



CTPG Stakeholder Meeting  
Draft Phase 4 Study Report  
Draft California State-Wide Transmission Plan

January 7, 2011

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**MEETING WELCOME – STEVE METAGUE**  
**CTPG EXECUTIVE COMMITTEE**

# Agenda

Meeting Opening/Logistics	9:30 – 9:35	Mike Deis
Meeting Welcome	9:35 – 9:40	Steve Metague
Meeting Agenda	9:40 – 9:45	Mike Deis
2010 CTPG Study Process Recap	9:40 – 9:50	Mike Deis
CTPG Schedule Overview	9:50 – 9:55	Mike Deis
West of River Stress Study	9:55 – 10:10	Chifong Thomas
Review of High and Medium Potential Transmission Upgrades	10:10 – 10:35	Mike Deis
High Potential Transmission Upgrade Progress Towards 33%	10:35 – 10:50	Jon Eric Thalman
Stakeholder Q&A	10:50 – 12:00	Mike Deis
Lunch	12:00 – 12:50	On-Site

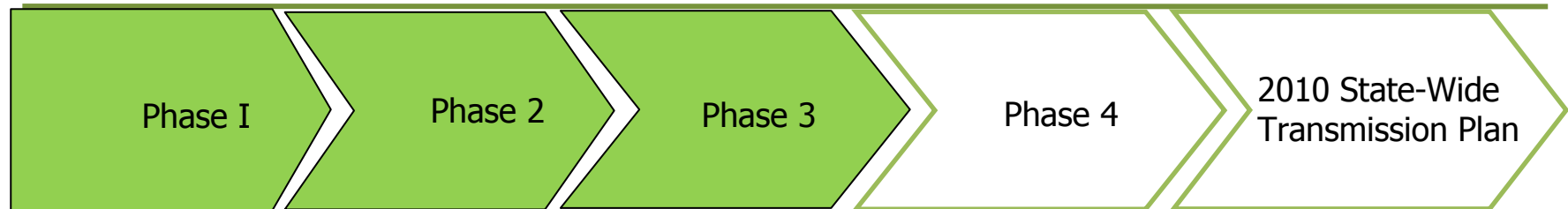
# Agenda

Lunch	12:00 - 12:50	On Site
Assessment of Potential Northern California and Out-of-State Import Opportunities	1:00 – 1:15	Mike Deis
CTPG 2010 California Statewide Transmission Plan Approach	1:15 – 1:40	Mike Deis
California Balancing Authority Planning	1:40 – 1:45	Jon Eric Thalman
Lessons Learned	1:45 – 1:55	Jon Eric Thalman
CTPG 2011 Next Steps	1:55 – 2:10	Jon Eric Thalman
Stakeholder Q&A	2:10 – 3:30	Mike Deis
Wrap-up	3:30 – 3:35	Mike Deis
Adjourn	3:35	

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# 2010 CTPG STUDY PROCESS RECAP – MIKE DEIS

# CTPG 2010 Study Process



•Development of the CTPG membership

•Development of the CTPG 2010 Stakeholder and Study process

•Load Serving Entity Scenario

•Stakeholder recommended Generation Queue

•RETI recommended Heavy In State Scenario

•RETI Net Short

•Analysis of Stakeholder Alternatives

•Stakeholder recommended Northwest and Southwest Scenarios

•RETI Best CREZ Scenario

•Analysis of Stakeholder Alternatives

•Fall off-peak scenario

•Identification of High Ranked CREZs

•Identification of High and Medium Potential transmission elements

•Analysis of progress towards a 33% RPS

•Assess potential for increased out-of-state imports and potential impact on state-wide transmission plan

•RETI West of River Stress Scenario

2010 State-Wide Transmission Plan

•Finalize 2010 High and Medium Potential transmission elements/corridors

•2010 Lessons Learned

•Begin preparation of 2011 Study Plan

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# CTPG SCHEDULE OVERVIEW – MIKE DEIS

# Phase 4 Report & Statewide Transmission Plan Schedule

Date	Item
Oct 14	Second draft Phase 4 study plan posted
Oct 20	Stakeholder call to review second draft of Phase 4 study plan
Dec 30, 2010	Draft Phase 4 report posted
Jan 4, 2011	Draft 2010 state-wide plan posted
Jan 7, 2011	Stakeholder meeting to discuss Phase 4 results and statewide plan
Jan 18, 2011	Stakeholder comments due
Jan 31, 2011	Final Phase 4 study report posted Final 2010 statewide transmission plan posted



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# **PHASE 4 WEST OF THE RIVER (WOR) STRESS STUDY – CHIFONG THOMAS**

# Phase 4 West of River (WOR) Stress Study

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- Stakeholders recommended that CTPG explore the potential system impacts should California receive imports via the West of the River Path at levels higher than previously studied
- At CTPG's request, RETI explored renewable resource availability at major transmission hubs located on the eastern edge of the West of River Path
- RETI, through their stakeholder process, provided the CTPG with the WOR resource scenario data

# Phase 4 WOR STRESS Study

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- Study Assumptions
  - Net Short same as Phase 2 and Phase 3, (52,764 GWh)
  - Discounted Core
    - PPA under CPUC review
    - Permit application data adequate
    - POU contracts not included
  - Additional Southwest Out-of-State Imports
    - Assumed additional imports from NV, AZ, NM and WY
    - Solar/Wind
  - Remaining energy to meet net short from California RETI Best CREZs
    - RETI Phase 2B CA CREZs with best economic/environmental scores

# Phase 4 WOR STRESS STUDY

## Scenario Summary

Resource	GWh/year	%Total
Discounted Core	20,905	40%
Additional Southwest Out-of-State Imports	21,106	40%
California RETI Best CREZs	10,753	20%
Totals	52,764	100%

# Phase 4 WOR STRESS STUDY

## Additional Southwest Out-of-State Imports Recommended by RETI



Resource	GWh/year	%Total
Eldorado	10,553	50%
Palo Verde	7,915	37.5%
North Gila	2,638	12.5%
Totals	21,106	100%

# WOR Stress Study - Assumptions

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- Decrementing Fossil Fuel (Re-dispatch) Approach
  - Heat Rate, highest heat rate first
  - Respect local capacity area requirements and “must run” generation for cases A and B (not an issue for off-peak case “F”)
  - 70%/30% split In-State/Out-of-State
- All other analysis methods, grid configuration, reliability same as previous study phases.

# Phase 4 WOR Stress Study - Assumptions

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- CTPG studies utilizing the RETI WOR Scenario:
  - Case A: 2020 Northern California adverse weather case (1-in-10 Northern California peak coincident with an approximate Southern California 1-in-2 peak)
  - Case B: 2020 Southern California adverse weather case (1-in-10 Southern California peak coincident with an approximate Northern California 1-in-2 peak)
  - Case F: 2020 California Autumn Case with high WOR (September 9 AM loads)
  - Case F: 2020 California Autumn Case with “historical” WOR (September 9 AM loads)

# WOR Stress Study - Assumptions

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## WOR Flows By Case

System Conditions	(MW)			
	A	B	C	D
Pre-Stress	7,580	7,130	10,090	6,700
Post-Stress	10,460	9,800	11,930	8,960



# WOR Stress Study - Results

## Additional Upgrades Identified

Impacted Transmission Line	Potential Mitigation	Noted in Case			
		A2	B2	F1	F2
Lugo-Victorville 500-kV line	<ul style="list-style-type: none"> <li>Upgrade terminal equipment at Victorville and raise some line towers, or</li> <li>Increase series compensation in parallel 500-kV lines, or</li> <li>Build a second line</li> </ul>	X	X	X	
Eldorado-Pisgah 500-kV line (series caps)	Upgrade series capacitors	X		X	
Pisgah-Lugo 230-kV line	Loop Mohave-Lugo 500-kV line into Pisgah	X	X	X	X
North Gila-IV 500-kV line (series capacitors)	Upgrade series capacitors or bypass series capacitors during critical outage	X	X		
Fairmont-Rinaldi 500-kV line	Upgrade terminal equipment at Rinaldi			X	X
Lugo-Llano #1 & #2 500-kV lines and Llano-Vincent #1 & #2 500-kV lines	Upgrade wave traps in lines and drop Kramer area generation			X	

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# **REVIEW OF HIGH AND MEDIUM POTENTIAL TRANSMISSION UPGRADES – MIKE DEIS**

# Phases 1 – 3 Scenario Based Approach

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- The Phase 1, 2 & 3 Studies included:
  - 24 Scenarios Studied
  - 180 Identified Transmission Upgrades
- Efforts yielded significant info regarding transmission required for each scenario
- There was some expectation that a diverse set of scenarios would suggest a common set of conceptual transmission upgrades
- However, there was significant divergence of results across scenarios

# Phase 3 -Two Step Approach

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- In Phase 3, based upon the studies performed in Phases 1-3, the CTPG introduced a two step approach to develop the 2010 statewide transmission plan
  - Step 1: Identify “High and Medium Potential” Transmission
    - Elements
      - A. Ranked CREZs using commercial interest and environmental assessment
        - » CPUC Discounted Core
        - IOUs PPA under CPUC review by 6/1/2010
        - Permit application data adequate by 3/1/2010
      - CTPG Queue Portfolio
      - In process of signing IA by March 2010
      - Posted financial security in ISO Cluster process

# Phase 3 Study High Ranking CREZs

CREZ	Core in Queue by Technology	Discounted Core (GWh)	Gen Queue (GWh)	RETI Environmental Score
Mountain Pass	81%	1086	1518	3.5
Pisgah	100%	1047	1867	4
Tehachapi	100%	5887	13934	4.6
Riverside East	100%	560	5615	5.1
San Diego South	0%	149	939	5.5
Kramer	0%	617	652	5.9
Carrizo South	86%	1562	1789	6.6
Nevada C	0%	1239	2209	n/a
Oregon	0%	1362	0	n/a
Solano	100%	102	1452	7.6
San Bernardino – Lucern	0%	96	0	7.7
Imperial South	70%	1095	4691	7.8
Palm Springs	100%	241	624	8
Round Mountain - B	100%	227	253	8.4

# Overview of Evaluation Methodology

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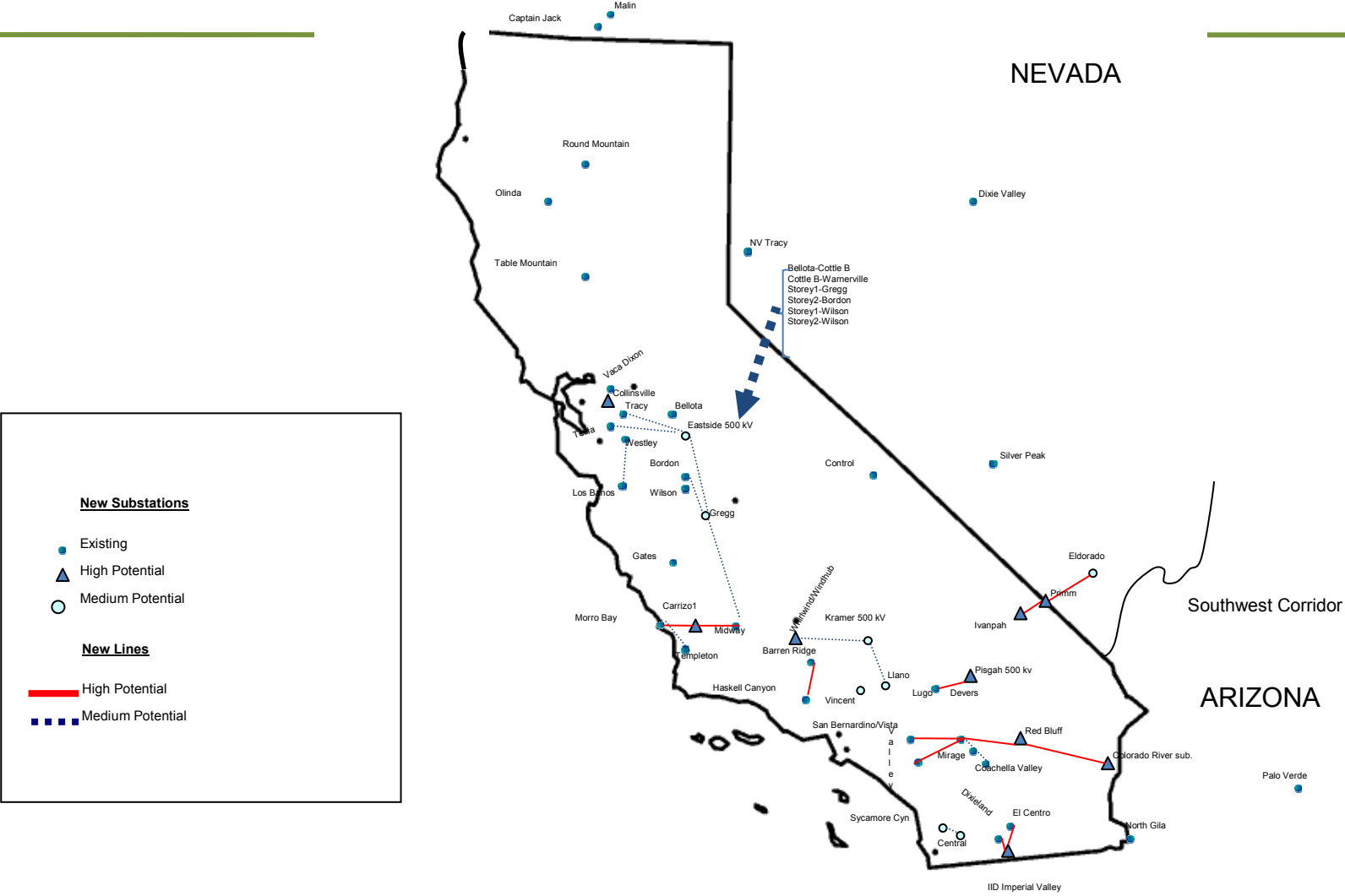
- Evaluation of transmission elements identified in Appendix B of CTPG Phase 3 report
- Identified high ranking CREZs and transmission elements associated with them
- Performed shift factor analysis of these elements and CREZs
- Compiled list of high and medium potential transmission

# High Ranking CREZ Transmission Elements

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- High potential lines are (from report)
- Medium potential lines are (from report)

# High and Medium Potential Transmission Upgrades





# Phase 3 – Two Step Approach

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- Step 2: Final Analysis and Completion of 2010 State-Wide Transmission Plan
  - Analyze the progress made towards the states 33% RPS goal by the proposed “High Potential” transmission elements.
  - Assess the potential opportunities of increased out-of-state imports to determine their potential impact on the 2010 state-wide transmission plan.

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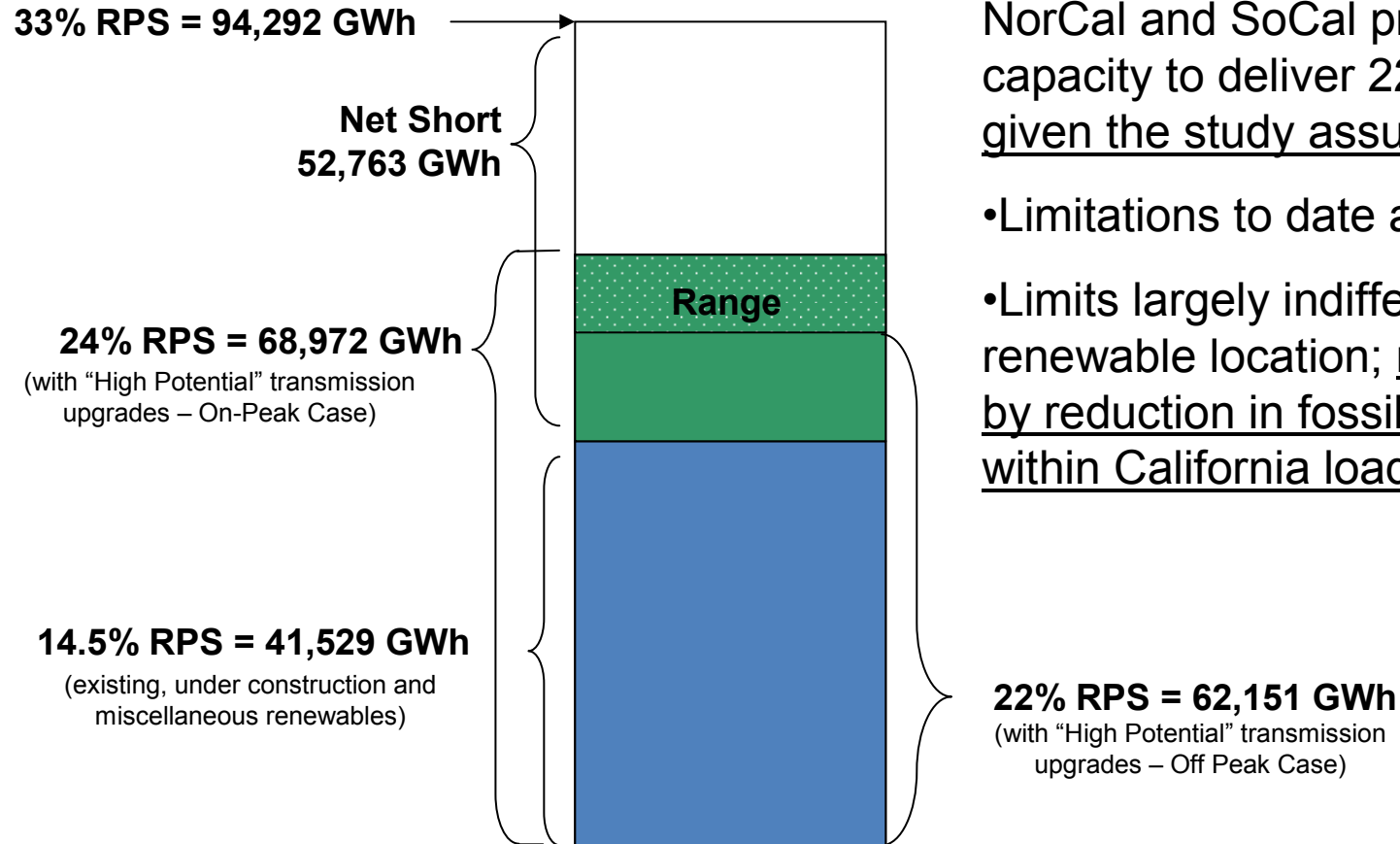
# **HIGH POTENTIAL TRANSMISSION UPGRADE PROGRESS TOWARDS 33% – JON ERIC THALMAN**

# Analysis of Phase 3 Proposed High Potential Transmission Elements

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- Peak and off-peak power flow analysis for both conditions including proposed Phase 3 “high potential” transmission
- Estimated level of renewable sources that can be dispatched without contingency-based thermal overloads
- Not intended to imply a likelihood that development of the modeled renewable resources will occur
- Same power flow approach as CTPG’s Phase 1, 2 and 3 analysis for determining the proposed “High Potential” and “Medium Potential” transmission upgrades.
  - limited to on-peak/off-peak snapshots
  - no CAISO “deliverability” analysis
  - no economic determinations other than implicit in RETI’s CREZ determination
  - **Results should be interpreted accordingly**

# RESULTS



- Adding high potential lines to NorCal and SoCal provides capacity to deliver 22-24% RPS given the study assumptions
- Limitations to date are thermal.
- Limits largely indifferent to renewable location; mainly driven by reduction in fossil-generation within California load centers.

# Analysis of Phase 3 Proposed High Potential Transmission Elements

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- Assumed fossil dispatch pattern significantly impacts the ability of the transmission system to accommodate renewable energy development
- Generally, CTPG studies:
  - Started with fossil dispatch pattern in the WECC Heavy Summer powerflow case
  - Used heat rate as a relative cost proxy to determine fossil re-dispatch as renewables added
- The ability of the transmission system to accommodate renewable development could be increased by:
  - Changing the starting-point fossil dispatch pattern in the WECC powerflow case
  - Using an “out-of-merit order” re-dispatch of fossil when adding renewables
- However, a different fossil generation dispatch pattern could mean that inefficient generators would be retained, a different set of “High Potential” transmission upgrades identified, and the continued use of generation that has higher air emissions and carbon emission impacts to the local area.
- Additional re-dispatch methodologies would require similar comprehensive reliability and feasibility analyses.

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# STAKEHOLDER INPUT – MIKE DEIS

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# LUNCH – ON SITE

# Phase 3 – Two Step Approach

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- Step 2: Final Analysis and Completion of 2010 State-Wide Transmission Plan
  - Analyze the progress made towards the states 33% RPS goal by the proposed “High Potential” transmission elements
  - Assess the potential opportunities of increased out-of-state imports and northern California CREZs to determine their potential impact on the 2010 state-wide transmission plan



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# **ASSESSMENT OF POTENTIAL NORTHERN CALIFORNIA AND OUT-OF-STATE IMPORT OPPORTUNITIES – MIKE DEIS**

# Out-of-State and Northern California Renewable Resources Potential

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- The CTPG reviewed the commercial status of out-of-state renewable resources and potential Northern California resources
- The CTPG obtained publicly available information from the following:
  - NV Energy
  - Bonneville Power Administration (BPA)
  - Arizona Public Service (APS)
  - Salt River Project (SRP)
  - New Mexico Public Service (PNM)
  - Western Area Power Administration-Southwest
  - BC Hydro

# Out-of-State and Northern California Renewable Resources Potential

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- The CTPG obtained publicly available information from the following:
  - Sierra Sub-regional Planning Group
  - Southwest Area Transmission Planning Group
  - Lassen Municipal Utility District
  - Other Sources

# Out-of-State and Northern California Renewable Resources Potential

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- *We found that:*
  - Several western states believe the development and export of renewable energy to be important to their respective state's economic strategies
  - Several western states have the support of private and government entities to work towards their economic strategy goals

# Out-of-State and Northern California Renewable Resources Potential

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- *We found that:*
  - Several western states have significantly large generation interconnection queues that are well beyond their own RPS needs
  - Some entities have already interconnected resources beyond their state's current requirements

# Out-of-State and Northern California Renewable Resources Potential

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- *We found that:*
  - Several states have developed conceptual transmission plans for the export of energy in the event the market requires additional transmission to collect and bring renewable energy to load centers
  - The amount of commercial interest demonstrated by California's load serving entities in the out-of-state renewable energy resources has not yet reached the levels modeled in Phase 3

# Out-of-State and Northern California Renewable Resources Potential

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- *Conclusion:*

- Additional study is required before deciding whether, and which, transmission upgrades associated with significant renewable energy imports from out-of-state should be designated as “High Potential”

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# **CTPG 2010 CALIFORNIA STATE-WIDE TRANSMISSION PLAN APPROACH– MIKE DEIS**



# 2010 State-Wide Transmission Plan

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- Background
  - There is considerable uncertainty regarding the precise location and amount of renewable resources
  - Load serving entities are still finalizing procurement decisions as the regulations surrounding renewable energy credits (REC) and green house gas reductions are developed
  - The existing purchase power agreements (PPA) may be insecure
    - Inability to meet some scheduling terms
    - PPAs may contain milestones that if not achieved render the contract terms invalid

# 2010 State-Wide Transmission Plan

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- **Background**

- Environmental impacts and associated permitting difficulties could affect the proposed project's economics and viability
- There is some uncertainty on the RPS level that can be attained from the medium and high potential line additions
- Further uncertainty exists regarding the exact amount of existing, under construction, and miscellaneous renewables identified in the power flow base cases

# 2010 State-Wide Transmission Plan

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- **The CTPG has chosen to identify “High Potential Transmission Corridors” for future study in 2011 for the following reasons:**
  - Will provide California’s load serving entities with potential future procurement options beyond the “High Commercial Interest CREZ”
  - Recognizes the potential for renewable resource projects with less environmental restrictions that may be developed faster and for less cost
  - Recognizes the potential for reduced total procurement costs, i.e., combined generation and transmission costs

# 2010 State-Wide Transmission Plan

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- **The CTPG has chosen to identify “High Potential Transmission Corridors” for future study in 2011 for the following reasons:**
  - Will sustain a competitive renewable resource development and procurement environment as final procurement decisions are made by the State’s load serving entities
  - The CTPG believes that additional renewable resource options should be explored because California will have additional renewable resource needs beyond 2020 and to address future GHG reduction polices

# HIGH POTENTIAL TRANSMISSION CORRIDOR SELECTION CRITERIA

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- **Criteria No. 1** – The transmission corridor is associated with out-of-state transmission additions or upgrades currently being considered by other WECC planning entities for the delivery of renewable resources into California

- **Reason:** WECC planning entities should continue to work together to plan for and identify mutual solutions for satisfying respective renewable energy goals

- **Criteria No. 2** - The transmission corridor is associated with out-of-state transmission additions or upgrades that are known to be supported by federal and/or state government(s) for the purpose of developing and exporting renewable resources to California

- **Reason:** The success of completing out-of-state renewable energy projects and transmission infrastructure that may contribute to the potential export of renewable energy to California is contingent on the support of local and state governments

# HIGH POTENTIAL TRANSMISSION CORRIDOR SELECTION CRITERIA

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- **Criteria No. 3** – The development of transmission additions or upgrades within the transmission corridor will facilitate a renewable resource portfolio for California that has geographical and weather (wind and sun) diversity

  - **Reason:** Renewable energy geographical and weather diversity

  - **Reason:** State's renewable resource portfolio is less likely to be adversely impacted by unplanned electric system disturbances or by localized weather patterns.

- **Criteria No. 4** – The development of transmission additions or upgrades within the transmission corridor will support the delivery of energy to California from out-of-state entities that are either developing or planning for the development of renewable resources well beyond their own needs.

  - **Reason:** Gauges the commitment of the regions outside of California to develop renewable energy resources beyond that required for these regions' own needs in order to export to California.

# HIGH POTENTIAL TRANSMISSION CORRIDOR SELECTION CRITERIA

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- **Criteria No. 5** – The development of transmission additions or upgrades within the transmission corridor will provide access to areas that have a successful record of renewable resource development.

- **Reason:** A measure of the likelihood that the renewable energy projects being considered will actually be completed. Interconnection and permitting approval and financing.

# High Potential Transmission Corridor

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- Based upon study results in Phase 3 and the further analysis performed in Phase 4, the CTPG has identified the following High Potential Transmission Corridors:
  - Pacific Northwest Corridor,
  - Northwest Nevada Corridor
  - Southwest Corridor



# 2010 State-Wide Transmission Plan

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- These corridors are recognized as potential areas for the state of California to import power, including renewable energy to meet the state's RPS goals. The corridors have been selected for the following reasons:
  - The recognition by other sub-regional planning groups for study as potential WECC transmission system improvements
  - The potential for geographic, weather, and resource diversity for California's renewable resource portfolio beyond that provided by renewable resources developed primarily in southern California

# 2010 State-Wide Transmission Plan

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- The strong support by federal and state governments required for the completion of the renewable resource projects and transmission improvements that would provide renewable energy throughout the western United States.
- Potential access to entities that are currently planning for the development or renewable energy resources well beyond their own needs for potential import into California
- It is expected that as critical legislative, policy and rule-making decisions are made, the high potential transmission corridors and transmission upgrades within those corridors will be adjusted and the results reflected in a more definitive state-wide transmission plan.



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# RECOMMENDATIONS – JON ERIC THALMAN

# Recommendations

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- High Potential Transmission Needs:
  - Transmission project developers, balancing authorities, regulatory bodies, and state agencies with environmental permitting authority, should focus time and resources on the “high potential” transmission needs
  - Solutions to Needs should be submitted by different implementing entities for regulatory approval and environmental authorizations as required by applicable laws and regulations

# Recommendations

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- Medium Potential Transmission Needs:
  - Study further in the ongoing transmission planning processes of the various utilities, balancing authorities and planning groups within the state of California
- High Potential Transmission Corridors
  - The Pacific Northwest, Northwest Nevada, and Southwest Corridors warrant further study by the CTPG in 2011

# Next Steps

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- Finalize Phase 4 study report
- Finalize statewide transmission plan
- Schedule a stakeholder conference call in early 2011 to gather input for 2011 work plan
- Develop 2011 work plan
- Schedule quarterly stakeholder meetings
- Develop coordination plan for TEPPC

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# **CALIFORNIA BALANCING AUTHORITY PLANNING – JON ERIC THALMAN**



# California Balancing Authorities

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Statewide Plan includes Transmission Planning Process report from following Balancing Authorities:

- CAISO
- SMUD
- LADWP
- IID
- TID

Each includes narrative on coordination of respective process with the CTPG study results.

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# **CTPG 2010 LESSONS LEARNED – JON ERIC THALMAN**

# CTPG 2010 Lessons Learned

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- Better clarify its study objectives and its ongoing processes
- Develop a single baseline study scenario with a limited number of sensitivities designed to explore uncertainties in key assumptions embedded in the baseline study scenario

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# STAKEHOLDER INPUT – MIKE DEIS



Thank you for you input and  
attendance