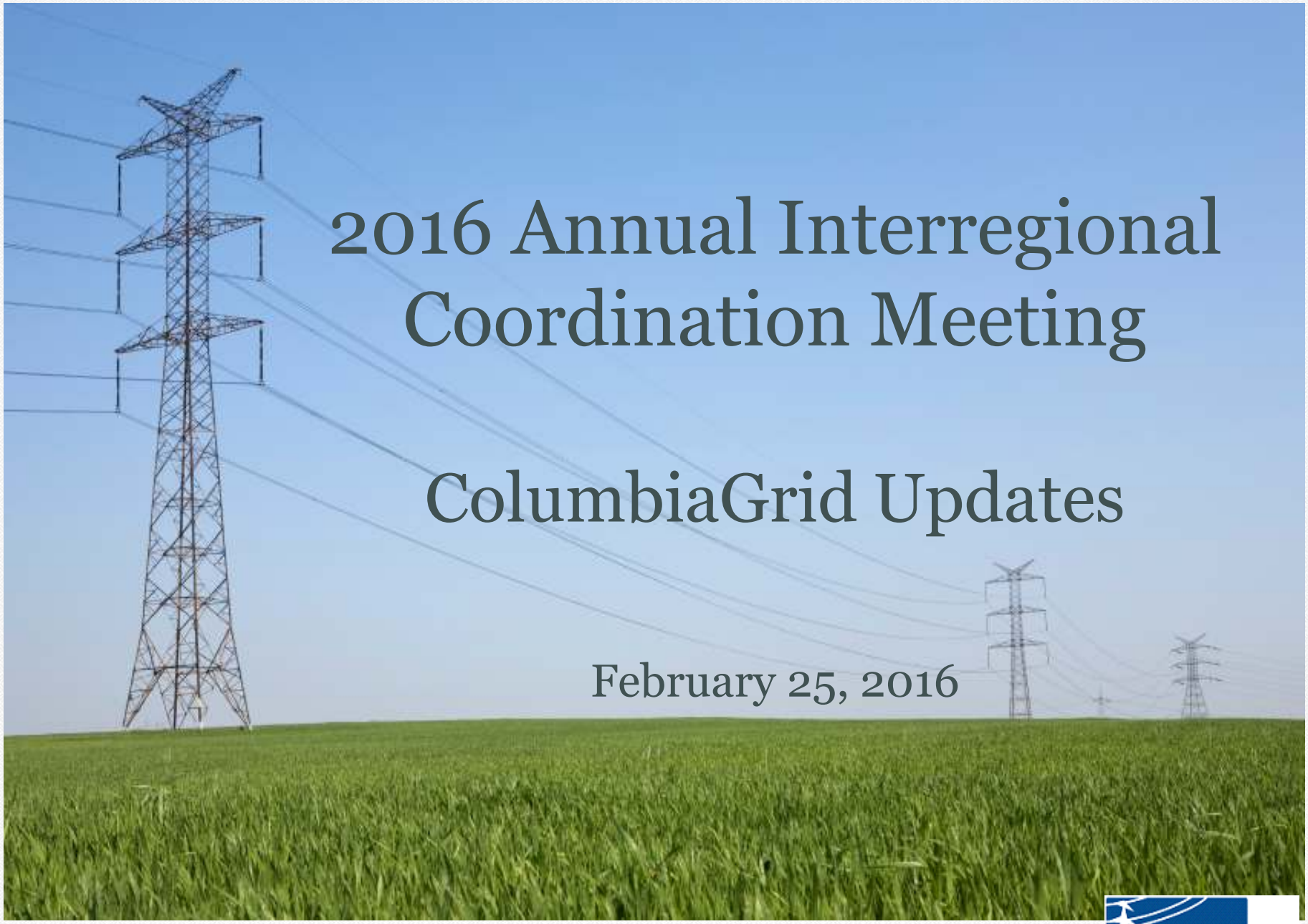
Charlie Reinhold, reinhold@ctcweb.net



2016 Annual Interregional Coordination Meeting

ColumbiaGrid Updates

February 25, 2016

In This Presentation

- Introduction
- Overview of ColumbiaGrid Planning Process
- Current status
  - Update to the 2015 Biennial Plan
  - 2016 System Assessment
  - Order 1000 Needs suggestion window
  - Order 1000 ITP submission window
  - Other studies e.g. Economic Planning, Transient Stability, Study Teams, etc.

In This Presentation

- Next steps and other updates
  - Regional process e.g. evaluation of Order 1000 Needs
  - Interregional process e.g. Annual Interregional Meeting
  - Notifications & communication
- Recent Annual Interregional Information
  - ColumbiaGrid information package
  - 2016 System Assessment Study Plan
  - Updated to the 2015 Biennial Transmission Plan
  - 2015 System Assessment Report

Introduction: ColumbiaGrid

- Independent staff
- Conducts a wide range of technical studies
  - Reliability (power flow, stability)
  - Economic studies (Production Cost Simulation, etc)
  - Other studies that focus on specific issues
- Focuses on transmission planning
- Open stakeholder process
- Planning and Expansion Functional Agreement (PEFA) and Order 1000 (O1K) Functional Agreement
- Cost allocation

Introduction: Members and Planning Participants

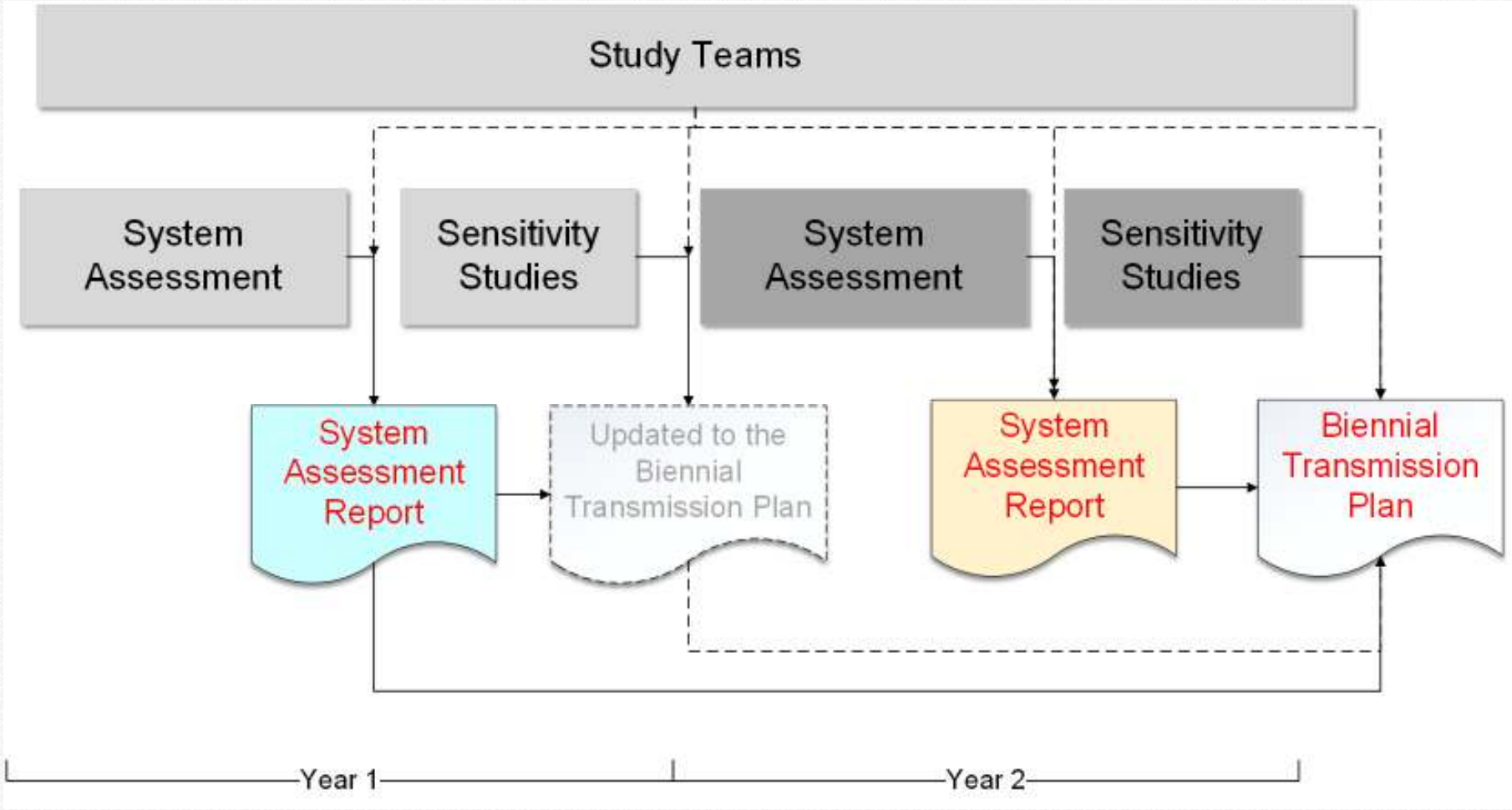
- Avista Corporation
- MATL (formerly Enbridge)*
- Puget Sound Energy
- Bonneville Power Administration
- Chelan County PUD
- Cowlitz County PUD*
- Douglas County PUD*
- Grant County PUD
- Seattle City Light
- Snohomish County PUD
- Tacoma Power

* Non-Member PEFA Planning Participants

Overview: ColumbiaGrid Planning Process

- 1 Planning Cycle: 2 years
- Single process complies with Planning and Expansion (PEFA) & Order 1000 Functional Agreements
- Two main products provide information regarding the activities under both Functional Agreements
  - System Assessment Report (annual)
  - Biennial Transmission Expansion Plan (every 2 years)
- Update to the Biennial Transmission Plan may be issued for the interim year
- Additional documents/information may be available as well

Overview: ColumbiaGrid Planning Process



Overview: ColumbiaGrid Planning Process

- Opportunities for stakeholder participation throughout the process
  - Submit data & suggestions to the process
  - Participate (in person, phone, Webex) in meetings, study teams etc.
  - Receive information & notifications, etc.
- Flexible process
  - Several study options available throughout the planning process
  - Timing of the studies can be varied
- Three different ways a study can be performed
  - Included in System Assessment (Mar – Jun)
  - Part of Sensitivity Studies (Aug – Oct)
  - Through a Study Team (Flexible timeline)

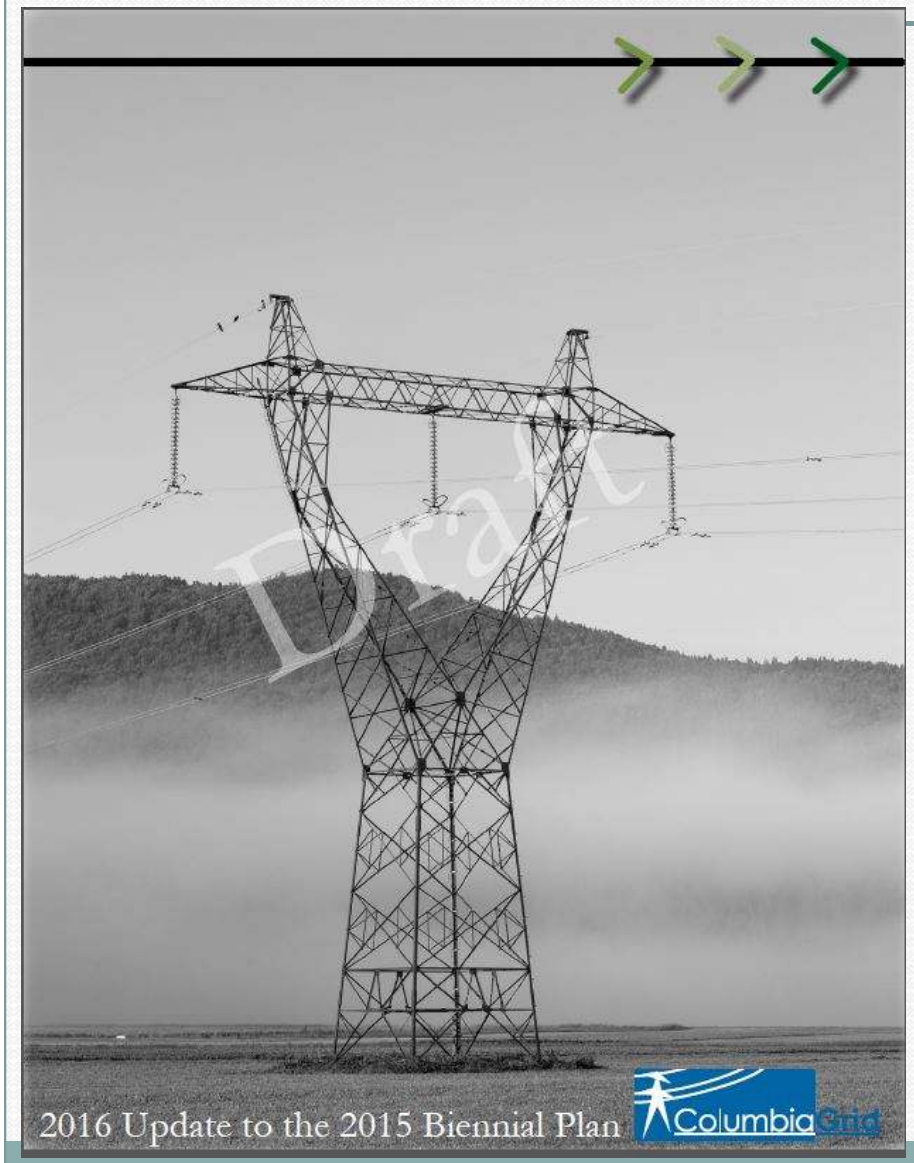
Overview: ColumbiaGrid Planning Process

- System Assessment: Reliability analysis
  - Focus on joint areas of concerns (involve multiple entities)
  - 10-year planning horizon
  - Use NERC TPL Reliability Standards as reference
- Sensitivity: Special studies
  - Study scopes for each year are determined by Planning participants
  - 4 studies were conducted in 2015
- Study Teams: Dedicated study groups
  - For studies that need more time and resources
  - Flexible timeline
  - Examples: Puget Sound, Mid Columbia areas, Order 1000 Needs and project evaluation

Current Status: Biennial Plan

- Update to the 2015 Biennial Transmission Plan
  - The 2015 Biennial Transmission Plan was approved in early 2015
  - In general, ColumbiaGrid is not required to issue another Biennial Plan in early 2016
  - However, in late 2015, planning parties agreed that an Update to the 2015 Biennial Plan should be created
  - The first draft of the Updated plan was issued in Dec 2015
  - CG Board approved this Updated Plan on Feb 17, 2016
  - The final plan is being posted on ColumbiaGrid's website

Current Status: Biennial Plan



Major contents

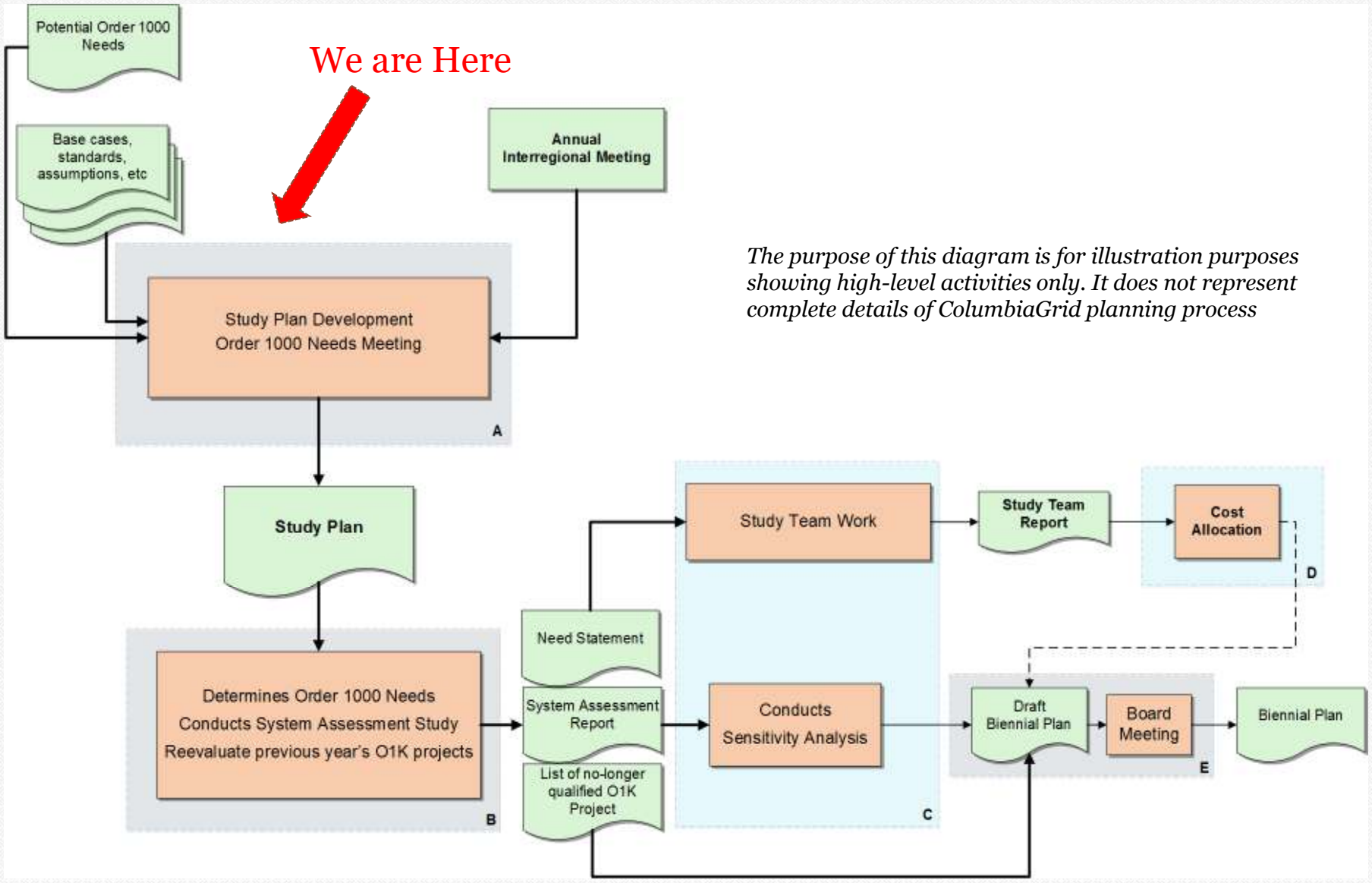
- 2015 System Assessment: 15 joint areas of concerns identified
- Study Team updates: Puget Sound
- 2015 Sensitivity Studies: Transient Stability, Extra Heavy Winter, N-1-1, and Puget Sound Area switching
- Economic Planning Study Results
- Summary of Order 1000 activities
- Other updates such as CIP-014

ColumbiaGrid

Current Status: Other Activities

- Ongoing planning activities
  - Starting point of 2016 planning activities
  - Driven by PEFA and/or Order 1000
  - Collect input regarding Order 1000 Potential Needs and Interregional Transmission Project (ITP) proposals
  - Collect & share data, finalize study plan, develop base cases & data for technical studies
  - Order 1000 Needs determination
  - ITP evaluation
  - Ongoing regional and interregional coordination efforts
  - This step lasts approximately 3 months (Jan-Mar)

Current Status: Where we are now?



The purpose of this diagram is for illustration purposes showing high-level activities only. It does not represent complete details of ColumbiaGrid planning process

Current Status: Major Activities

- 2016 System Assessment (SA)
  - Annual study – focuses more on Reliability Assessment
  - Status: Draft study plan was created, posted, and shared. Base cases, scenarios, etc. are being finalized
  - Some revisions may be needed to reflect Order 1000 Potential Needs suggestions
  - Anticipate completion: July 2016
- Two submission windows with different purposes
  - Order 1000 Needs Suggestion Window
  - Interregional Transmission Project (ITP) Submission Window

Current Status: Major Activities

- Order 1000 Needs Suggestion Window
  - Interested persons may submit suggestions for "Potential Order 1000 Needs"
  - Potential drivers for Order 1000 projects
  - May be driven by Reliability Requirements, Economic Considerations or Public Policy Requirements
  - Two suggestions were received
  - For more info: Please refer to the 12/29/15 notification (also posted at: https://www.columbiagrid.org/1000-overview.cfm)

Current Status: Major Activities

- ITP submission window
  - Opportunity to submit "Project" proposal to be evaluated by relevant regions
  - For more information, please refer to the 1/5/16 notification and CG's website at: https://www.columbiagrid.org/O1000Inter-overview.cfm
- Other activities
  - Ongoing coordination with other regions
  - Conduct System Assessment, Economic Planning, Transient Stability, Sensitivity Studies
  - Base case improvement process
  - Study Teams, etc.

Next Steps

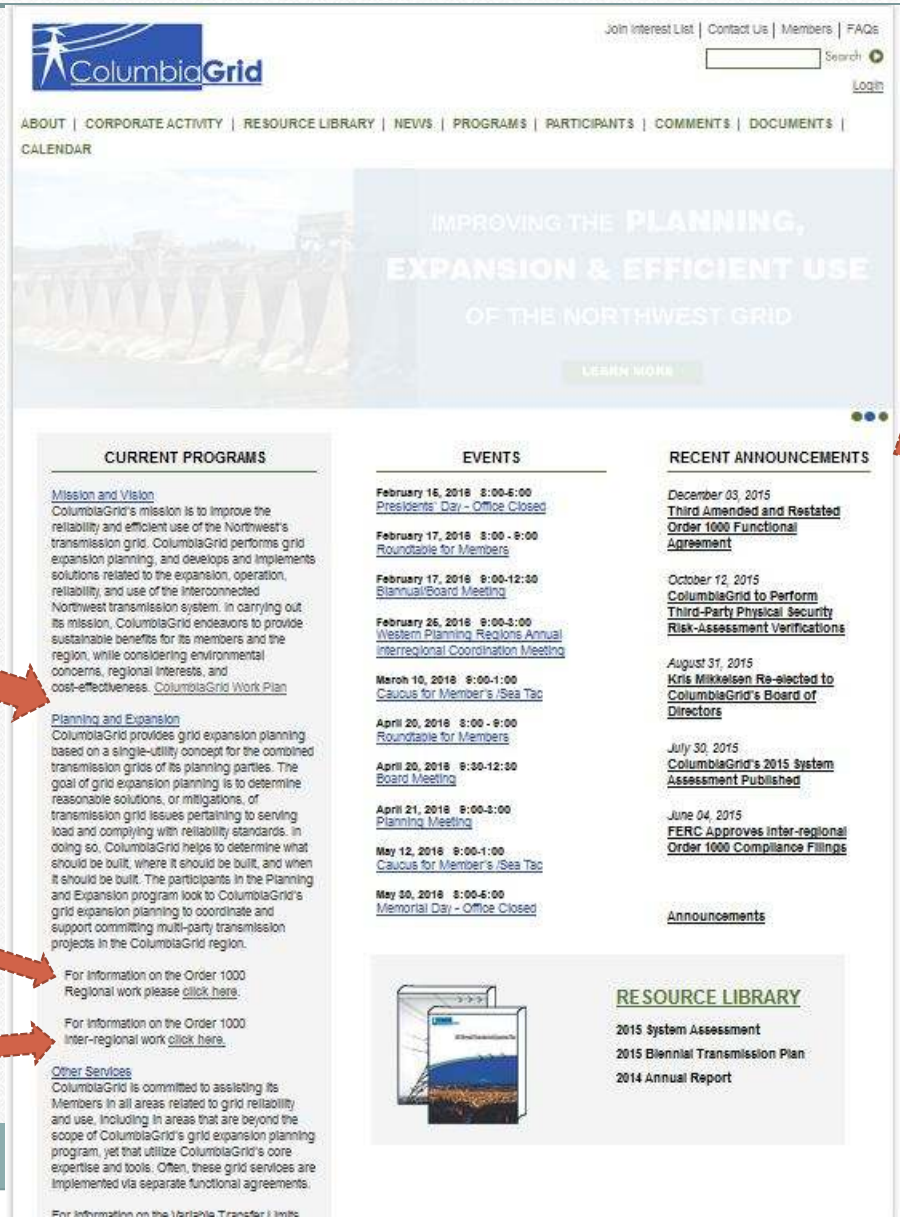
- Evaluation of Order 1000 Needs
  - From Order 1000 Potential Needs
  - Results will be available in 2016 System Assessment Report and during planning meetings
- Future planning meetings
  - Please refer to ColumbiaGrid's website for more details

No	Date	Location	Focus
1	February 11, 2016	Portland, OR	Order 1000 Needs suggestions, 2016 System Assessment assumptions, other updates
2	April 2016	Portland, OR	Order 1000 Potential Needs, Study Plan, and updates on System Assessment, Updates
3	June 2016	Portland, OR	Order 1000 Needs, Draft System Assessment study results, Updates
4	August 2016	Seattle, WA (SCL)	Updates & Technical discussion, Updates
5	October 2016	Portland, OR	Order 1000 updates, Draft Sensitivity Study results, Other updates
6	December 2016	Portland, OR	Draft Biennial Plan, Updates

Next Steps

- Finalize Study Plan, Base cases, Scenarios
- Conduct system assessment / sensitivity studies
- Perform necessary tasks to evaluate ITP submissions
- Ongoing coordination & sharing information with other regions and eligible entities
- (More) information posting

Stay informed about future Activities



Recent Announcements

Planning and Expansion: General postings & PEFA related information

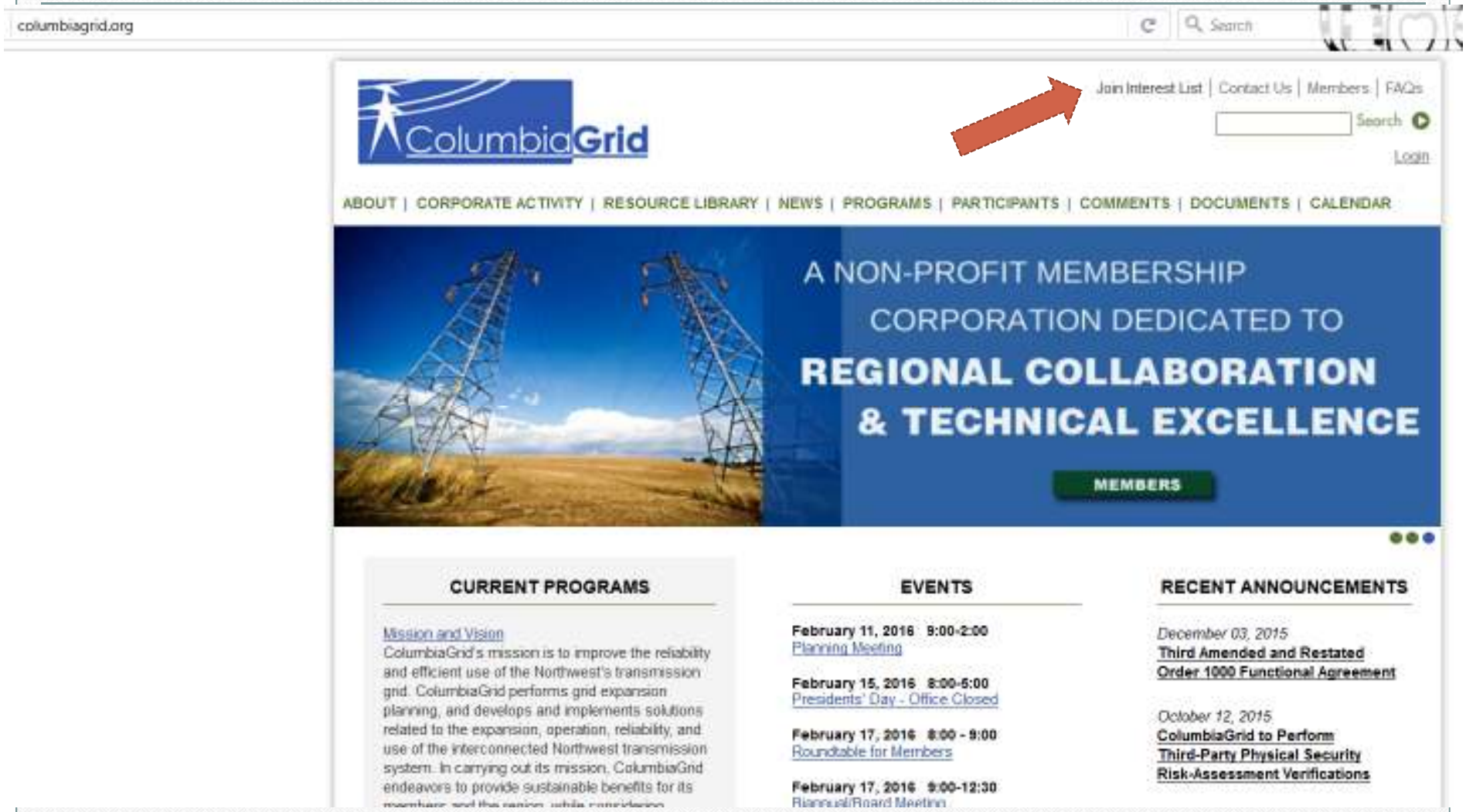
Order 1000 Regional

Order 1000 Inter-regional

Stay informed about future Activities

- Public notifications
  - ColumbiaGrid will notify interested person regarding future activities through notifications
  - Self-register system
  - Refer to “Join Interest List” on CG’s main page

Stay informed about future Activities



Recent Annual Interregional Information

- Posted under "Order 1000 Interregional page" on CG's website
  - ColumbiaGrid information package
  - 2016 System Assessment Study Plan
  - Update to the 2015 Biennial Transmission Plan
  - 2015 System Assessment Report
- More information, once available, will be posted at this location
  - Notifications can be sent to inform interested persons as well

Question:

Larry Furumasu, furumasu@columbiagrid.org
Paul Didsayabutra, paul@columbiagrid.org

Planning Process and Interregional Transmission Project Consideration

Western Planning Region
Annual Interregional Coordination Meeting

Tempe, Arizona
February 25, 2016

Northern Tier Transmission Group ("NTTG")

Participating Utilities

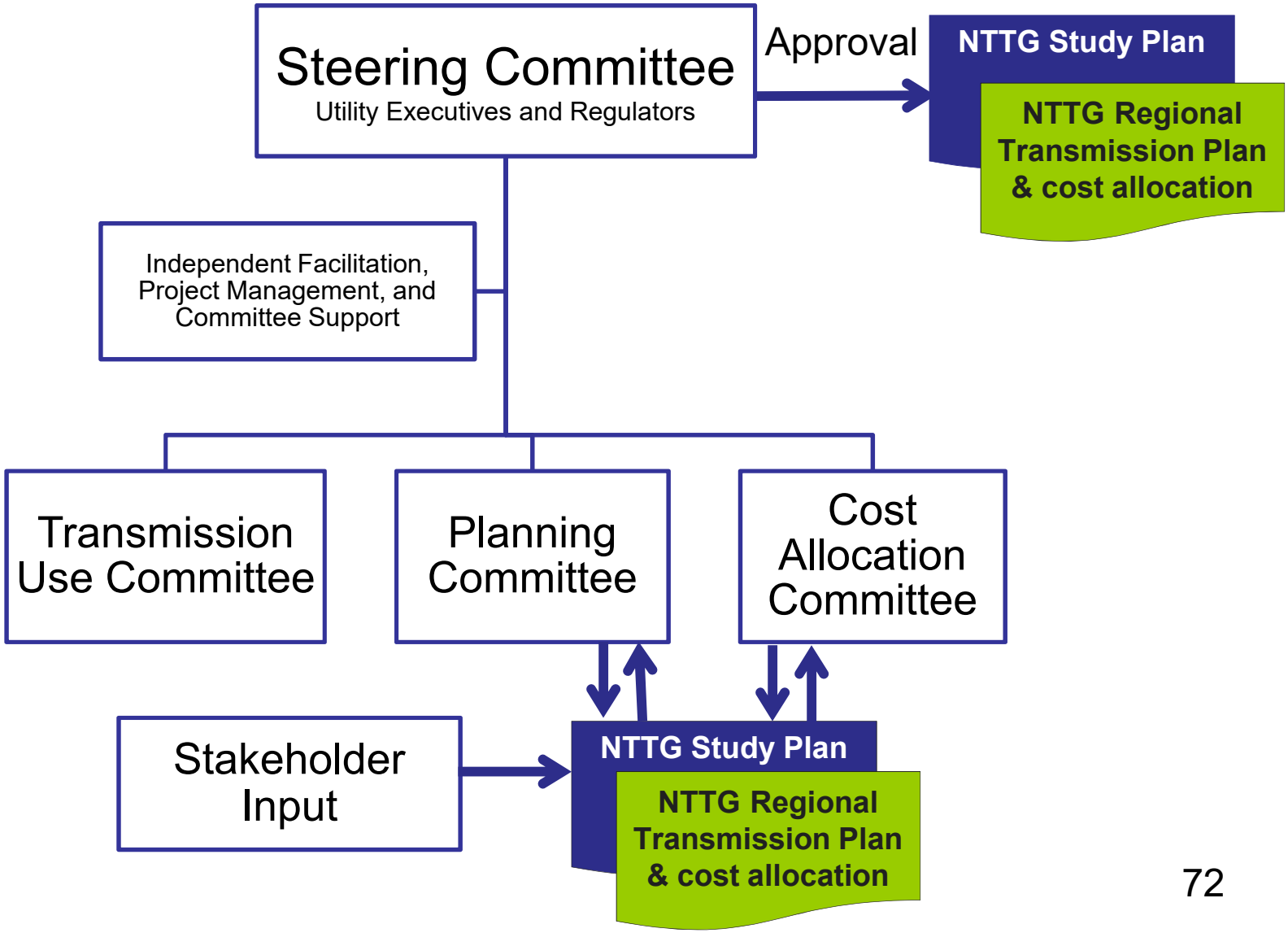
Deseret Power Electric Cooperative
Idaho Power
NorthWestern Energy
PacifiCorp
Portland General Electric
Utah Associated Municipal Power Systems

4,308,200 customers served
29,239 miles of transmission

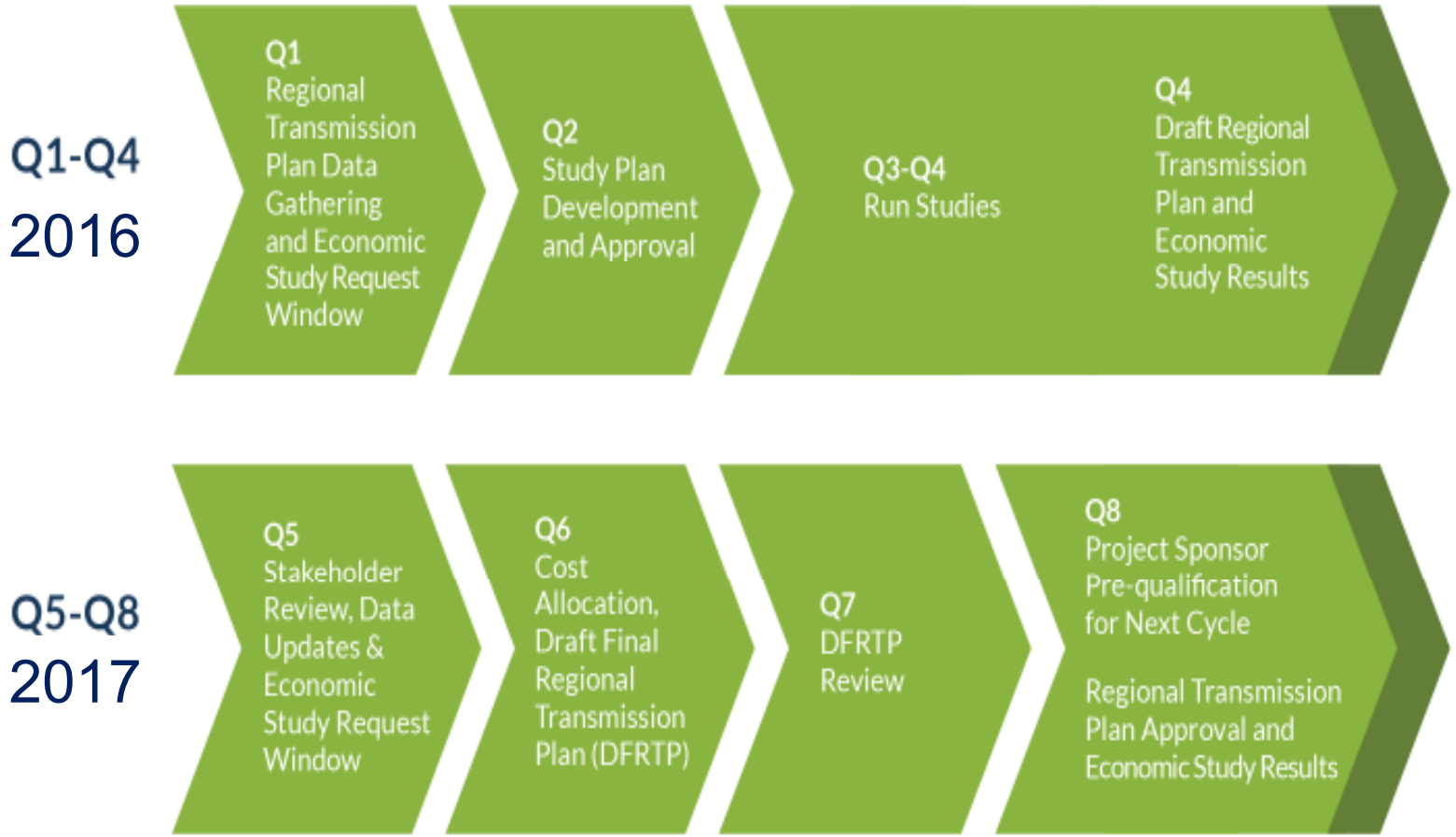
Participating State Representatives

Idaho Public Utilities Commission
Montana Consumer Counsel
Montana Public Service Commission
Oregon Public Utility Commission
Utah Office of Consumer Services
Utah Public Service Commission
Wyoming Public Service Commission

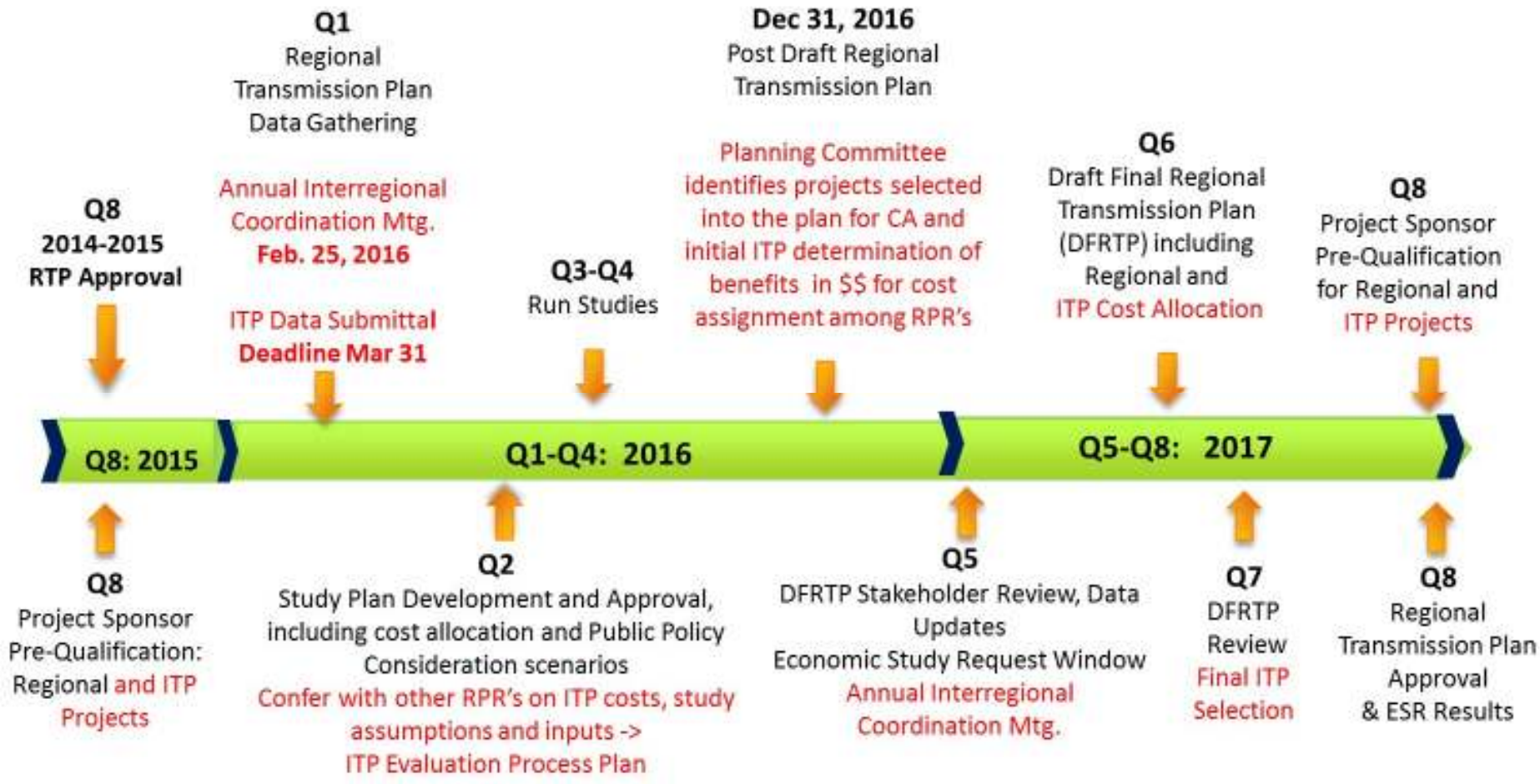
NTTG Structure



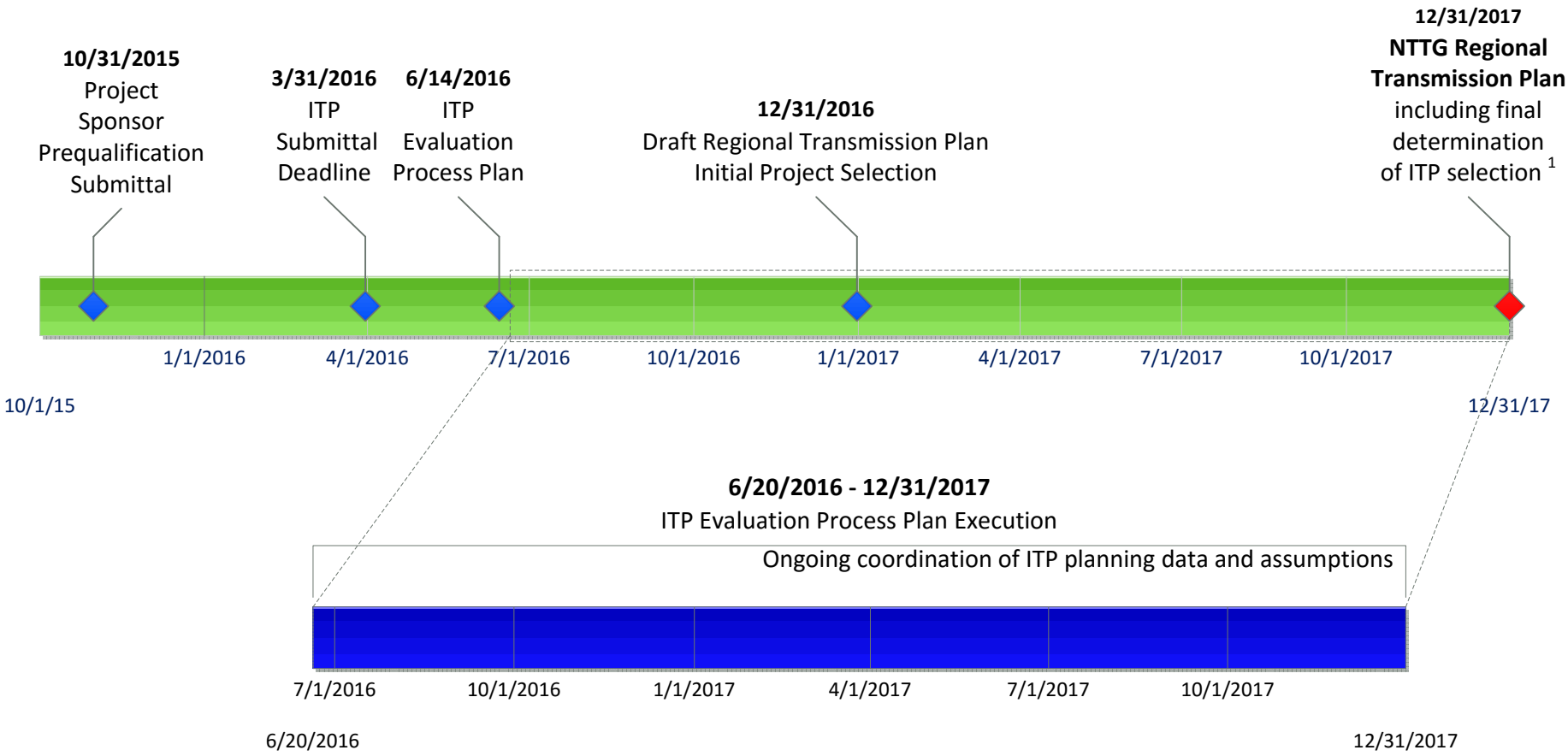
NTTG 2016-2017 Planning Cycle



NTTG 2016-2017 Planning and ITP Evaluation Process



Key NTTG Dates for ITPs



[1] Depending on each region's process, the completion of ITP determination may go beyond this date due to various factors such as re-evaluation process

Key ITP Considerations

- Any stakeholder may submit data to be evaluated as part of the NTTG Regional Transmission Plan

- NTTG's plan evaluates whether transmission needs within the NTTG footprint may be satisfied on a regional or interregional basis more efficiently or cost effectively than through local planning processes

- NTTG's Regional Transmission Plan is not a construction plan – it provides valuable insights and information for stakeholders and developers to consider and use in their respective decision making processes

NTTG Coordination with Other Planning Regions

Interregional Coordination

As part of Interregional coordination efforts, NTTG will be sharing the following:

- 2014-15 Regional Transmission Plan – Study Findings
- 2016 Q1 Data Submittal Summary
- 2016-2017 Study Plan
- Interregional Transmission Project(s) – Submittal Deadline (3/31/2016)

NTTG 2014-15
Regional Transmission Plan
Technical Findings

NTTG 2014-15
Regional Transmission Plan

- The plan proposes a strategy to meet the transmission needs of the NTTG region in year 2024.
- The plan aims to reliably meet the region's future transmission needs in a manner that is more efficient or cost-effective than an Initial Regional Plan, and
- Is comprised of a combination of the funding Transmission Providers' local transmission plans.

Transmission Plan Analysis

- Developed the Regional Transmission Plan through analysis
  - reliability (power flow)
  - Transmission Capacity and
  - benefit (changes in capital costs, losses, and reserves)
- of
  - Initial Regional Plan (IRTP)
  - IRTP without uncommitted projects
  - Alternative projects

Transmission Projects

SPONSOR	TYPE	PROJECTS	VOLTAGE	CIRCUITS
IDAHO POWER (NON-COMMITTED)	LTP	Gateway West Project	500 kV	2
	LTP	B2H Project	500 kV – 230 kV	2
GREAT BASIN TRANSMISSION (NON-COMMITTED)	Sponsored (1)	Southwest Intertie Project North	500 kV	1
NORTHWESTERN ENERGY	LTP	Broadview – Garrison Upgrade	500 kV	1
	LTP	Millcreek – Amps Upgrade	230 kV	1
PACIFICORP EAST (NON-COMMITTED)	LTP	Gateway South Project	500 kV	1
	LTP	Gateway West Project	500 kV – 230 kV	5
PORTLAND GENERAL	LTP	Blue Lake – Gresham	230 kV	1
TRANSWEST EXPRESS	Merchant Transmission Developer (2)	TransWest Express	±600 kV DC	1

(1) Sponsored Projects and Unsponsored will be evaluated

(2) Per customer request, the TransWest Express (Merchant) project will not be evaluated this planning cycle as an Alternative Project for selection in the Regional Transmission Plan

Analysis Inputs and Cases

INITIAL REGIONAL PLAN (IRP)
NON COMMITTED PROJECTS

- Boardman to Hemingway (B2H)
- Energy Gateway (EG)

ALTERNATIVE PROJECTS

- SWIP North (SWIPN)
- Alternative Project derived from Analysis (ALT.P)

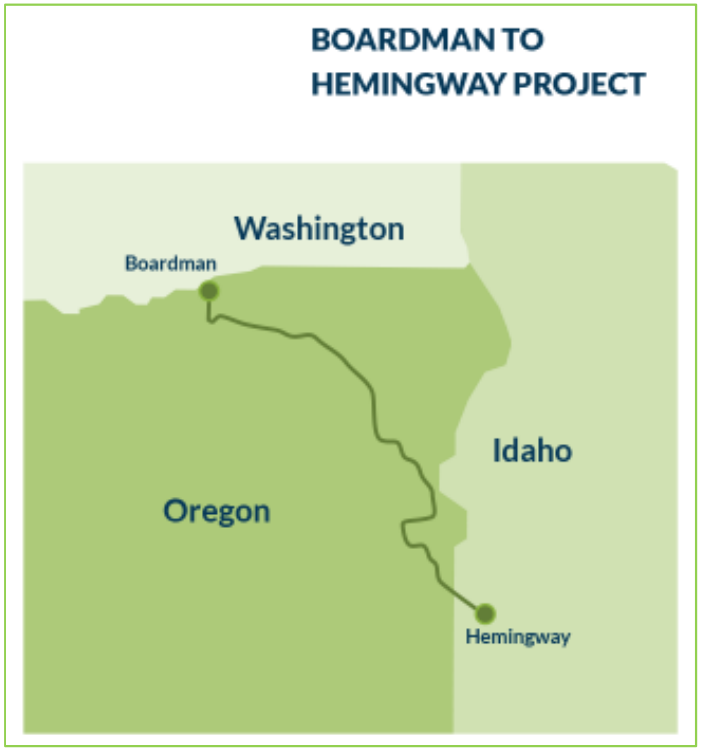
CHANGE CASES CONSIDERED

	EG	B2H	SWIPN	ALT.P
IRP	X	X		
CC1				
CC2		X	X	
CC3				X
CC4	X	X	X	
CC5	X		X	
CC6			X	X
CC7		X		X

Modeling and Analysis Methods

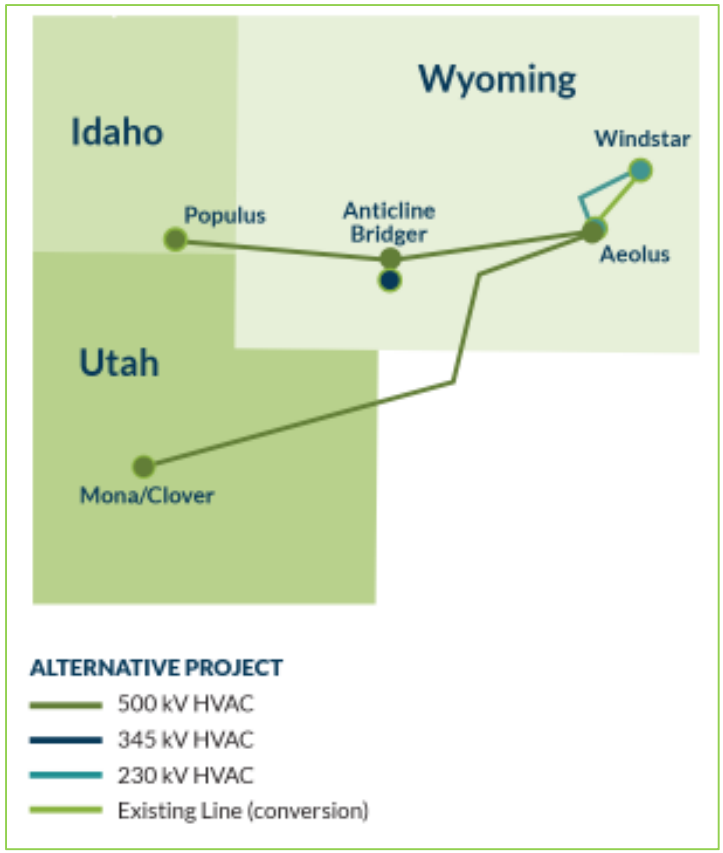
Regional Transmission Plan

- One Alternative Project, along with the Boardman to Hemmingway 500 kV project, produced a more efficient or cost-effective regional transmission plan than the Initial Regional Plan.



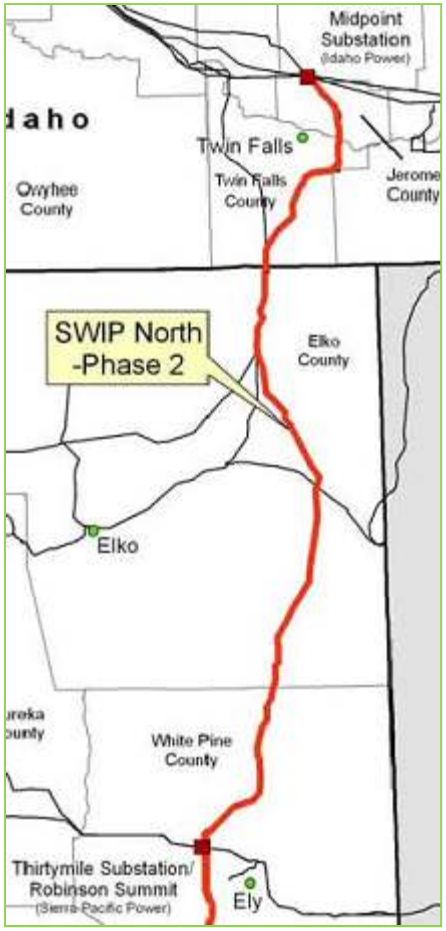
Regional Transmission Plan (cont.)

- This Alternative Project comprises the following transmission elements:
  - 230 kV line from Windstar to Aeolus in central Wyoming and reinforcements to existing underlying transmission facilities line
  - 500 kV line from Aeolus to Clover near Mona, Utah
  - 500 kV line from Aeolus to Anticline (Bridger) to Populus
  - 345 kV line from Anticline to Bridger



Other Technical Analysis

- Cost Allocation Process
  - Two project were considered for selection
    - **SWIP North**, a sponsored project submitted by Great Basin Transmission LLC (affiliate of LS Power): failed to meet the more efficient or cost-effective criteria; therefore, was not selected into the Draft Final RTP.
    - Unsponsored **Alternative Project**, was evaluated and selected into the RTP for purposes of cost allocation; however, the project did not receive cost allocation because not all costs identified could be fully allocated.



Other Technical Analysis (cont.)

- Public Policy Consideration Scenario Requests

  Of the three requests received, one PPC request was evaluated:

  – Scenario Evaluated
    - Assess retirement of Colstrip units 1 and 2 by 2020, and
    - Integration of 610 MW of replacement wind at Broadview, Montana

  – Study Findings
    - Steady-state power flow contingency analysis solution require generation tripping
    - NorthWestern Energy performed a dynamic stability assessment that produced consistent results
    - Cannot definitively conclude that the wind-for-coal replacement is possible

Other Technical Analysis (cont.)

- Regional Economic Study Requests (ESR)

  Within the study request window, one regional ESR request was considered:

  – Scenario Evaluated
    - Assess retirement of Colstrip units 1 and 2 (305 MW, net), and
    - Replace with 1,000 MW of wind and 400 MW of pumped hydro

  The Planning Committee declined to pursue this study request because points of receipt and points of delivery overreached the NTTG footprint.

2016 Q1 Data Submittals

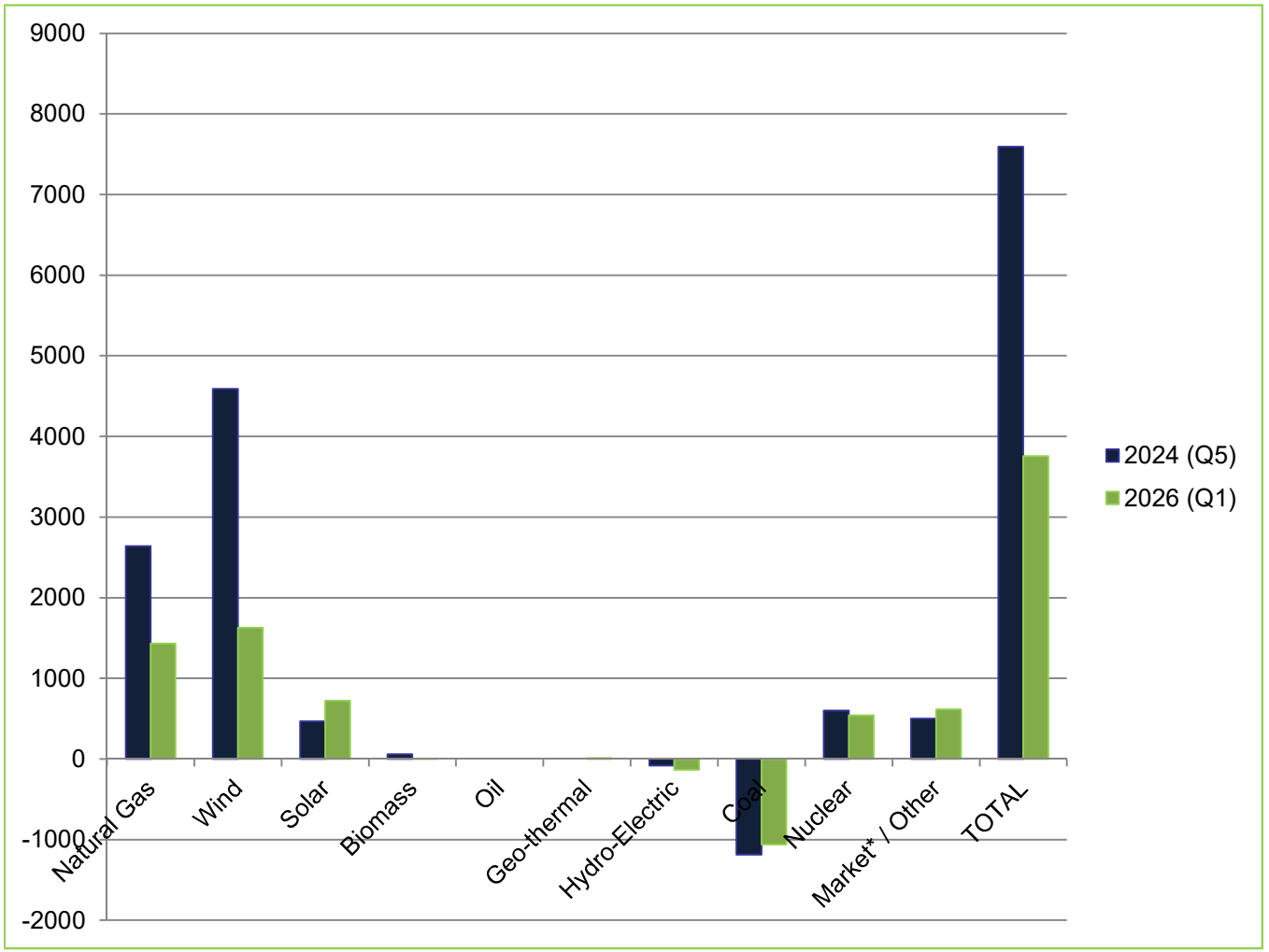
Load Submissions

SUBMITTED BY:	2015 Actual Peak Demand (MW)	2024 Summer Load Data Submitted in Q1 2014 (MW)	2026 Summer Load Data Submitted in Q1 2016 (MW)	Difference (MW) 2024-2026
Deseret G&T	Included in PacifiCorp East			
Idaho Power	3,743	4,193	4,359	166
NorthWestern	1,790	1,774	1,992	218
PacifiCorp	13,469*	14,002	13,414	-588
Portland General	3,958	3,933	3,885	-48
UAMPS	Included in PacifiCorp East			
TOTAL	22,960	23,892	23,650	-242

- Based on 2014 Actual Peak Demand

2015 Actual Peak Demand will be provided when it becomes available

Resource Submissions



Transmission Submissions

Sponsor [1]	Type	Projects	Voltage	Circuits
Deseret G&T	LTP	Bonanza – Upalco	138 kV	1
Idaho Power	LTP	Gateway West Project [2]	500 kV	2
	LTP	B2H Project	500 kV – 230 kV	2
PacifiCorp East	LTP	Gateway South Project	500 kV	1
	LTP	Gateway West Project [2]	500 kV – 230 kV	5
	LTP	Gateway Central Project	345 kV	2
	LTP	Antelope Project (600 MW Nuclear Gen.)	345 kV	2
PacifiCorp West	LTP	Wallula – McNary	230 kV	1
Portland General	LTP	Blue Lake Project	230 kV	1
	LTP	Harborton Project	230 kV	

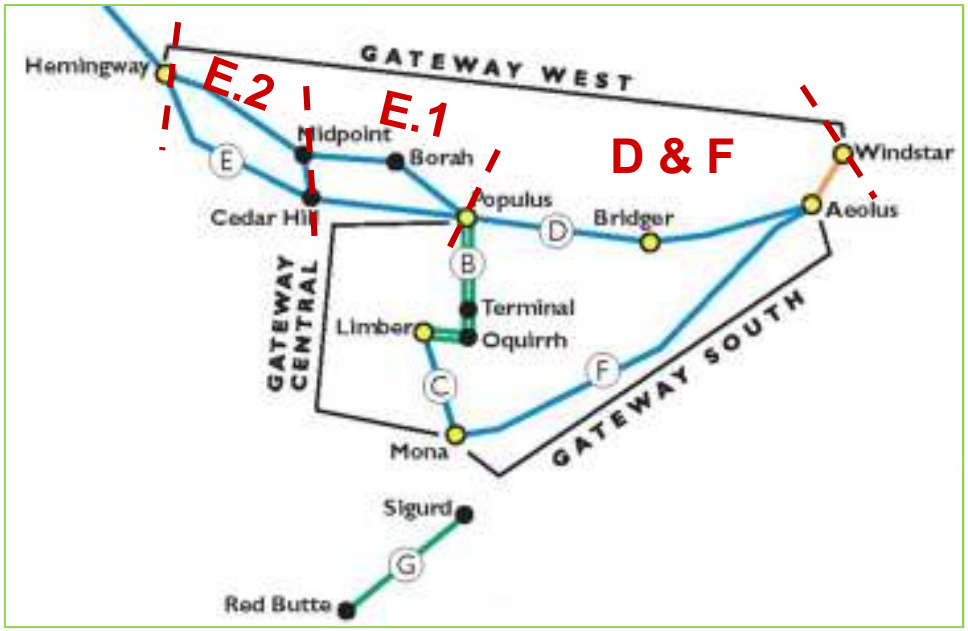
(1) Transmission projects as of Jan 31st, 2016

(2) Slight change in Gateway West configuration

Gateway Project Submission

Gateway Project has been split into 3 sub-projects to better match regional plans

1. Segment D and F
2. Segment E.1 (Populus west to Midpoint/Cedar Hill)
3. Segment E.2 (Midpoint/Cedar Hill west to Hemingway)



New Transmission Service

Submitted by	MW [1]	Start Date	POR	POD
Idaho Power	500/200	2021	Northwest	IPCo
	250/550	2022	LaGrande	BPASEID
PacifiCorp East	540	2024	Antelope	Network
	887	2026	Miners, Point of Rocks	Network

[1] Summer/Winter

Public Policy Requirements/Considerations

Public Policy Requirements

Resources submitted to NTTG [or TEPPC] support the following state statutory targets for percentage of renewable energy generation:

- California 33% by 2020
- Montana 15% by 2015
- Oregon 25% by 2025
- Utah 20% by 2025
- Washington 15% by 2020

Public Policy Considerations

- Renewable Northwest and NW Energy Coalition Request
  - Based on 111(d) proposed rule, consider retirement of Colstrip 1, 2 & 3 (1494 MW)
  - Three replacement scenarios:
    a) 1494 MW of wind located at Broadview
    b) Scenario a) with a synchronous condenser at Colstrip
    c) 1244 MW of wind and 250 MW gas turbine at Billings
  - Study Cycle plans to use TEPPC 2026 Base Case

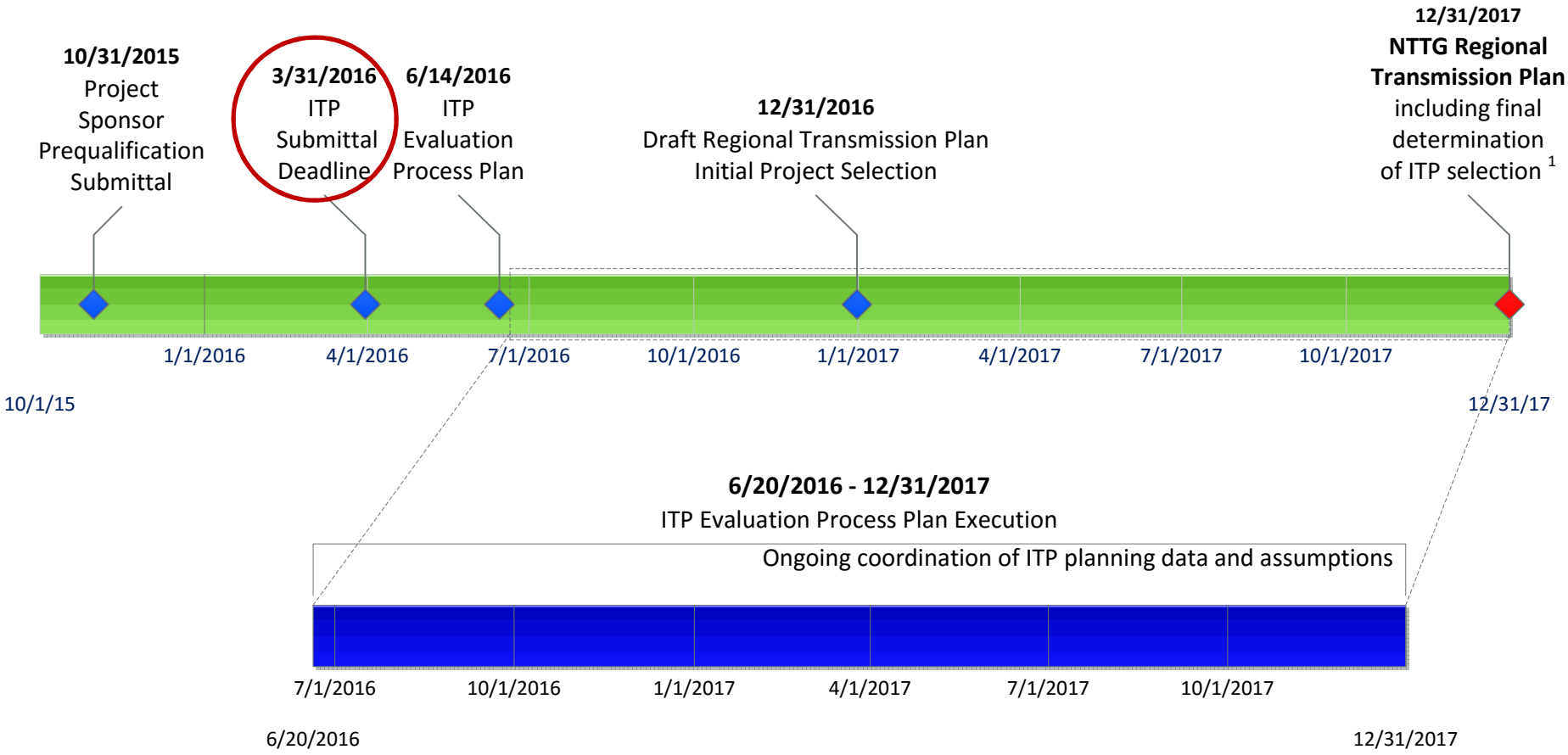
➢ The NTTG Technical Workgroup will review the request and prior studies and make a recommendation to Planning Committee on a study that would satisfy the request and provide meaningful information to NTTG and ColumbiaGrid

2016-2017 Biennial Study Plan Updates

Study Plan Updates

- The 2016-2017 biennial study plan will reflect lessons-learned from the previous study process.
- Reliability requirements will continue to reflect a second threshold requirement identified in the previous analysis;
  - Plan must meet the footprint transmission needs
    - Loads
    - Resources
    - Public Policy Requirements
    - Transmission service obligation and
    - Other identified transmission requirements
- The study plan will support evaluation of Interregional Transmission Projects

Key NTTG Dates for ITPs



Additional Information Regarding the Regional Planning Process can be Accessed at:

www.NTTG.biz

or email inquiries to:

info@nttg.biz

NORTHERN TIER
TRANSMISSION GROUP

Thank You!

Presenter Contact Information:
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Craig Quist, Craig.Quist@Pacificorp.com

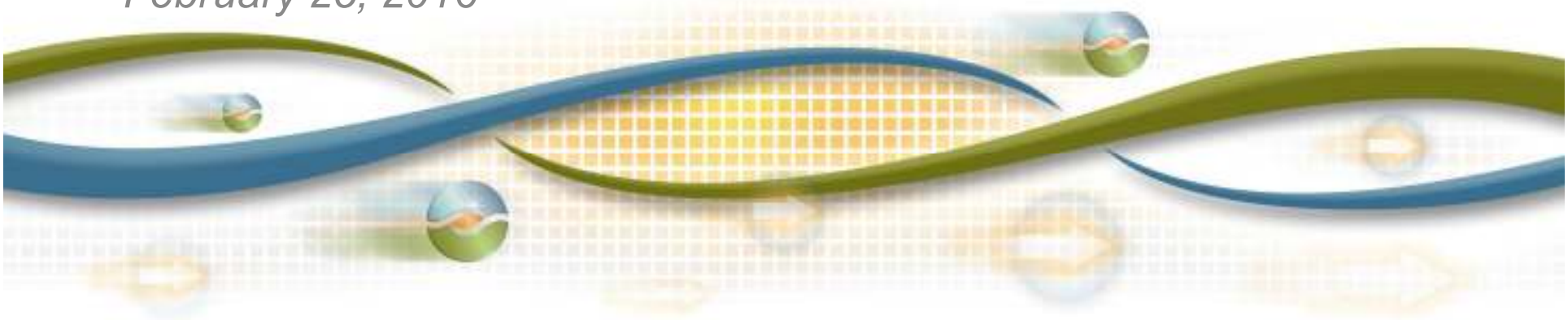
California ISO Annual Interregional Information

Western Planning Regions (WPR) Annual Interregional Coordination Meeting
Tempe, Arizona

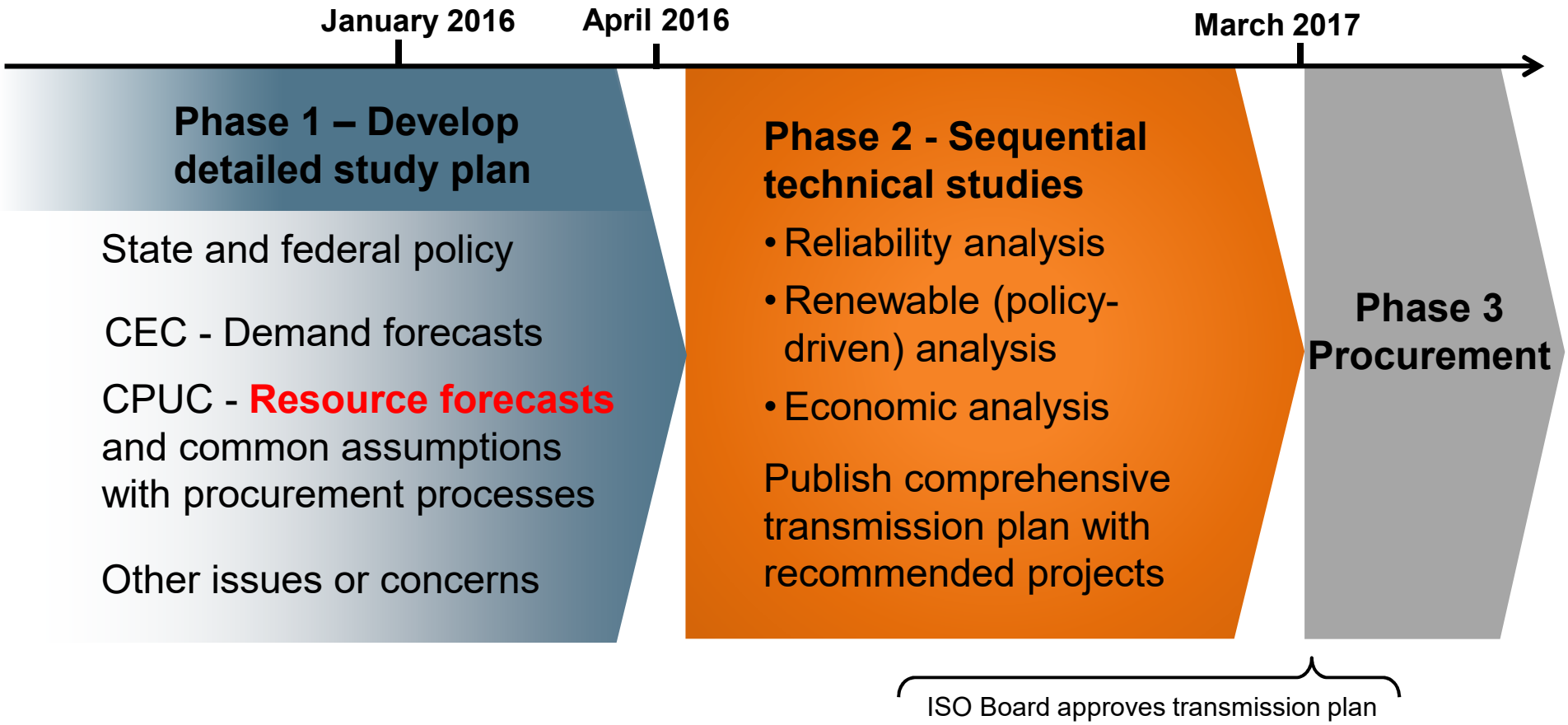
Neil Millar
Executive Director
Infrastructure Development

Sushant Barave
Senior Regional Transmission Engineer
Infrastructure Development

February 25, 2016



The CAISO's annual transmission planning process relies on state policy and state agency input and aligns assumptions



CAISO regional planning process aligns with new FERC Order 1000 Interregional Coordination Process that commences in Q1, 2016

The trajectory towards 2020 goals is well established with few changes between recent years

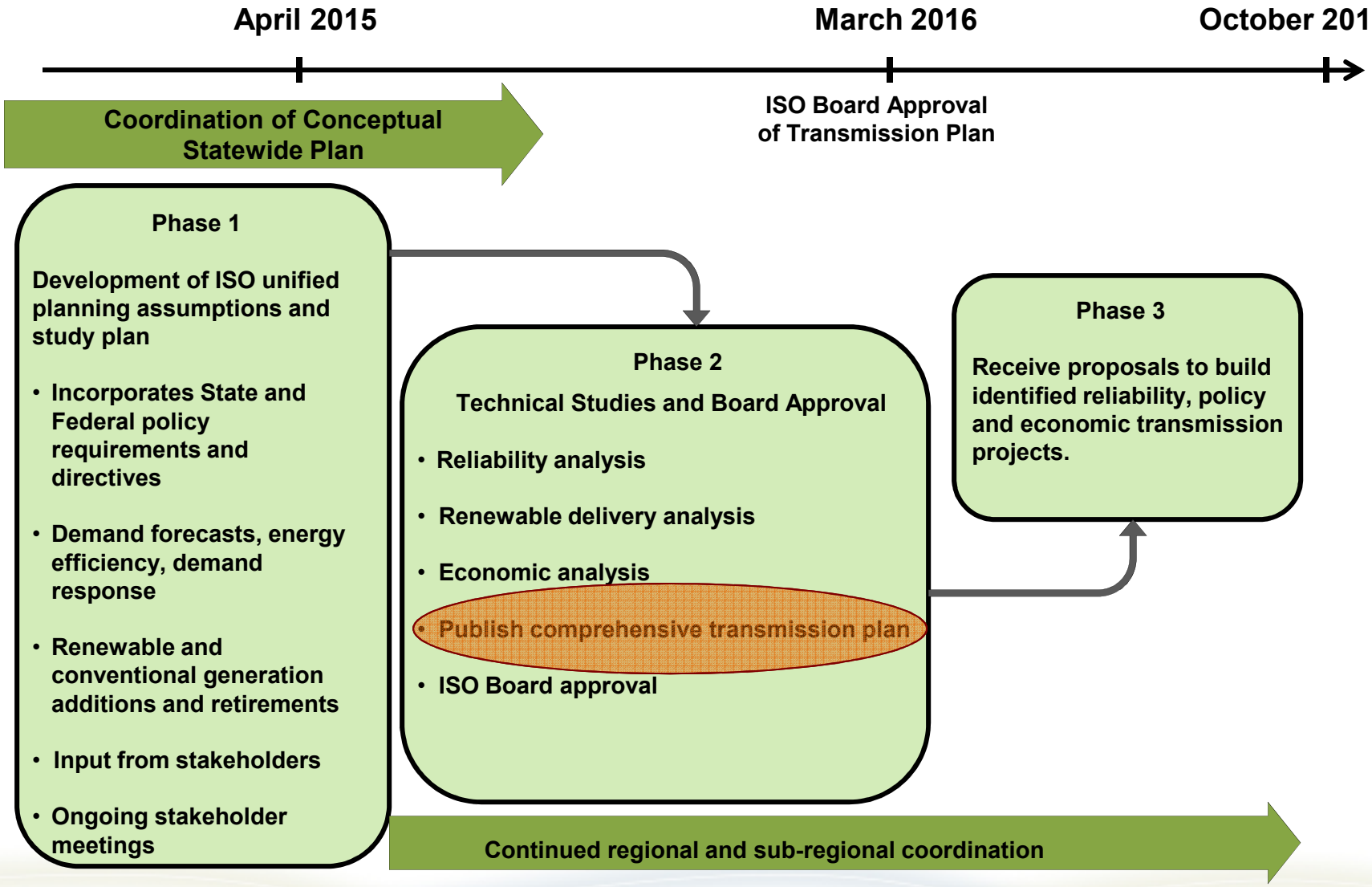
CREZ	Base Portfolio	
	2015-2016	2014-2015
Riverside East	3017	3800
Imperial	1750	1000
Tehachapi	1653	1653
Distributed Solar - PG&E	984	984
Carrizo South	900	900
Nevada C	516	516
Mountain Pass	658	658
Distributed Solar - SCE	565	565
NonCREZ	185	185
Westlands	475	484
Arizona	400	400
Alberta	300	300
Kramer	250	642
Distributed Solar - SDGE	143	143
Baja	100	100
San Bernardino - Lucerne	87	87
Merced	5	5

Transmission is well underway to meet 33% RPS in 2020

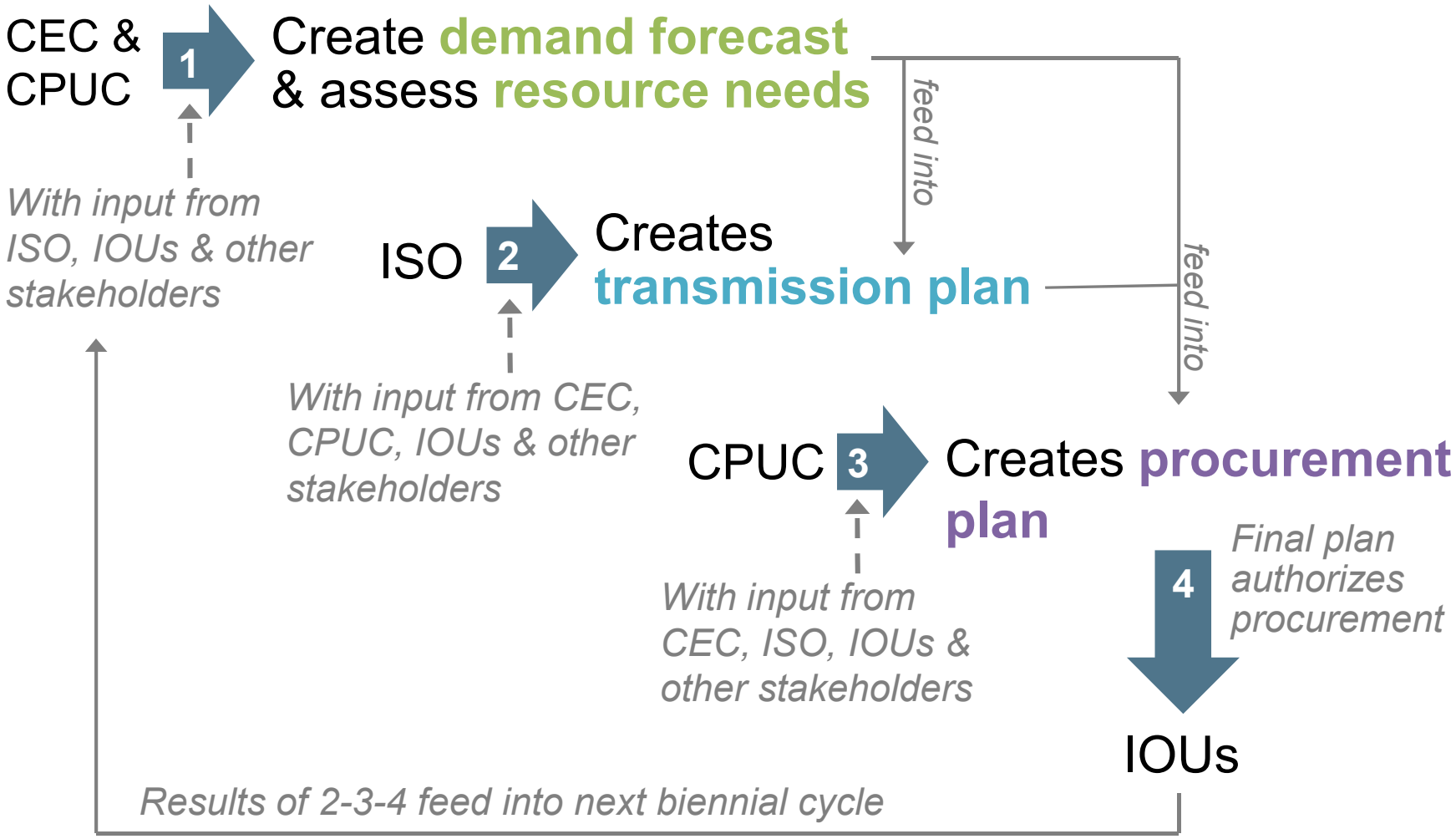
$6.5 B

	Transmission upgrade	Approval status		Online
		ISO	CPUC	
1	Carrizo-Midway	LGIA	NOC effective	energized
2	Sunrise Powerlink	Approved	Approved	energized
	Suncrest dynamic reactive	Approved	Not needed	2017
3	Eldorado-Ivanpah	LGIA	Approved	energized
4	Valley-Colorado River	Approved	Approved	energized
5	West of Devers	LGIA	Pending	2021
6	Tehachapi (segments 1, 2 & 3a of 11 completed)	Approved	Approved	2016
7	Cancelled			
8	South Contra Costa	LGIA	In process	2016
9	Borden-Gregg	LGIA	Not yet filed	2018
10	Path 42 reconductoring	Approved	Not needed	2016
11	Sycamore-Penasquitos	Approved	Not yet filed	2017
12	Lugo-Eldorado line reroute	Approved	Not yet filed	2017
13	Lugo-Eldorado and Lugo-Mohave series caps	Approved	Not needed	2019
14	Warnerville-Bellota recond.	Approved	Not yet filed	2017
15	Wilson-Le Grand recond	Approved	Not yet filed	2020

2015-2016 Transmission Planning Cycle



Planning and procurement overview



Emphasis in the transmission planning cycle:

- A relatively light capital program, as:
  - reliability issues are largely in hand
  - policy work was limited to 33% RPS and portfolios are not available yet for moving beyond 33% (for approvals)
  - economic studies not showing any material new opportunities
- Continued emphasis on preferred resources, and increased maturity of study processes
- A 50% RPS goal by 2030 became law in California during 2015
- Special studies looking at emerging issues preparing for grid transitioning to low carbon future
  - 50 percent “energy only” study
  - Frequency response study
  - Gas/electric coordination preliminary study

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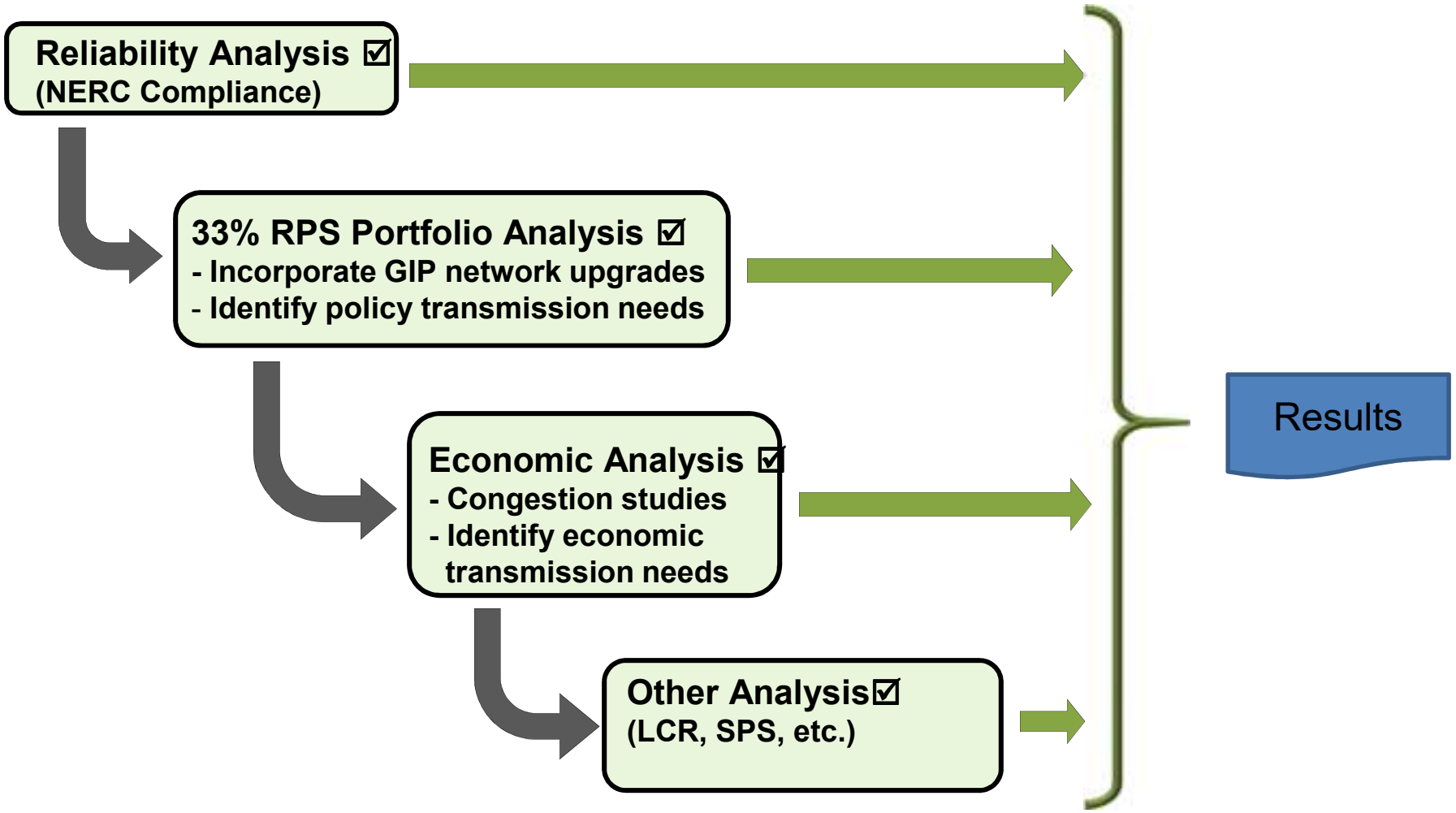
Development of 2015-2016 Annual Transmission Plan



Summary of Needed Reliability Driven Transmission Projects

	2010/11 Plan		2011/12 Plan		2012/13 Plan		2013/14 Plan		2014/15 Plan		**2015/16 Plan**	
	#	Cost (million)	#	Cost (million)	#	Cost (million)	#	Cost (million)	#	Cost (million)	**#**	**Cost (million)**
Pacific Gas & Electric	23	$683	22	$610	31	$1,168	15	$536.4	2	$254	**7**	**$202**
Southern California Edison Co.	0	$0	3	$25	0	0	2	$712.0	1	$5	**1**	**$10**
San Diego Gas & Electric Co.	9	$515	5	$56	5	$175	11	$584.0	4	$93	**6**	**$94**
Valley Electric Association							1	0.1	0	0	**0**	**0**
Total	**32**	**$1,198**	**30**	**$691**	**36**	**$1,343**	**29**	**$1,832.5**	**7**	**$352**	**14**	**$306**

14 reliability-driven projects are recommended for approval

- Seven projects focused on addressing high voltage concerns.

- The Lugo-Victorville 500 kV upgrade was found to be needed but is not being recommended for approval at this time - coordination with LADWP will take place before approval is recommended.

No.	Project Name	Service Area	Expected In-Service Date	Project Cost
1	Panoche – Ora Loma 115 kV Line Reconductoring	PG&E	May-21	$20 M
2	**Bellota 230 kV Substation Shunt Reactor**	PG&E	Dec 2020	$13-19 M
3	**Cottonwood 115 kV Substation Shunt Reactor**	PG&E	Dec 2019	$15-19 M
4	**Delevan 230 kV Substation Shunt Reactor**	PG&E	Dec 2020	$19-28 M
5	**Ignacio 230 kV Reactor**	PG&E	Dec 2020	$23.4-35.1 M
6	**Los Esteros 230 kV Substation Shunt Reactor**	PG&E	Dec 2020	$24-36 M
7	**Wilson 115 kV SVC**	PG&E	Dec 2020	$35-45 M
8	15 MVAR Capacitor at Basilone Substation	SDG&E	Jun-16	$1.5-2 M
9	30 MVAR Capacitor at Pendleton Substation	SDG&E	Jun-17	$2-3 M
10	**Bay Boulevard Third 230/69 kV Transformer Bank**	SDG&E	Jun-18	$13-18 M
11	Reconductor TL 605 Silvergate – Urban	SDG&E	Jun-18	$5-6 M
12	**Second Miguel – Bay Boulevard 230 kV Transmission Circuit**	SDG&E	Jun-19	$20-45 M
13	**TL600: "Mesa Heights Loop-in + Reconductor**	SDG&E	Jun-18	$15-20 M
14	Eagle Mountain Shunt Reactors	SCE	Dec-18	$10 M

Policy and Economic driven solutions:

- There were no policy-driven requirements identified
- There were no economically driven requirements identified
- The 2015-2016 plan is based on the Imperial Irrigation District (IID) system model provided by IID in the spring. IID have since submitted new base cases as comments in October – those changes will be assessed in next year's transmission plan.

Study plan development for 2016-2017 is underway:

- Not anticipating any major changes in reliability needs or policy driven needs focusing on 33% RPS
- We expect portfolios considering 50% (by 2030) RPS goals either in the 2017-2018 or 2018-2019 cycle:
  - CPUC portfolio development process expected to be informed by “RETI 2.0” non-regulatory process underway
- Emphasis will be on special studies to further prepare for emerging system challenges and inform portfolio development in the future
- Interregional coordination will be key to supporting several of those studies

Areas of emphasis expected in 2016-2017 cycle:

- Initiating interregional coordination of consideration of interregional projects supporting geographic and resource diversity as part of 50% RPS considerations
- Potential for increased economically driven retirement of gas fired generation
- Further consideration of preferred resource characteristics – especially slow response resources
- Modeling improvements to enhance frequency response analysis
- Support increased challenges in load forecasting given behind the meter emerging issues.

California ISO Special Study

Initial investigation of the feasibility and implications of a "50% RPS by 2030" on the ISO transmission grid

Sushant Barave

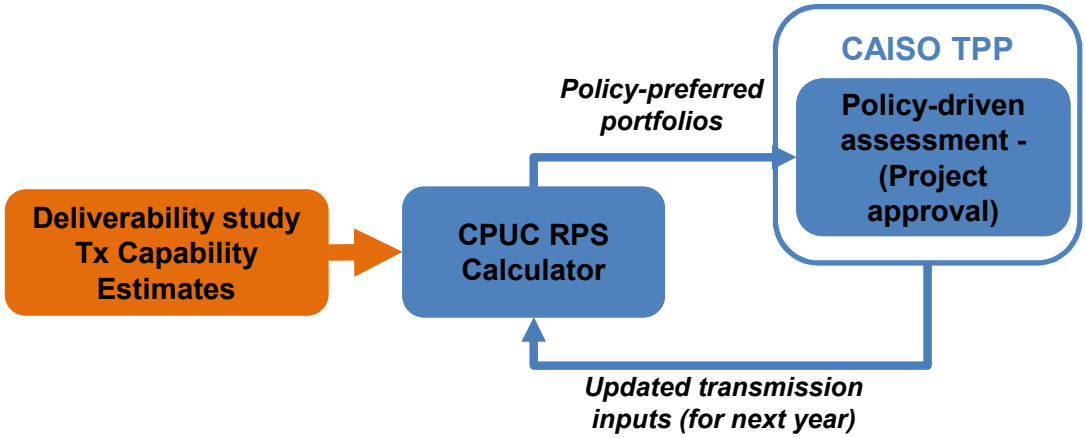
Senior Regional Transmission Engineer

2016 Annual WPR Interregional Coordination Meeting

February 25, 2016

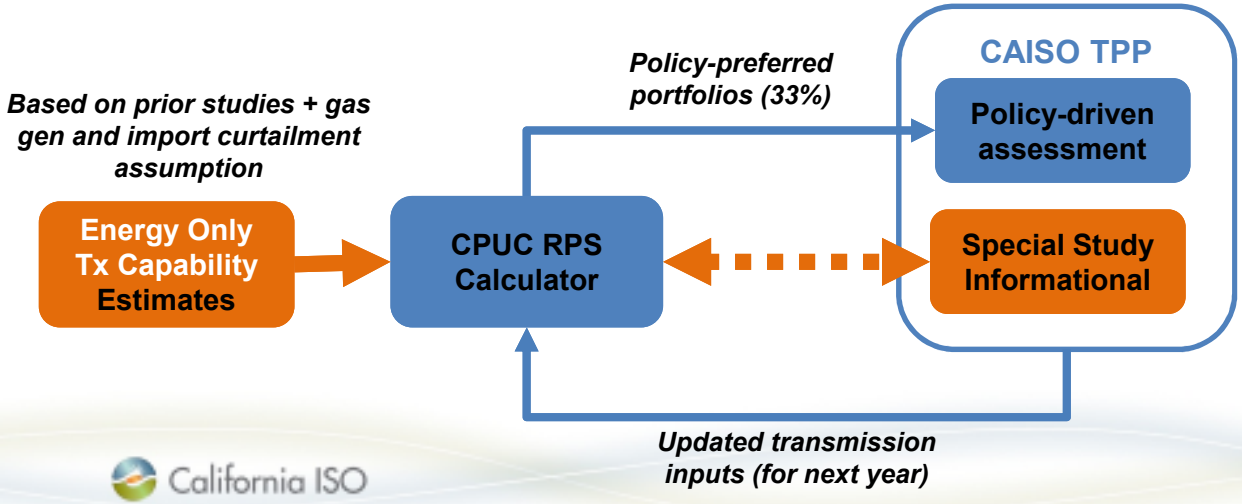
Study tested CAISO estimates of generation that could be delivered on an "energy only" basis – moving to 50%

Existing policy-driven planning process



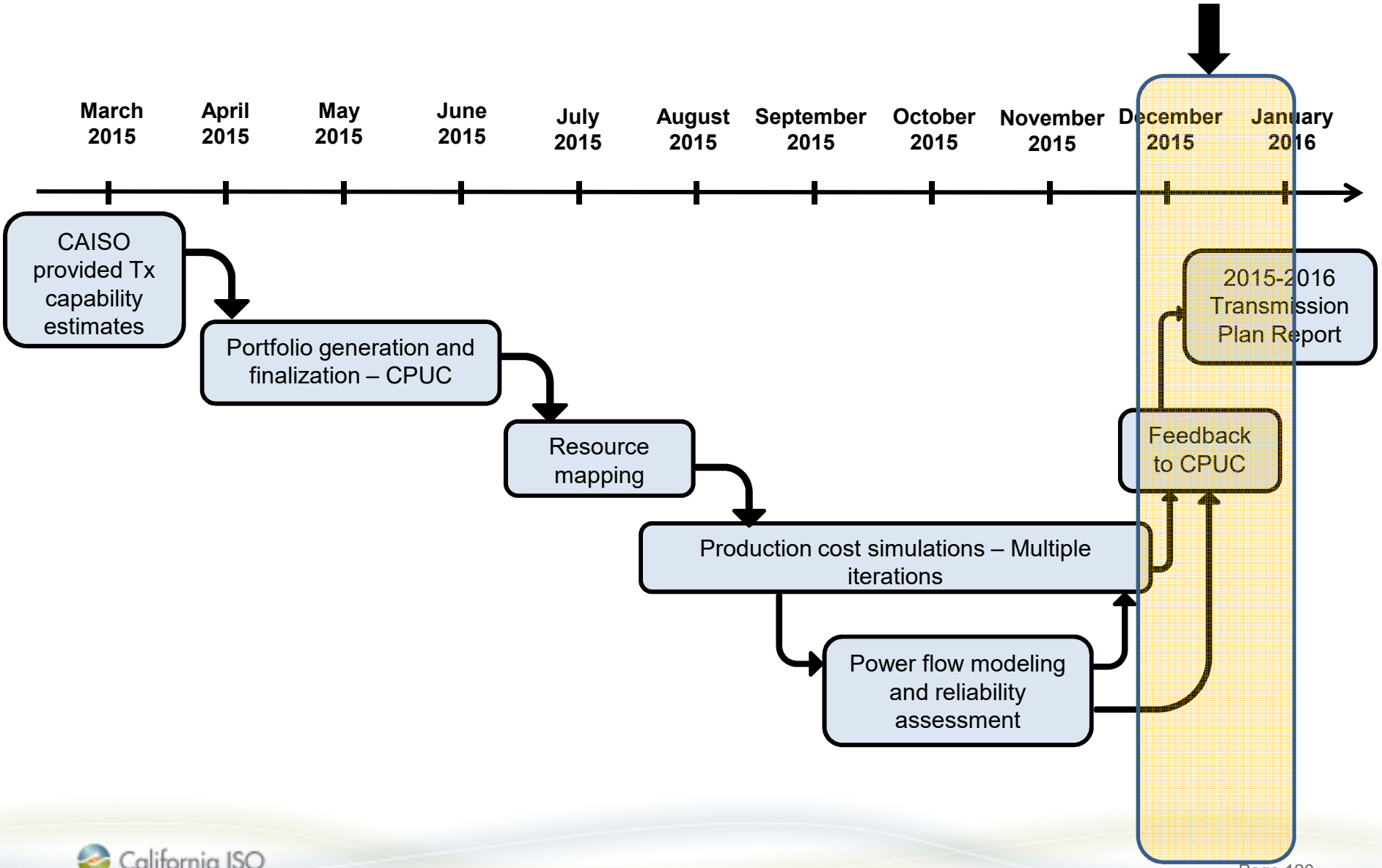
- Iterative process used to achieve 33% RPS goals
- This process results in policy-driven transmission upgrade approval
- Most procured generation assumed to have FCDS

Iterative process used to test preliminary 50% RPS portfolios

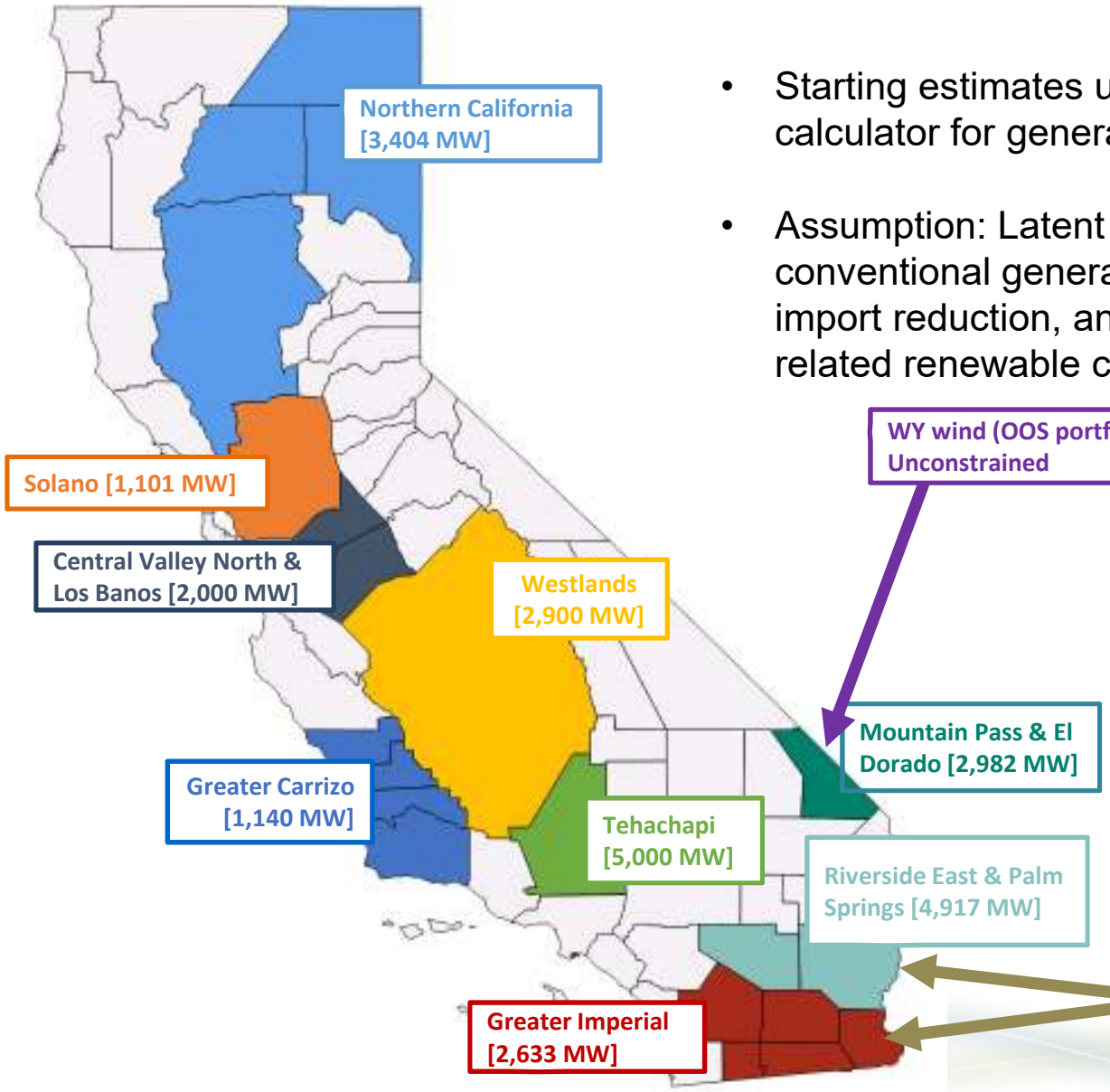


- Strictly an informational effort
- Procured gen assumed to be EO
- ***Objective***
  - To test and revise the transmission (Tx) capability numbers provided by CAISO
  - Preliminary transmission stress-test

50% Special study timeline (in 2015-2016 planning cycle)



Initial transmission capability estimates for “energy only” resources

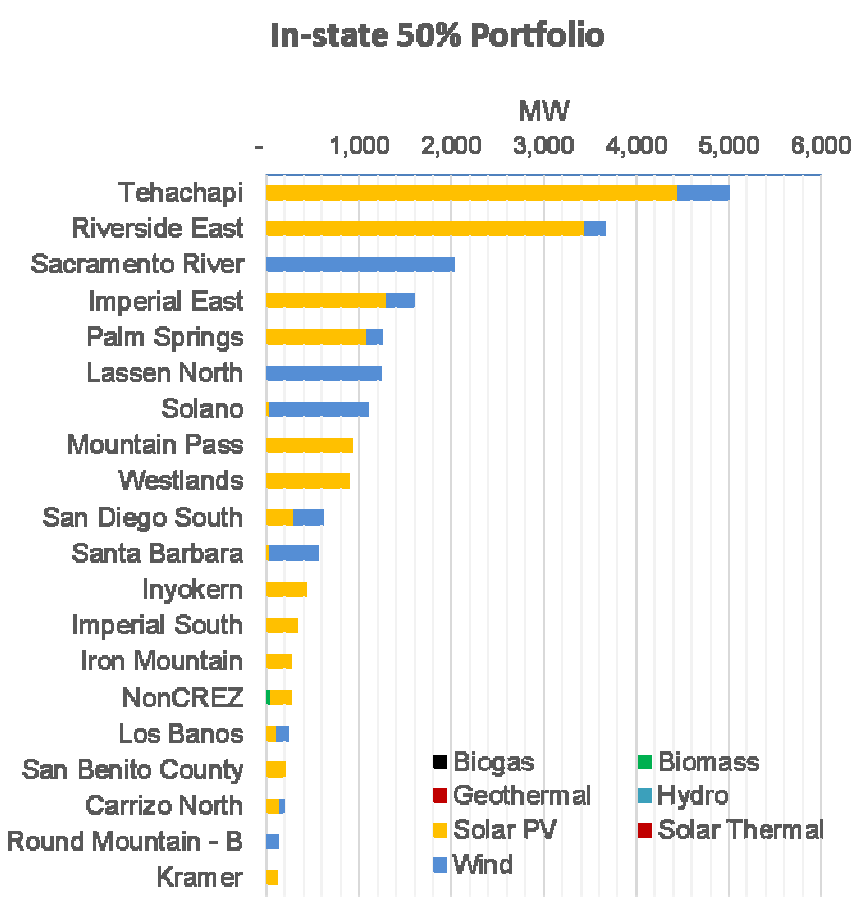


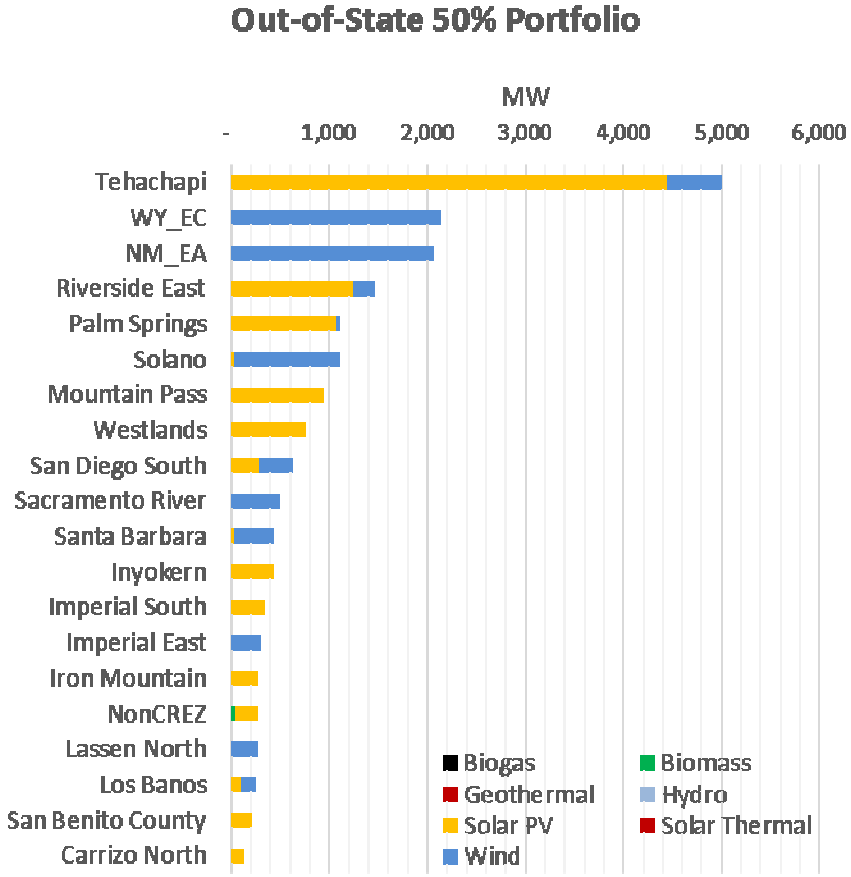
- Starting estimates used as an input to RPS calculator for generating the 50% portfolios
- Assumption: Latent system capacity, conventional generation curtailment, some import reduction, and modest transmission-related renewable curtailment

Note – impacts on the California system of out of state imports were tested by assuming specific injection points into California

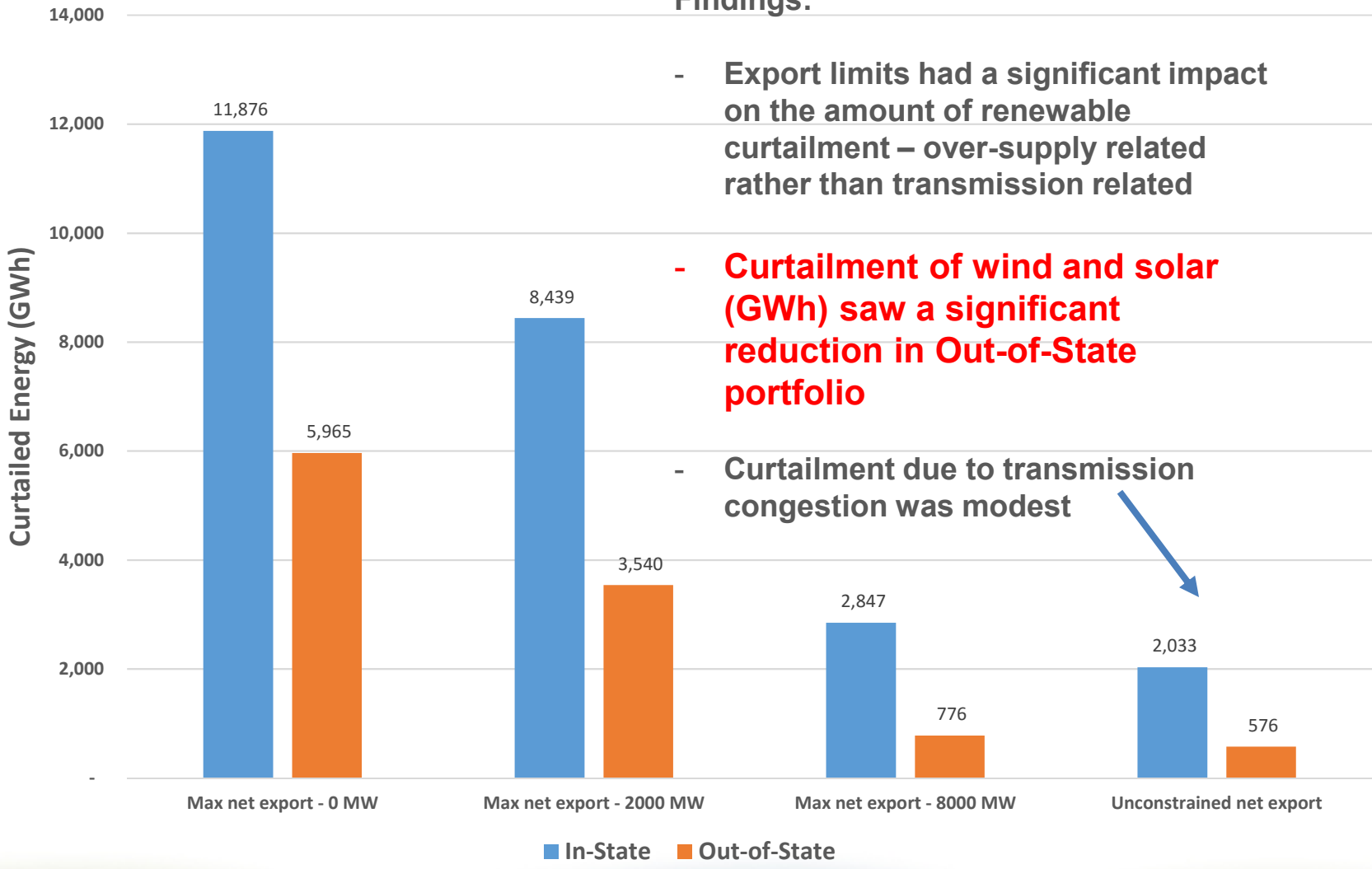
Portfolios selected for the special study

- RPS calculator v6 was used to generate the portfolios





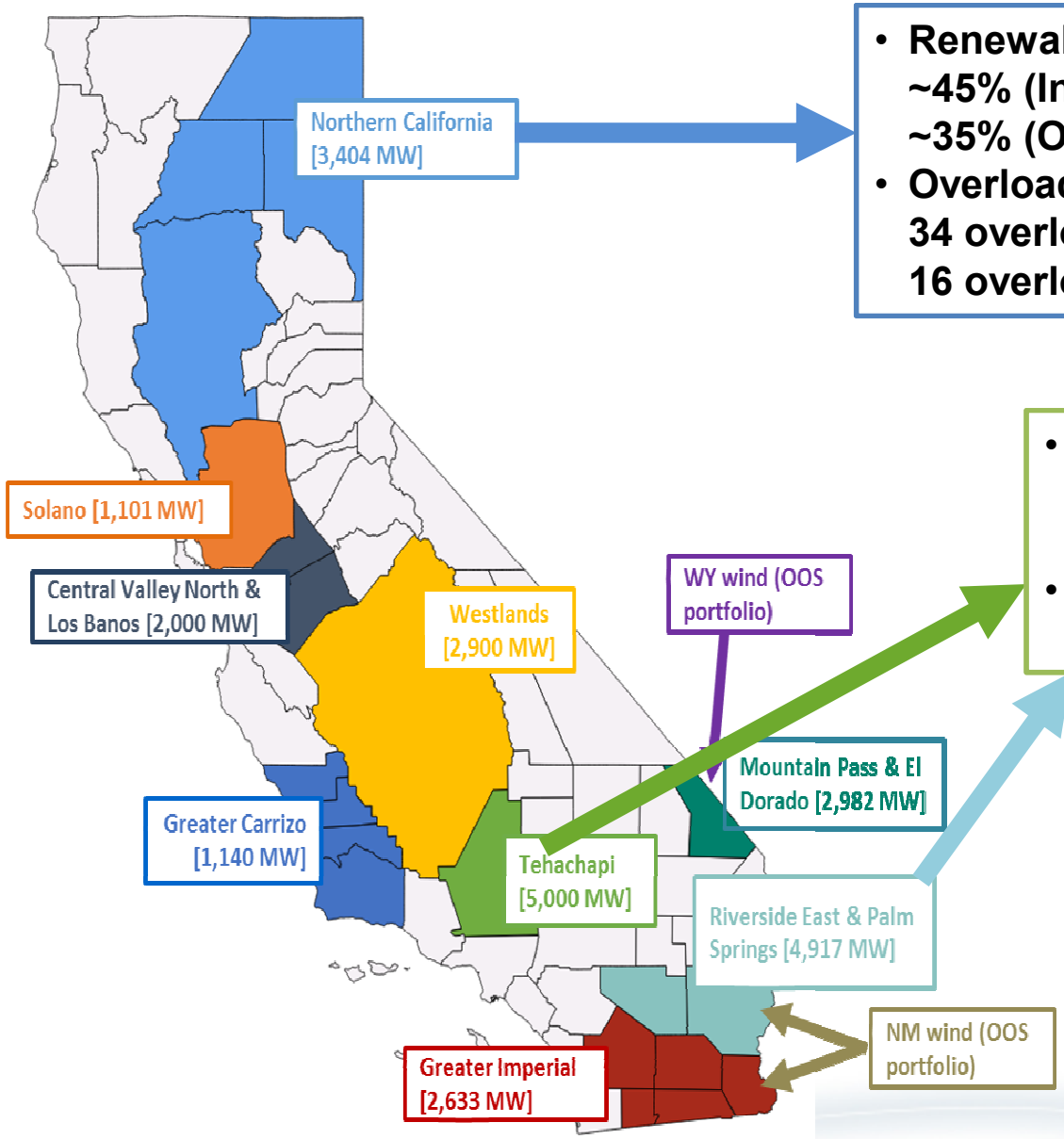
Curtailment was tested for a range of export assumptions



Findings:

- **Export limits had a significant impact on the amount of renewable curtailment – over-supply related rather than transmission related**
- **Curtailment of wind and solar (GWh) saw a significant reduction in Out-of-State portfolio**
- **Curtailment due to transmission congestion was modest**

Salient observations



- **Renewable Energy curtailed:**
  ~45% (In-state)
  ~35% (OOS)
- **Overloads:**
  34 overloads (In-state)
  16 overloads (OOS)

- **Several N-1-1 and a few N-2 issues require pre-contingency renewable curtailment (>1,000 MW)**
- **Maintenance conditions could pose challenges**

Solano, Santa Barbara, Westlands, Northern CA

- Wide-spread overloads on sub-transmission
- Curtailment due to this congestion – not captured

Conclusion

- Transmission capability estimates for the all the zones appear to be reasonable for developing future portfolios for additional transmission studies, with the following refinements –

  - **Northern California zone:**
    - We recommend splitting this zone into smaller zones and updating the transmission capability numbers

  - **Tehachapi and Riverside zones:**
    - At risk of substantial renewable curtailment (>1000 MW) under maintenance scenarios
    - But RPS calculator seems to treat these as high value resources, so we do not want to reduce the transmission capability estimate at this point.

  - **Solano, Westlands, Santa Barbara zones:**
    - Obvious issues on <230 kV system
    - As long as local upgrades or collector stations deliver these resources to 230 kV system in these zones, the transmission capability numbers are good.
    - Incorporate specific delivery points in RPS calculator

Next steps

- CAISO will work with the CPUC to incorporate the following into the RPS calculator
  - Refinements to transmission capability estimates
  - Specific delivery points for resources in zones which resulted in widespread local reliability issues

- 2016-2017 Special Study:
  - We do anticipate further special studies
  - Detailed scope will consider the CPUC's decisions regarding the next steps for the RPS calculator, study objectives, and consideration of these final results of 2015-2016 special study
  - We will need to consider the potential impact of transmission related curtailment on conventional generation
  - We anticipate an out-of-state resource portfolio to be part of this special study

Lunch Break

The meeting will resume at x:xx

WPR Engagement with TEPPC Review Task Force – *WPR Anchor Case Development Process*

John Leland, NTTG

WPR Anchor Case Presentation

- A collaborative presentation from the Western Planning Regions ("WPR")
- A short-term solution
  - Replaced when a long-term solution is available
- Reflects WPR current thinking and is subject to change
- Anchor case development and implementation by WECC uses existing staff and processes

Anchor Case

- Based on the WPR Regional Transmission Plans
- Consistent Production Cost Model ("PCM") and power flow ("PF") base cases
- WPR to provide additional data to WECC
- Contemplates ongoing coordination between the WPR and WECC
- Anchor case PCM and PF may be the starting point for future anchor case development
  - Assuming the long-term data management system isn't available
- WECC and WPR may modify the final anchor case data as appropriate for their studies

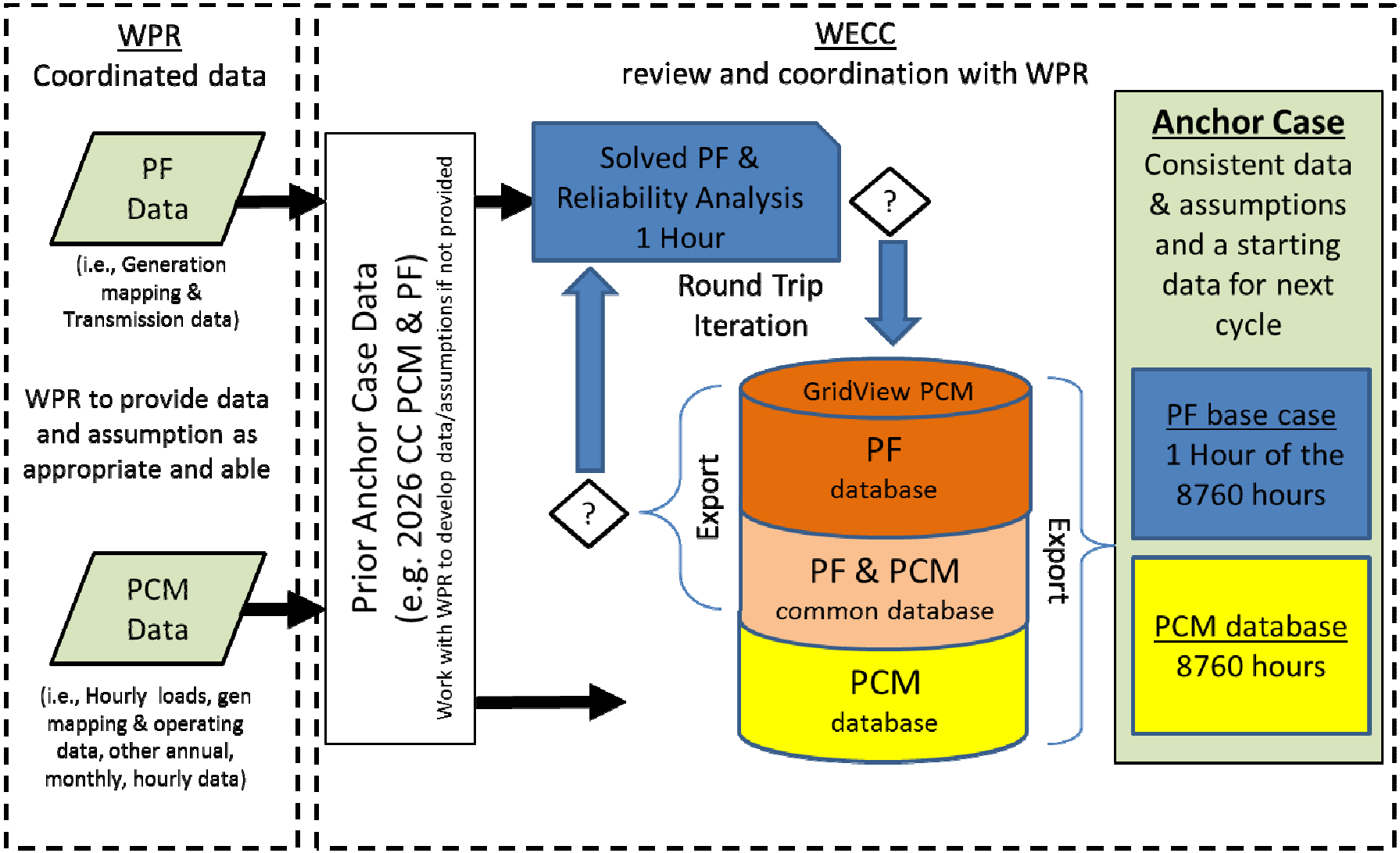
Anchor Case Round Trip Process

- Integral to short-term anchor case development
- Results in consistent PCM & PF base cases
- Reduces development time from historical methods
- Provides a bottom up approach (WPR → WECC) for anchor case development
- Is an opportunity to “automate” some of the process to build a new PCM case
- Hopefully helps staff to better manage resources applied to development of PF and PCM data
- A method to test and address future issues

Anchor Case Data

- March 31 2026 PCM CC and exported PF
- WPR regional transmission plans data and assumptions
- The WPR anchor case process can be applied to other PCM datasets and PF base cases assuming a long-term method is not available

Anchor Case Development - Diagram



Production Cost Model (PCM), Power Flow (PF), Western Planning Regions (WPR), Regional Transmission Plan (RTP)

Anchor Case Verification

- Verification of results using an "unexpected results" type of test or other appropriate method
- if unexpected results are identified, use round trip to modify and synchronize PF and/or PCM data

Anchor Case Improvements

- Likely a PCM and PF data input miss-match will hamper the future anchor case development
  - Helpful if WECC provides a standardized PCM and PF data input process
  - Miss-match likely lessened with better PCC-TEPPC coordination to identify and address issues
  - Likely to continue until a long-term data management system solution is the source for PCM and PF base case development

Timing for Anchor Case Development

- As soon as practical
- Use 2016-2017 planning cycle to develop the process
- Fully functional and consistent PCM and PF data/models (with dynamic models) available for the start of the 2018-2019 planning cycle

WPR Information & Data Provided to WECC

- PCM data or assumptions that may be provided:
  - Loads, DSM, Energy, Unit Commitment
    - Annual and Monthly data and hourly shapes
  - Other modeling assumptions (e.g., year for hydro shapes or other input assumptions)
- PF data that may be provided:
  - Transmission topology and generator mapping data
  - WPR data for development or updating dynamic models
- WPR recommends that WECC work with the WPR to develop appropriate data/assumptions for certain data not provided

WECC Provide Information & Data to WPR

- Anchor case PCM and PF base case data
- Relevant change files that WECC develops to make any changes to WPR data
  - Should also be available to other stakeholders
- WECC to work with WPR to fill in the missing data not historically included in WECC data
- WPR requests that WECC coordinate relevant study results and change case files with the WPR using the WPR's data submittal windows

WECC Data and Scenario Case Development

- No proposed change to WECC historical data collection or development process or methods
- WECC can follow historical method to define and collect PCM and PF data
  - However, future WPR anchor cases should start with the prior cycle's anchor case data and information
- WECC consider coordinating the timing of their data collection with the WPR data collection
- Need better PF development coordination between PCC development and the Anchor Case

WECC Data and Scenario Case Development (Continued)

- For transparency and ease of use reasons, WECC should use change files (or other type of data set management system) to modify WPR anchor case
  - To develop TEPPC scenarios
  - Other data needed for other WECC studies

Long-Term and Next Steps

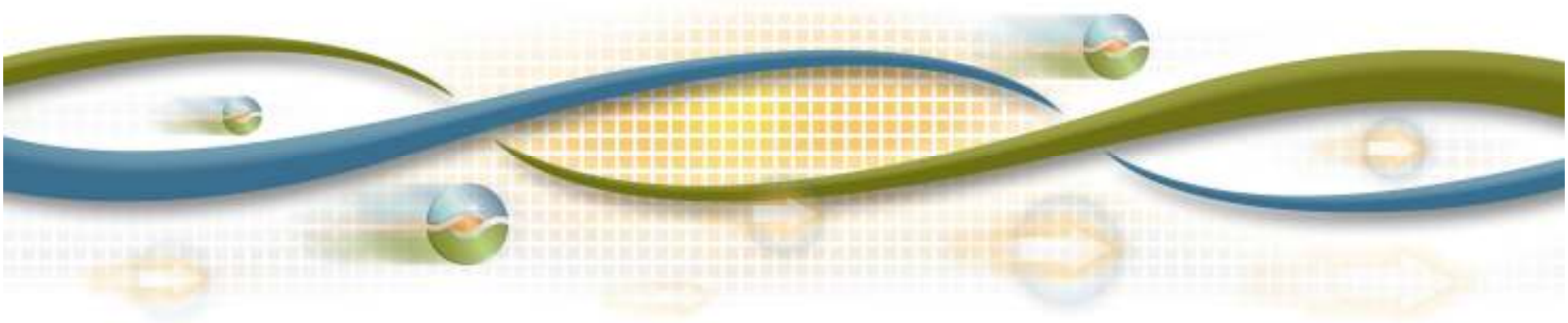
- Long-term anchor case development yet to be determined
- Next Steps
  - WPR representatives meet with WECC to develop the technical details/process for developing the anchor case for 2018-2019 planning cycle

Questions?

Renewable Energy Transmission Initiative 2.0

Neil Millar
Executive Director
Infrastructure Development

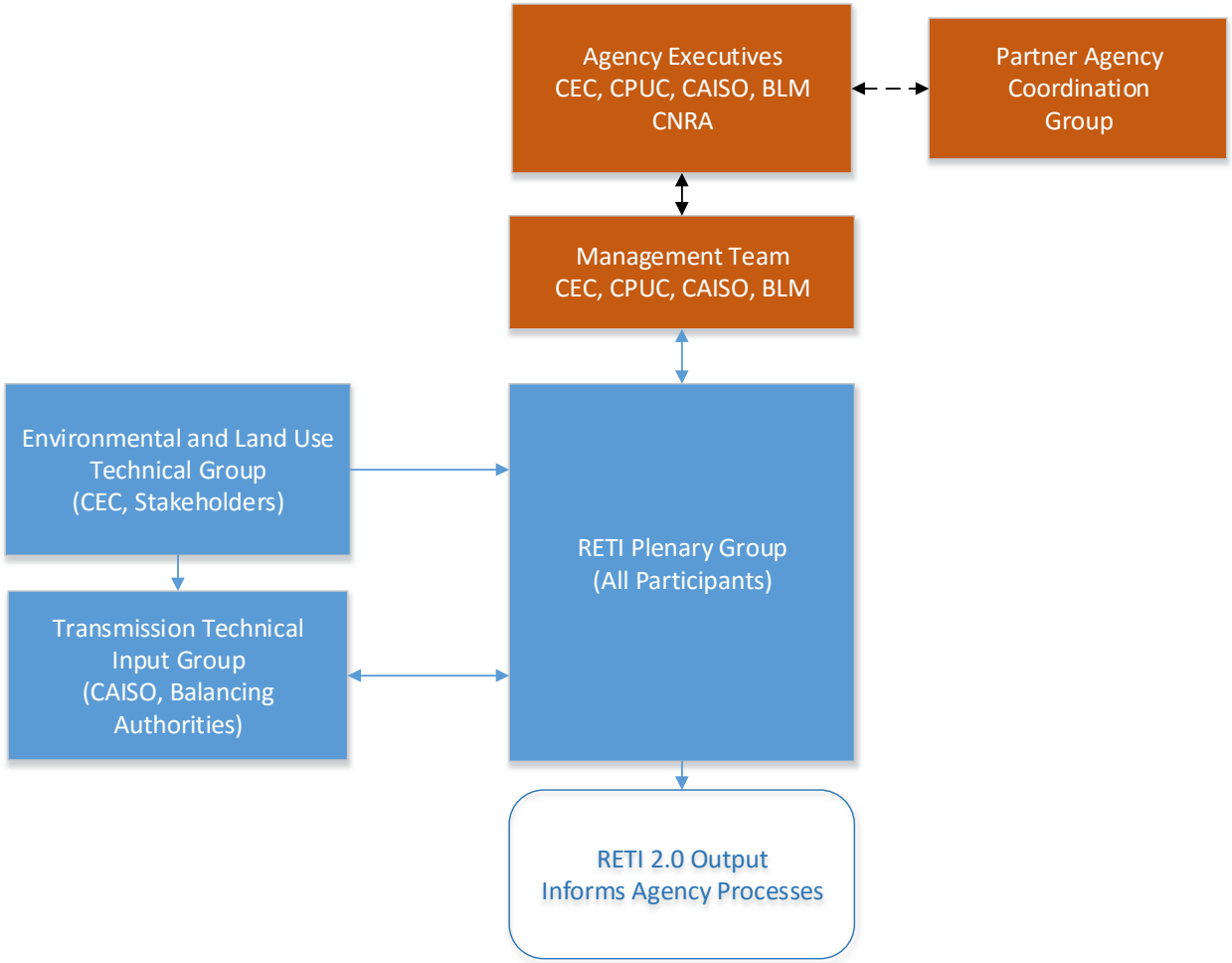
February 25, 2016



RETI 2.0 Objectives

- Statewide, non-regulatory planning effort to help meet statewide GHG and renewable energy goals.
- Explore combinations of renewable generation resources in California and throughout the West that can best meet goals
- Identify land use and environmental opportunities and constraints to accessing these resources
- Build understanding of transmission implications of renewable scenarios, and identify common transmission elements
- Inform future planning and regulatory proceedings

Organizational Structure



Month-by-month Timeline

Month	Plenary Group Objectives
January	Explore planning goals (GHG, renewables, and system)
February	Gather renewable resource information, studies of combined value
March	Understand environmental, land use, and transmission constraints and opportunities; Recommend scenario approach
April	Build conceptual resource combinations; Engage local communities
May	Explore environmental and transmission implications
June	Propose draft scenarios of renewables and transmission
July	Analyze scenarios for common elements and solutions
August	Review and refine solutions; develop recommendations
September	Release draft report

California's Senate Bill 350 – Clean Energy and Pollution Reduction Act of 2015

- Signed into law on October 7, 2015, SB350 would reduce GHG emissions through a 50% RPS by 2030
- Directs the ISO to "expeditiously" develop, through specific requirements, a set of proposed modifications to its governance structure that if instituted, would allow the ISO to transform into a "regional organization"
- Provides California opportunities to consider renewable resources across the broader western landscape
- Promotes collaborative effort among the ISO and state energy agencies to explore informational analysis to understand potential transmission implications of increased grid connected renewable generation

The interregional coordination process is well suited to facilitate California's RETI 2.0 objectives

- California understands that outreach to the broader western renewable landscape is a likely and necessary step to achieve its 50% energy goal
- RETI 2.0 seeks opportunities to consider renewable resources throughout the West that could provide a "best fit" for California's renewables need
- The West is rich with transmission opportunities to link California's renewables need with needs of other entities in the West

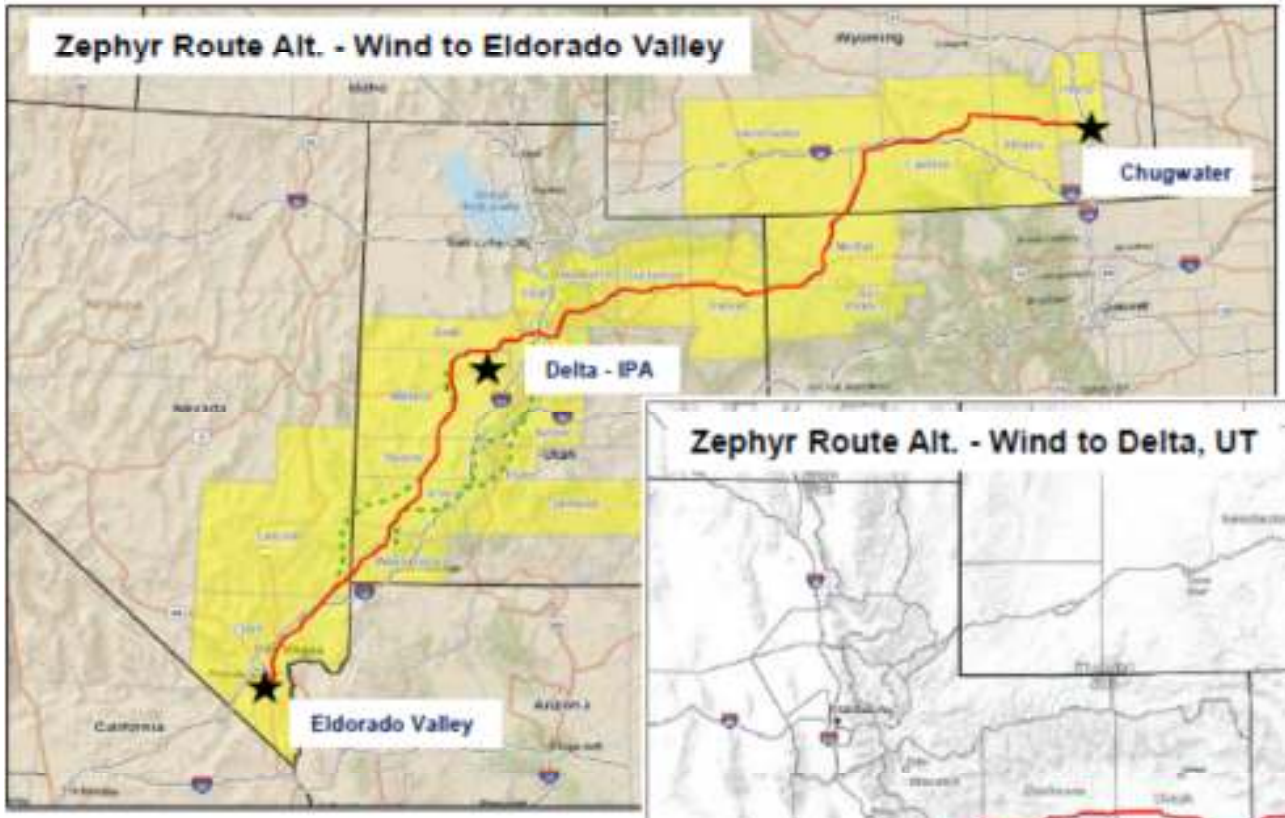
Interregional input into the RETI 2.0 Process

- A number of interregional project proposals have been raised in the RETI 2.0 process as means to help achieve the state's 50% RPS requirements
  - California Energy Commission RETI 2.0 website – January 22nd Transmission Workshop
- The ISO analysis in the "energy only" study and ISO studies being conducted as part of the SB 350 requirements indicate significant value in increased geographic and resource diversity
- The proposals identified to this point are summarized in this presentation.

Zephyr Project Overview

- Zephyr Project is an HVDC transmission line project that interconnects very rich wind resources in eastern Wyoming to the large renewable energy market in California
  - 2,100 to 3,000 MW capacity, 525 to 850 miles
  - $2 to 3.5 billion in capital
  - Target commercial operation in mid-2020s
- 2011 Development Agreement with Pathfinder Renewable Wind Energy (Pathfinder)
  - Pathfinder is the anchor shipper on Zephyr project
  - Pathfinder offtake agreements are a primary condition precedent to proceeding with Zephyr
  - Parties cooperate on development and marketing (CA utilities) activities
- In addition to the Wind Project, Pathfinder is developing a Compressed Air Energy Storage (CAES) project to store wind energy
  - CAES site is on the current proposed route for Zephyr, and adjacent to the Inter-mountain Power Authority (IPA) coal plant near Delta, Utah
  - IPA owns an HVDC line from the coal project to CA (the STS)

Zephyr Project Overview



- 500 kV HVDC transmission line
- 2,100-3,000 MW capacity
- Anchor Shipper – Wind
- Route alternatives: Chugwater, WY to terminus at Eldorado Valley, and/or interconnection at Delta, UT (IPP)

DATC
DUKE American Transmission Co.

TWE Project: An Inter-Regional Transmission Solution

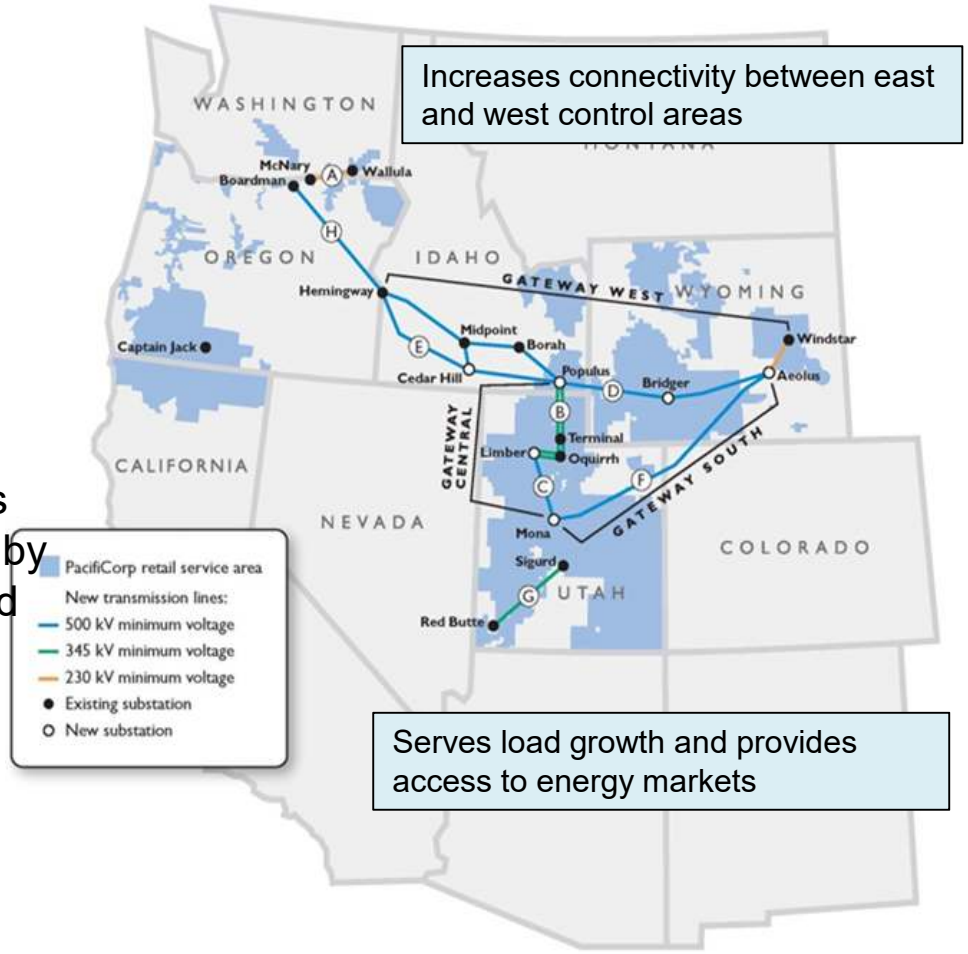
- 1,500 MW initial/3,000 MW final, 600 kV HVDC
  - Wyoming planning areas: NTTG, WestConnect
  - Nevada planning areas: CAISO, WestConnect
  - Potential Utah planning areas: NTTG, WestConnect
- Bi-directional operation
- 730-mile route, 66% on federal land
- Potential use of 500 kV AC included in permitting

Energy Gateway Transmission Expansion Plan

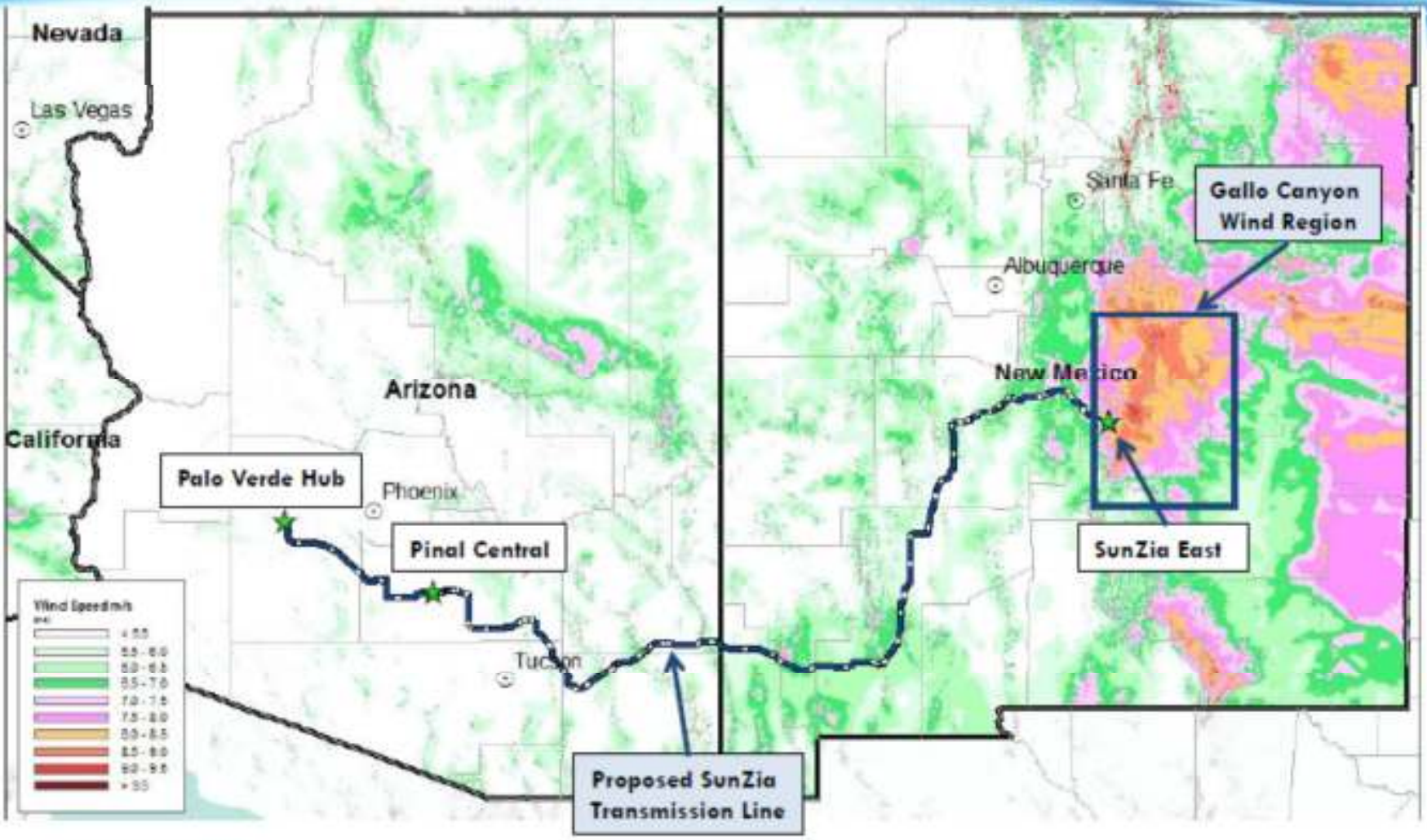
- Approximately 2,000 new line miles
- Multi-year, multi-billion dollar investment
- Objectives
  - Secure capacity for the long-term benefit of customers
  - Load service needs first, regional needs second
  - Support multiple resource scenarios
  - Secure regulatory and community support
  - Improve reliability

Planning Energy Gateway

- Origins in multiple local and regional transmission planning efforts
- Announced in May 2007
- Designed to ensure a reliable, adequate system capable of meeting current and future customer needs
- Energy Gateway's design supports multiple future resource scenarios by connecting resource-rich areas and major load centers
- Projects continue to be vetted in multiple public forums at the local, regional and interconnection-wide levels



SunZia: 500kV Project delivering NM Wind to Palo Verde



SunZia Project Summary

- 515 miles, 2 single-circuits, 500kV project, from new SunZia East to existing Pinal Central substations (2 x AC or AC + DC)
- Obtain transmission service over the existing system from Pinal Central to Palo Verde (or Westwing)
- WECC 3-phase rating of 3,000 MW (East to West, 2 x AC)
- Capital cost estimated at $2 billion over 30 months (2 x AC)
- Permitting began in 2008. Record of Decision issued by BLM in January 2015. AZ state permit expected in Feb 2016.
- Financial Close expected in 2018 with COD in 2020/2021, subject to commercial arrangements

Southwest Intertie Project

- Midpoint to Robinson Summit 500 kV line (SWIP North)
  - ~284 miles
  - NEPA complete
  - BLM issued Notice to Proceed
  - 24 months Construction
  - Target In-service 2020
- Robinson Summit to Harry Allen 500 kV line (ON Line)
  - ~231 miles
  - Currently In service
  - Transmission Use and Capacity Exchange Agreement with NV Energy
- Harry Allen to Eldorado 500 kV line (DesertLink line for CAISO)
  - In service by 2020

SWIP North Benefits

- Improves transfer capability between CAISO & other BAAs: PacifiCorp, NV Energy, Idaho Power, BPA
  - SWIP North provides up to 2100 MW of transfer capability from Midpoint (Idaho Power/PacifiCorp) to Robinson Summit (NV Energy) to Harry Allen (NV Energy/CAISO) to Eldorado (NV Energy/CAISO)
    - LS Power's share of capacity on this path is free of hurdle rate
  - SWIP North unlocks current transmission constraints in WECC and provides access to cost competitive renewables from WY, ID, OR, NV, and UT to access California markets
    - CPUC RPS Calculator v6.1 selects 4000 MW+ of WY/NM wind resources

- Economic benefits
  - Energy Savings (hourly dispatch) + Congestion reduction + Producer Benefits
  - Capacity benefits of new transmission
    - Reduced flexible capacity requirements
    - Load/resource diversity
  - Increased EIM benefits due to increased transfer capability between CAISO, PAC, NVE & APS
  - Geographical Diversity benefits - Wyoming Wind Integration Study shows diversity benefits of delivering WY wind to California load are estimated at $2.3-$9.5 billion

SWIP North Benefits (cont.)

- Policy Benefits
  - Allows more cost effective options to meet CA 50% RPS and GHG goals
  - Aids in over-generation management and reduces renewable curtailment
  - NREL's Low Carbon Grid Study (Phase II) sees SWIP N as a key transmission path that helps economically meet California's 2030 GHG goals
- Reliability Benefits
  - Creates a major WECC path paralleling the California Oregon Intertie (COI) path & Path 26
  - Addresses Northern CA bulk transmission overloads identified by CAISO during 2014/15 TPP
  - Helps prevent WECC NE/SE separation in the event of loss of COI lines
  - Provides significant incremental transfer capability between CAISO and neighboring BAAs even without PAC integration
- Enhanced Benefits for CAISO/PacifiCorp integration
  - Overcomes 776 MW transfer limit identified in E3 integration study
  - Resource procurement savings
  - Over-generation management
  - Lower peak capacity needs
  - More efficient unit commitment and dispatch

Clean Line proposes developing a 1000 MW, single circuit transmission line to import wind from New Mexico to CA

Timeline	Activity
2013	Clean Line purchases project
2013-2015	Initial development
2016-2017	Final development
2018	Construction
4Q 2018	COD

Western Spirit will deliver up to 1000 MW of renewable energy to northwest New Mexico and points further west

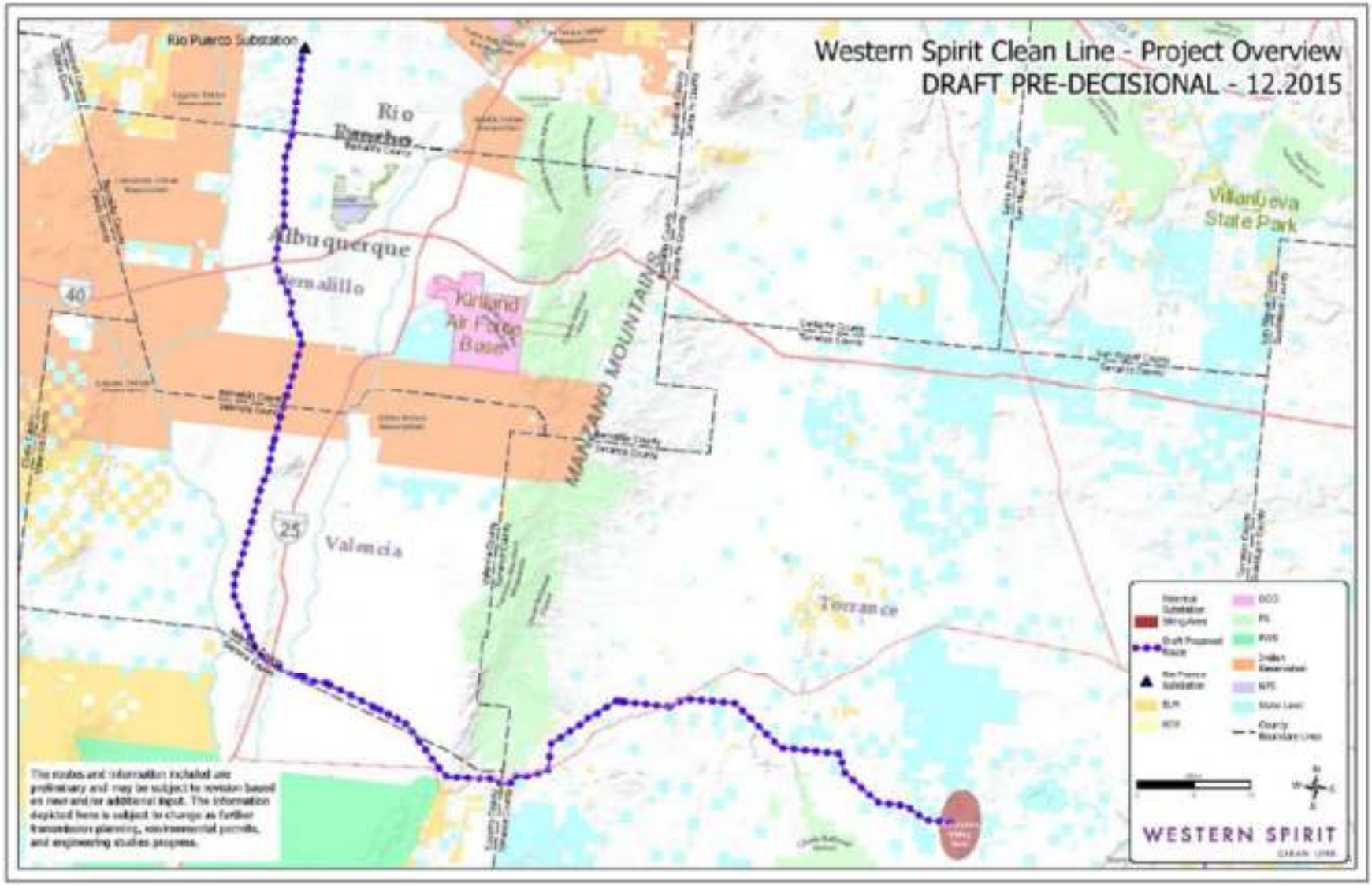
Western Spirit is currently being studied by the Public Service of New Mexico in a Wires-to-Wires study process and in the TSR queue for service to Four Corners

Western Spirit is also in Arizona Public Service's TSR queue for service from Four Corners to CAISO

A preliminary route has been developed and an easement agreement has been executed with the Isleta Pueblo

Clean Line has entered into a lease agreement with the New Mexico Renewable Energy Transmission Authority ("RETA"). RETA is authorized by statute to acquire land for the project and own transmission facilities

Western Spirit will interconnect with PNM at Four Corners, power can be imported to CA via the APS 500 kV system



Route Overview Map

SOUTHLINE TRANSMISSION PROJECT

The Project will have a right-of-way up to 200 feet wide.

LEGEND

- Agency Preferred Route
- Substation End Point
- Intermediate Substation Location
- Proposed Substation Location
- City/Town

0 12.5 25 50 MILES

N

Project Overview

SOUTHLINE TRANSMISSION PROJECT

- **Two Segments, approximately 360 Miles**
  - New Build — 345kV double-circuit Afton-Apache, 240 Miles
  - Upgrade — 230kV double-circuit Apache-Saguaro/Tortolita, 120 Miles
- **Meet Multiple Needs**
  - Improve Reliability
  - Relieve Congestion
  - Support Growth
  - Facilitate Access to Renewable Resources
- **Minimize Environmental Impacts**
  - Upgrades existing Western Area Power Administration 115kV lines and follows existing corridors to minimize impacts
- **Option for Improved Regional Coordination**
  - Multiple interconnections to existing & planned system
  - Bi-directional capability: approximately 1,000 MW (east to west), 400 (west to east)

Order 1000 interregional coordination reforms provide a forum through which California can engage west-wide entities on meeting its renewable needs

- FERC stated that “when transmission providers engage in regional transmission planning, they may identify solutions to regional needs that are more efficient than those that would have been identified if needs and potential solutions were evaluated only independently by each individual transmission provider”
- We hope this information will set the stage for the interregional coordination discussion California desires to have
- We also look forward to working with our planning region neighbors to identify where we may have shared interests and/or common needs

Open Discussion

Review of Key Points, Action Items, and Assignments

Charlie Reinhold,
WestConnect Project Manager

ITP Submissions

- For the Regions to consider an ITP, it must be submitted to each Relevant Planning Region (RPR) no later than March 31st of any even-numbered calendar year
  - A proponent must follow the submittal process established by each RPR, and
  - In its submittal, the proponent must include a list of all RPR's to which the project was submitted
- Each RPR will determine if the ITP data is properly submitted in accordance with its regional planning process

ITP Submittal Matrix

- ITP submittal deadline is March 31, 2016

	CAISO	ColumbiaGrid	NTTG	WestConnect
ITP Submittal Form	CAISO Link	ColumbiaGrid Link	NTTG Link	WestConnect Link
Return Forms to:	Regionaltransmission@caiso.com	Order1000@columbiagrid.org	info@nttg.biz	projects@WestConnect.com
Separate Deadlines and Form(s) for Projects Seeking Cost Allocation?	No	Yes	Yes	No
Pre-Qualification Process for Developers Seeking Cost Allocation?	No	No	Yes	Yes
Method for Noticing Opening of Submittal Window:	**Standard "Market Notice" posted by January 1 of each even calendared year.**	**Email announcement; Announcement posted to www.columbiagrid.org**	**Email announcement; Announcement posted to www.NTTG.biz**	**Email announcement; Announcement posted to www.WestConnect.com**
Send Requests to Receive Planning Region Notifications to:	http://www.caiso.com/informed/Pages/Notifications/Default.aspx	http://www.columbiagrid.org/interested-persons.cfm	info@nttg.biz	info@WestConnect.com
For Questions, Contact:	**Gary DeShazo Director, Regional Coordination** gdeshazo@caiso.com	Order1000@columbiagrid.org	info@nttg.biz	info@WestConnect.com

Closing Remarks & Next Meeting

Charlie Reinhold,

WestConnect Project Manager

Stakeholder Comment Window

Comments may also be submitted by email to regionaltransmission@caiso.com through March 10, 2016

Thank You