

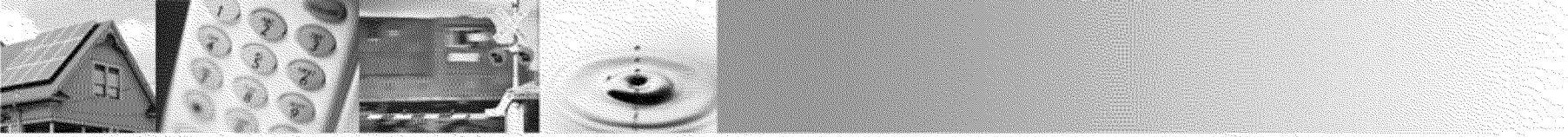


Status of Transmission Projects at the California Public Utilities Commission To Meet the 33% Renewable Goal Per the CAISO Sept. 2009 Report

November 2009
DRAFT

**INFORMATION ON THESE SLIDES ARE
SUBJECT TO CHANGE WITHOUT NOTICE**

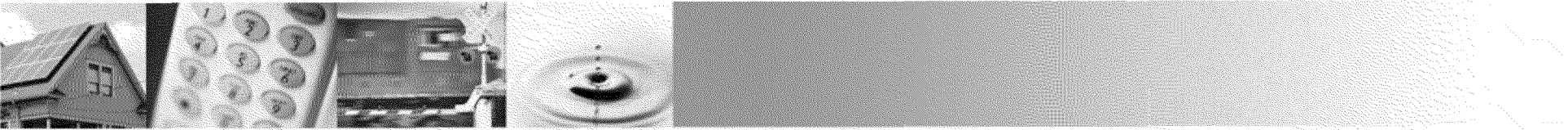




DISCLAIMER

- These projects are best estimates at this time and the information is subject to change without notice.
- The timing of these projects and related CPCN filings is unknown at this time.





Renewable Goals

- Renewable net short to meet 33% RPS goal in California is 59,700 GWh/year by 2020*

*Source: RETI Phase 2A Conceptual Transmission Plan – Final Report
September 2009





Renewable Studies in California

- CAISO technical studies
 - Based on the RETI report, interconnection queue, signed Power Purchase Agreements
 - 69,000 GWh/year renewable net short
 - Approximately 55,000 GWh/year in state
 - Approximately 14,000 GWh/year out of state
- 14 CREZs
- 21,375 MW of developable renewable generation
 - 18,568 MW in southern California
 - 2807 MW in northern California
- RETI Phase 2A Report
 - 96,000 GWh/year renewable net short (1.6 times 59,700 MW with 60% additional margin)
 - 31 (CREZs) with 33,996 MW of developable renewable generation
 - 30,147 MW in southern California
 - 3849 MW in northern California
 - Ranked CREZs based on economic and high level environmental impacts
 - Assumed 40% of the total developable MW in each CREZ except 100% for Tehachapi and Imperial North





CAISO Technical Studies of Transmission Needed for Reaching these Renewable Areas

□ Areas Needing Transmission Lines or Upgrades

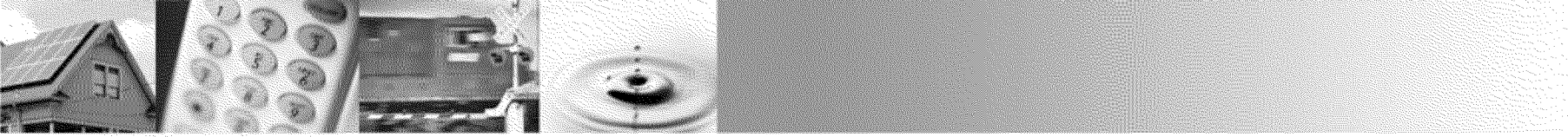
- Pisgah
- Riverside East
- Kramer
- Solano
- Carrizo South (San Luis Obispo County)
- Carrizo North
- Imperial North A – (Green Path North, LADWP)

□ Areas Under Permit Review/Permitted/Under Construction or No Transmission Upgrades Needed

- Mountain Pass - (Permit in Progress)
- San Diego South
- Tehachapi 1-3 (under Construction)
- Tehachapi 4-11 (Permit in Progress)
- Imperial South
- Riverside East (California portion of DPV2)
- Palm Springs
- Santa Barbara
- Round Mountain

□ Per CAISO Study 54,933 GWh/year and estimated costs are \$8.3 billion. Costs may be higher after more specific projects are defined.





Renewable Areas That Need Transmission Construction or Upgrades

- Pisgah–8995 GWh/year
- Riverside East – 7710 GWh/year
- Kramer – 5654 GWh/year
- Solano–2313 GWh/year
- Carrizo South – 2570 GWh/year
- Carrizo North – 1542 GWh/year
- Imperial North A – 1850 GWh/year)





Pisgah Area

- CAISO and SCE Proposed Projects / Upgrades
 - Existing 230 kV Pisgah substation is expanded to 500 kV (part of the Stirling project which is expected to be filed in 2010)
 - Loop in the existing Eldorado-Lugo 500 kV line into Pisgah to form Pisgah-Lugo No.1 (part of the Stirling project and requires CPCN)
 - Upgrade existing Lugo-Pisgah No.2 220 kV line to 500 kV to form Pisgah-Lugo No.2 (part of the Stirling project and requires CPCN)
 - Loop in the existing Lugo-Mohave 500 kV line into Pisgah 500 kV Substation to form Pisgah-Lugo No.3, proposed by CAISO (not part of the Stirling project and may require a CPCN)
 - New 500 kV line from the upgraded 500 kV Pisgah substation to the existing Rancho Vista 500 kV substation which is by Etiwanda (not part of Stirling project and requires a CPCN)
- Transmission configuration can deliver 3500 MW of renewable energy (per CAISO 2020 Renewable Transmission Conceptual Report)
 - 2500 MW solar
 - 1000 MW biomass (per CAISO SCE doesn't show biomass at Pisgah in CAISO Queue list & neither does RETI)
- CAISO estimated upgrades will accommodate 8,995 GWh/year





Pisgah Area (continued)

- Pisgah-Lugo transmission line
 - Project replaces the existing 220 kV Pisgah-Lugo line with a 500 kV line.
 - Stirling filed an AFC for the Solar One generation with the CEC Dec 2, 2008 and CEC deemed the application data adequate May 6, 2009.
 - CPUC had discussions with Stirling, CEC, BLM, and SCE in 2009 to discuss possibly expediting this project using the CEC AFC process. It is not possible to use CEC/BLM environmental document since SCE does not have all applicable upgrade details to meet CEC required deadlines.
 - SCE is expected to file an application for the Pisgah to Lugo transmission line upgrade with the CPUC in 2010
- **SCE may possibly need to file 1 to 3 CPCNs** in this renewable area depending on the timing of these upgrades

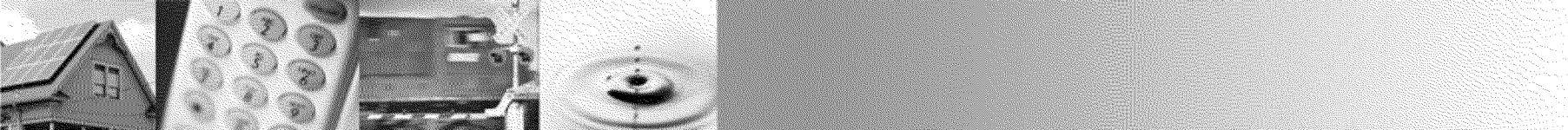




Riverside East Area

- CAISO and/or SCE Proposed Transmission Upgrades
 - [Redacted] formerly Midpoint, 500 kV switchyard – This new switchyard with completed environmental review (Devers - Palo Verde #2) would need CPUC decision through a Petition To Modify (PTM). PTM decision anticipated to be on the November 20, 2009 Commission meeting.
 - [Redacted] 500/230 kV substation – The [Redacted] Switchyard will be modified to a substation configuration utilizing 500/230 kV transformation (It is not part of DPV2) I am not sure that this is correct statement?? SCE – Isn't this a combination Sub and switchyard at same location???
 - Red Bluff 500/230 kV substation – New Substation proposed at Desert Center (Same as Desert Center 500 kV substation proposed in RETI Phase 2A). May require PTC or CPCN but possibly no environmental review by the CPUC. CPUC is working on MOU with BLM to use a NEPA document that is CEQA compliant so it can be used for a later PTC or CPCN filing
 - Colorado River-Red Bluff-Devers #2 500 KV line – This is the DPV2 line from [Redacted] looped into Red Bluff Substation (This line was permitted per the DPV2 CPCN)
 - Devers – Valley 2nd 500 kV – Part of DPV2 project going from Devers to Valley substation. Does not require a separate CPCN since it is part of DPV2 Project
 - Colorado River-Red Bluff-Devers #1 500 KV line - Existing DPV1 500 kV line looped into new Colorado River and Red Bluff Substations. This may require a PTC or CPCN or may be exempt if it there are service drops into the substations.
 - Red Bluff-Valley 500 kV line – A third 500 kV line in addition to DPV2 from Red Bluff (Desert Center) substation to Valley substation forming a new Red Bluff – Valley 500 kV line. Most likely requires a CPCN.





Redacted

Area (continued)

- West of Devers Upgrades (Upgrades originally analyzed in DPV2 EIR/EIS but new version will probably require new CPCN & environmental document.)
 - Devers-El Casco 230 kV line #1 (part of existing Devers – San Bernardino 230 kV line #2)
 - El Casco-San Bernardino 230 kV #1 (part of existing Devers – San Bernardino 230 kV line #2)
 - Devers-San Bernardino 230 kV line #1
 - Devers-Vista 230 kV line #1
 - Devers-Vista 230 kV line #2
- CAISO configuration and upgrades can deliver 3000 MW of solar to the grid/7,710 GWh/yr
- **SCE may need to file 1-3 CPCNs/PTCs.**





Kramer Area

- CAISO and SCE Transmission Project Description
 - Kramer 500 kV substation-Substation expansion from an existing 230 kV to a 500 kV substation and new 500 kV line from Kramer-Mira Loma. Requires a CPCN.
 - Kramer – Windhub - Whirlwind 500 kV line – New 500 kV line. Requires a CPCN.
 - Victor Lugo 230 kV line-New 230kV line. Requires CPCN.
 - SCE proposes Cool Water – Jasper – Lugo new 220 kV line – Cool Water and Jasper are new substations. Possibly Jasper substation filed as a PTC by itself. Line requires 1 CPCN.
 - Kramer – Inyokern box loop operate existing 115 kV lines and add two new 230 kV lines. Requires a CPCN.
- Can deliver 2200 MW of solar to the grid
- CAISO estimated upgrades will accommodate 5654 GWh/year.
- **SCE may need to file 1 - 4 CPCNs with the CPUC**





Solano Area

[PG&E proposes to replace this slide with the following slide]

- CAISO does not identify any transmission upgrades for this CREZ
- CAISO Transmission Upgrades
 - Identified in GIPR Transition Cluster Phase I Studies
 - Vaca Dixon-Birds Landing 230 kV Path Upgrade
 - Contra Costa-Newark 230 kV Path Upgrade
 - Contra Costa-Brentwood 230 kV Line Reconductoring
 - Newark-Ravenswood 230 kV Reconductoring (***Delete this line. Not identified in GIPR Transition Cluster I for this area***)
 - Contra Costa-Delta Pumps 230 kV Line Reconductoring
 - Delta Pumps-Tesla 230 kV Line Reconductoring
 - Kelso-Tesla 230 kV Line Reconductoring
 - Possibly no new permit needed for this work (PG&E believes the 7 reconductoring projects above will require significant permitting.)
 - Configuration can deliver 900 MW of wind
 - CAISO estimated upgrades will accommodate 2,313 GWh/year.
- PG&E recommendation is Bay Area 500 kV project (Question to PG&E – Is this 500 kV project the same as the studies listed above?) Yes, they are proposed alternatives for the Bay Area need.
 - New 500 kV substation at Collinsville
 - Dual 230 kV underwater cables from Collinsville to Pittsburg
- **PG&E may need to file 1-2 CPCNs with the CPUC.**





Redacted

Area

[PG&E suggested slide content]

- CAISO RETI study did not identify any transmission upgrades for this CREZ
- Recommended CAISO Transmission Upgrades from 2009 Assessment
 - Contra Costa - Moraga 230 kV
 - Contra Costs-Las Positas 230 kV
 - Neward - Ravenswood 230kV
 - Tesla-Pittsburg
 - Contra Costa -Delta pump 230 kV
 - Configuration can deliver 900 MW
 - CAISO estimated upgrades will accommodate 2313 GWh/year.
- PG&E recommendation is Bay Area 500 kV project
 - New 500 kV substation at Collinsville
 - Dual 230 kV underwater cables from Collinsville to Pittsburg
- 1569 MW in interconnection queue
- 312 MW is Power Purchase Agreements
- Improvements potentially needed to help meet 20% renewables





Redacted

Area

- CAISO Transmission Upgrades
 - Identified in GIPR Transition Cluster Phase I Studies (PG&E is this correct list based on your comments??. Updated line names for accuracy)
 - Reconductor Morro Bay-Gates 230 kV Line
 - Reconductor Morro Bay-Templeton-Gates 230 kV Line
 - Can deliver 600 MW of solar to the grid
 - Possibly could require PG&E to file a CPCN
- CAISO estimated upgrades will accommodate 1542 GWh/year.





Carrizo South Area

- CAISO Transmission Upgrades and San Luis Obispo (SLO) County Environmental Review
 - Identified in the Transition Cluster Phase I Studies (PG&E is this list correct?? Updated line names.)
 - New 230 kV switching station
 - Reconductor Morro Bay-Midway 230 kV Lines #1 and 2
 - County of San Luis Obispo (SLO) is siting solar farms in the area. CPUC will probably be a responsible agency to the SLO County environmental review which will include the generation, substation and the reconductoring.
 - CPUC plans to use the SLO environmental review, however, if it is not sufficient, then the SLO may need to be supplemented to amended.
 - CPUC staff spoke with PG&E and PG&E is in the process of doing preliminary engineering on the reconductoring.
 - Configuration can 1,000 MWs of solar/2570 GWh/yr

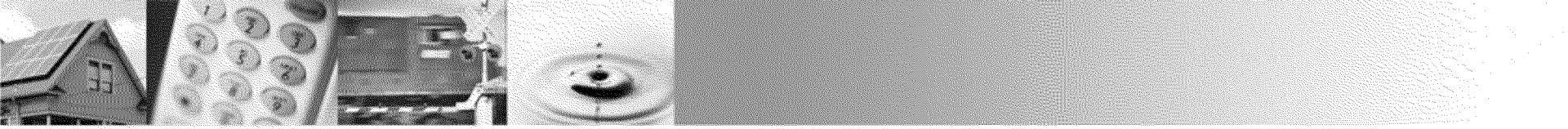




Imperial North A Area

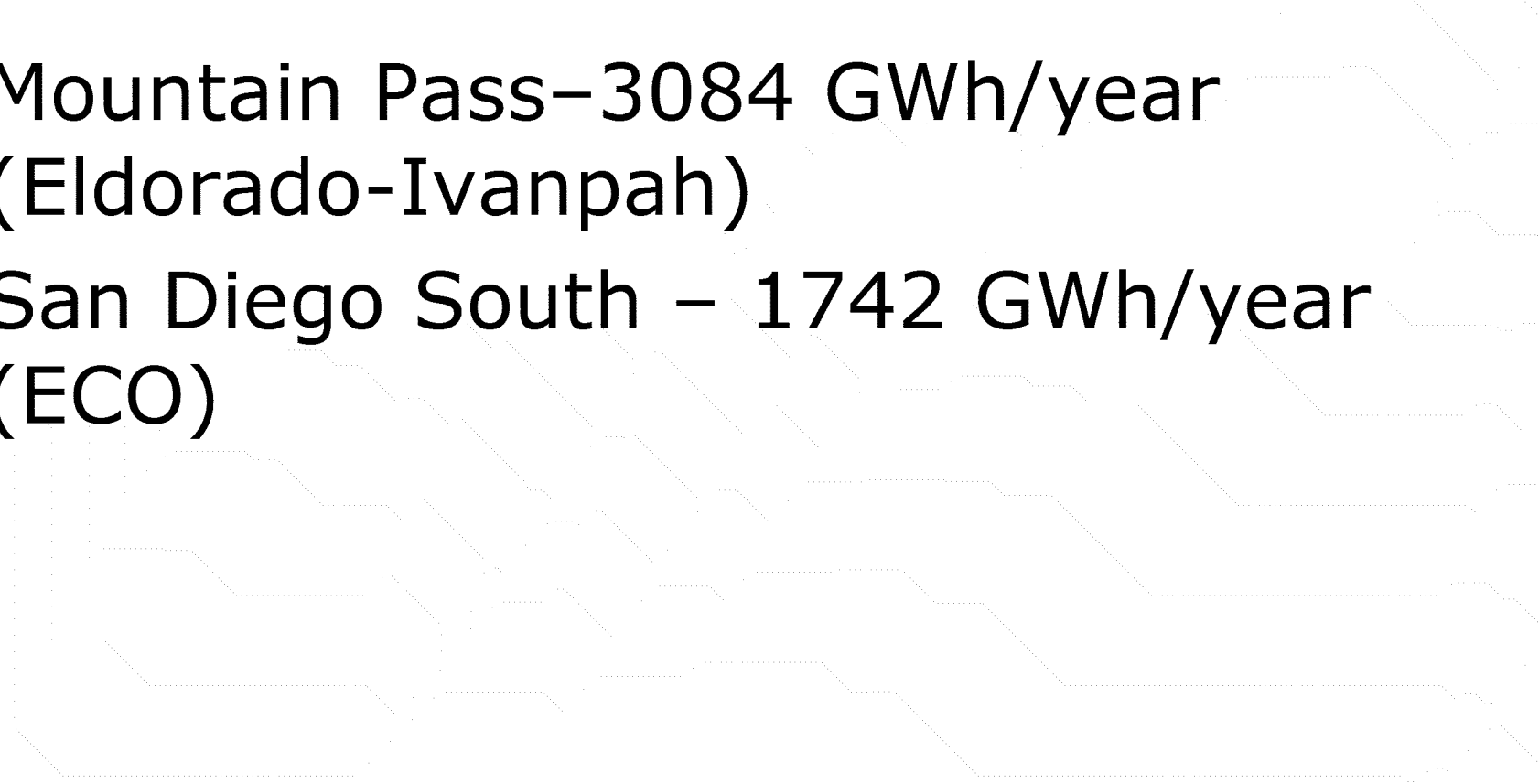
- CAISO Transmission Project Description
 - LADWP Green Path North Transmission Project
 - Mostly likely not CPUC permitting needed
 - Can deliver 720 MW of renewable to the grid
 - 540MW solar
 - 180 MW geothermal
- CAISO estimated upgrades will accommodate 1850 GWh/year.





RENEWABLE AREAS WHERE TRANSMISSION PERMITTING IS UNDERWAY

- Mountain Pass–3084 GWh/year (Eldorado-Ivanpah)
- San Diego South – 1742 GWh/year (ECO)





Redacted

Area

- CAISO and SCE Transmission Upgrades
 - New Ivanpah 230 Substation
 - Replace 35 miles of existing Cool Water-Dunn Siding-Baker-Mountain Pass-Eldorado 115 kV line between Ivanpah and Eldorado with new Ivanpah – Eldorado double-circuit 230 kV line connecting into the new Ivanpah substation
 - Line will be able to deliver 1400 MW of solar energy to the grid
- Ivanpah project filed with the CPUC
 - 35 mile long transmission line with and 7 miles in California and 28 miles in Nevada
 - SCE filed application with the CPUC May 29, 2009 and deemed complete June 28, 2009
 - Anticipated FEIR/EIS July 2010 and Decision 3rd quarter 2010
- CAISO estimated upgrades will accommodate 3084 GWh/year.

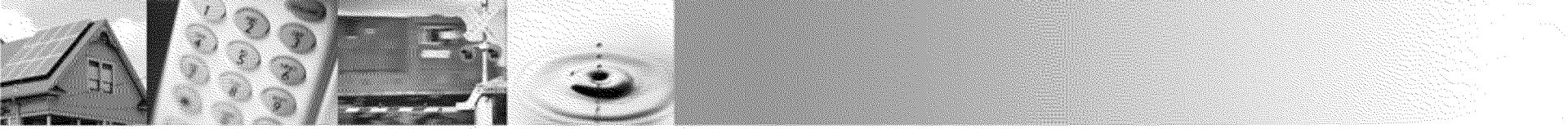




San Diego South Area

- CAISO and SDG&E Transmission Upgrades
 - Construct new 500/230 kV substation (ECO substation)
 - 1 x 500/230 kV and 1 x 230/138 kV banks
 - Imperial Valley-Miguel 500 kV line loop in ECO substation
- Can deliver 1800 MW of renewables to the grid
- SDG&E Filed East County (ECO) Project with the CPUC
 - SDG&E filed ECO project with CPUC August 10, 2009
 - CPUC is working with BLM and County of San Diego to site the transmission line Includes 13.5 miles of a new 138 kV line
 - The Tule Wind (200 MW) and Energia Santa Juarez (initially 120MW with ultimate build out to 1200MW) will connect to ECO substation
 - Located in southeastern San Diego County
 - Sunrise and Southwest Powerlink line are near the project site.
- CAISO estimated upgrades will accommodate 1742 GWh/year.





Renewable Areas That Have Transmission Permitted and are under Construction

- *Tehachapi (Segments 1 – 11) - 11,565 GWh/year
- Imperial South–5140 GWh/year
- Santa Barbara–308 GWh/year
- Round Mountain B – 481 GWh/year
- Palm Springs – 1979 GWh/year

* Tehachapi, Segments 1 – 3 were approved by the CPUC and under construction. Tehachapi, Segments 4 – 11, are expected to be approved by the CPUC Dec 3, 2009.





Tehachapi Area

□ CAISO & SCE Transmission Upgrades – Tehachapi Segments 1 – 3

Segments 1 CPCN issued March 1, 2007 and the ROD issued August 21, 2007.

- Segments 2 and 3 CPCN issued March 15, 2007.
- Segment 1 estimated on line date is November 12, 2009
- Segment 2 estimated on line date is the second week in December 2009
- Segment 3A estimated on line date is December 2009/January 2010.
- SCE waiting for developers to subscribe to 25% of Segment 3B before they start construction of the line.





Tehachapi Area (continued)

- CAISO and SCE Transmission Upgrade, Segments 4 - 11
 - Construct new or upgrade 220kV and 500 kV transmission lines, relocate 66 kV lines, construct several new substations (Whirlwind, Windhub, Highwind) and upgrade existing substations (Vincent and Antelope)
 - Segments 4 – 11 of the Tehachapi project is approximately 173 miles of new and existing rights of way (ROW)
- Segments 4 – 11 is expected to be approved by the CPUC Dec 3, 2009 and construction completed by Nov. 2013
- Tehachapi upgrades configured for 4500 MW of renewables
- CAISO estimated upgrades will accommodate 11,565 GWh/year





Imperial South Area

- CAISO and SDG&E transmission upgrade
 - Replace Imperial Valley #1 500/230 kV bank
 - Imperial Valley #3 500/230 kV bank
 - Sunrise Powerlink 500 kV line
- CAISO estimates the Sunrise configuration can deliver 2000 MW – 1100 MW of solar, 600 MW of wind and 300 MW of biomass - of renewables to the grid
- Sunrise permitted and construction underway
 - A new 500kV transmission line that is 123 miles long
 - Capacity of Sunrise is 1000MW and cost of the project is approximately \$2 billion
 - Transmission line was permitted in December 2008 by CPUC and pre-construction activities started in Spring 2009.
 - Scheduled to complete construction 4th quarter 2012.
 - Accommodate 5140 GWh/year.





Riverside East Area (Approved California only portion)

- Devers Palo Verde 2 (DPV) project
 - DPV2 line has capacity of 1200 MW
 - CPUC approved DPV2 in January 2007. SCE filed a Petition to Modify (PTM) May, 2008 to construct the California only portion. The PD for the PTM will be on the November 20, 2009 Commission agenda.
 - Construction can start after the Commission approves the PTM; CAISO requirements are satisfied by SCE; and BLM issues the Record of Decision.
- CAISO estimated upgrades will accommodate 7710 GWh/year.





Palm Springs Area

- CAISO did not identify any transmission upgrades
 - CAISO assumes gen-ties will be constructed by generator project owners to Devers substation; however, SCE believes getting gen-ties into Devers will be difficult.
 - Can deliver 770 MW to the grid
 - 270 MW wind
 - 500 MW biomass
 - CAISO estimated upgrades will accommodate 1,979 GWh/year.





Santa Barbara Area

- CAISO has not proposed a transmission configuration for this area
- Santa Barbara County sited Lompoc Wind project (120 MW) which included the transmission line – FEIR certified by County Board of Supervisors February 10, 2009
 - Project was on hold due to an appeal by CDFG on bird death issues with the wind machines; as of Nov 2009, PG&E is now working on the design of the transmission line
 - CPUC was a responsible agency
 - CPUC is expecting an Advice Letter filing from PG&E
- CAISO estimated upgrades will accommodate 308 GWh/year.





Round Mountain Area

- CAISO Transmission Project and Upgrades
 - New Hatchet Ridge 230kV substation
 - Loop Pit 3-Round Mountain into Hatchet Ridge
 - Reconductor Hatchet Ridge-Round Mountain 230 kV
 - Reconductor Pit 1-Cottonwood 230 kV
 - County of Shasta prepared an environmental document in 2007
 - This upgrade was already approved as an AL
 - Can deliver 187 MW of wind to the grid
 - Estimated costs of the project are \$120 million
- CAISO estimated upgrades will accommodate 481 GWh/year.





Other Renewable Projects

- PG&E's Central California Clean Energy Transmission Project (C3ETP) (in pre-filing)
- British Columbia to Northern California Line (in planning)






Central California Clean Energy Transmission Project (C3ETP)

- **Project Description:** 140- to 170-mile 500 kV overhead transmission line from Midway Substation to Gregg Substation or to a new 500/230 kV substation (E2) between Gregg Substation and Helms PSP.
- **Project Cost:** \$800 million to \$1 billion based on a conceptual cost estimate.
- **Project Status:** In preliminary planning stage; nineteen alternative plans of service are being investigated in the CAISO Stakeholder Process, and is anticipated to be operational in the third to fourth quarter of 2016.
- **Project Benefits:**
 - Enhance reliability to Yosemite/Fresno area
 - Increase utilization of the Helms PSP to enhance the value of off-peak generation
 - Facilitate efficient management of renewables
 - Increase Path 15 transfer capability by at least 1,000 MW
 - Provide opportunity for future expansion.

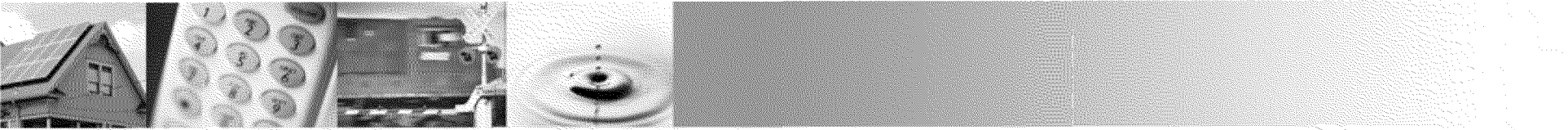




British Columbia to Northern California Line (In planning)

- **Project Description:** 3,000 megawatts (MW) transfer capacity from new renewable resources in British Columbia, Canada to the Pacific Northwest and northern California, over a 1,000 mile long transmission line.
- **Preliminary Plan of Service**
 - 500 kV HVAC facilities from Selkirk in southeast British Columbia to the proposed Northeast Oregon (NEO) Station with an intermediate interconnection at Devils Gap Substation in Spokane
 - 500 kV HVDC facilities from NEO Station to Collinsville Substation in the San Francisco Bay Area with a possible third terminal at Cottonwood Area Substation in northern California
- **Project Cost or Estimated Cost:** \$3-7 billion.
- **Project Status:** WECC Phase 1 rating study and preliminary plan-of-service submitted to WECC on December 19, 2008. WECC Phase 2 entered on March 10, 2009. The target operating date for the project is December 2015.
- **Investment Partner(s):** Avista Corporation, British Columbia Transmission Corporation, and Pacific Gas and Electric Company.
- **Project Benefits:**
 - Provide access to significant incremental renewable resources in Canada and the northwestern United States.
 - Improve regional transmission reliability.
 - Provide other market participants with beneficial opportunities to use the facilities.





Future PG&E Work

- Additional projects submitted to CAISO for future planning consideration
 - Midway – Antelope 500 kV line
 - Kramer - Gregg – Tesla 500 kV line

PG&E Should we add this slide? Yes.

