



California ISO
Shaping a Renewed Future

2011/2012 Conceptual
Statewide Transmission
Plan Update

2012/2013
Transmission
Planning Cycle

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Introduction

The development of the Conceptual Statewide Transmission Plan is pursuant to section 24.4.4 of the ISO tariff. The 2011/2012 Conceptual Plan is an update to the 2010/11 Conceptual Plan and will be used as an input into the 2012/2013 planning cycle as a part of the ISO's annual transmission planning process. The content drew largely on the efforts of the California Transmission Planning Group ("CTPG") in which the ISO participates.

This conceptual plan takes a statewide perspective rather than focusing only on the ISO footprint. As such, it includes potential transmission upgrades or additions at a high level across the state needed to meet the state's goal of 33 percent renewable energy by 2020. The 2011 CTPG Plan identified the amount of renewable energy, e.g. the "renewable net short", that needs to be added to California's annual supply mix in order to meet the 33 percent renewable energy goal by 2020 to be approximately 44.8 TWh. This amount was utilized in the renewable resource development portfolios to develop the 2011 CTPG Plan. The CPUC provided updated renewable portfolios scenarios on May 16, 2012 which identified the renewable net short to be 43.8 TWh which the ISO is using as an input assumption in the 2012/2013 transmission planning process. The ISO's current analyses indicates that this ISO conceptual statewide plan includes sufficient new transmission additions, both within the ISO footprint and in the footprints of certain other California balancing authority areas¹ as discussed below, to accommodate the addition of 43.8 TWh of renewable energy to serve California load by the year 2020. The ISO 2012/2013 transmission planning process will continue to assess the transmission infrastructure requirements within the ISO balancing authority area.

The purpose of this statewide conceptual plan is to ensure the simultaneous feasibility of the ISO's Comprehensive Transmission Plan and the transmission plans of other California BAAs, and coordinate planning with regional and sub-regional transmission planning processes and entities, including interconnected BAAs. As a result this conceptual statewide plan includes the transmission facilities the other California BAAs are contemplating for purposes of meeting 33 percent renewable goal. As described further in the next section, the ISO and these other entities shared information regarding their planning efforts in the context of the collaborative activities of the CTPG. Importantly, the transmission projects proposed for other BAAs have been or will ultimately be approved through their own transmission planning processes. Accordingly, the ISO is not seeking stakeholder comment regarding these non-ISO BAA projects nor

¹ There are five California Balancing Authorities: Sacramento Municipal Utility District (SMUD), Turlock Irrigation District (TID), Imperial Irrigation District (IID), Los Angeles Department of Water and Power (LADWP) and the ISO.

will the ISO evaluate their merits. Rather, the ISO has included non-ISO BAA projects to provide a complete picture of how transmission projects within the ISO BAA fit into an overall statewide plan.

This conceptual statewide plan reflects the ISO's conceptual vision regarding the transmission upgrades and additions that may be needed within the ISO footprint based on, among other things, the ISO's base case assumptions, studies of several sensitivity scenarios, other studies and analyses that the ISO has previously discussed with stakeholders in the 2011/12 transmission planning cycle, as well as input from the CTPG process. With the release of this conceptual statewide plan the ISO provides an opportunity for interested parties to submit comments and recommend modifications to the plan as it pertains to projects within the ISO BAA, including alternative transmission and non-transmission elements, potential interstate transmission lines and proposals for access to resources located in areas not identified in the plan.

Development of the ISO Conceptual Statewide Plan

The ISO developed this conceptual statewide plan by combining the results of the ISO's own planning studies performed under its Order 890 transmission planning process with the results of its collaborative work with the transmission planning entities participating in the CTPG. The CTPG prepared a draft Statewide Transmission Plan, which it posted on its web site on January 10, 2012, based on inputs from the ISO and CTPG's participating transmission planners². In particular, the ISO provided the CTPG with an assessment of transmission requirements for meeting a 33% RPS for its BAA based on assessments that the ISO had conducted by that time. The ISO has also shared these findings and more details of additional analysis with its stakeholders at its December 8, 2011 public meeting as part of its transmission planning process. Thus, the ISO conceptual statewide plan described in the present document reflects the results of the ISO's own studies, as well as the input of the ISO's stakeholders participating in the ISO's planning process to date, supplemented by the transmission upgrades and additions contemplated by the other California BAAs as reported by them for purposes of the CTPG January 10 draft plan. On March 5, 2012 the CTPG posted its 2011 Final CTPG California Statewide Transmission Plan (2011 CTPG Plan).

² The following entities participated in creating the CTPG Statewide Transmission Plan: California Independent System Operator (ISO), Imperial Irrigation District (IID), Los Angeles Department of Water and Power (LADWP), Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Southern California Public Power Authority (SCPPA), San Diego Gas and Electric (SDG&E), Sacramento Municipal Utility District (SMUD), Transmission Agency of Northern California (TANC), Turlock Irrigation District (TID), Western Area Power Administration (Western)

Over the past year the ISO worked closely with the California Transmission Planning Group (CTPG) to identify, from a statewide perspective, the transmission that would support achievement of the state’s target of 33 percent renewable energy by 2020. During their 2011 planning cycles, CTPG members performed a significant number of technical analyses to develop a conceptual framework for a statewide transmission plan. CTPG evaluated the transmission requirements of alternative renewable resource portfolios, which reflected input from the Renewable Energy Transmission Initiative (RETI), state agencies and other stakeholders, as well as the best information available to date on renewable resource development activities.

A primary goal of the 2011 CTPG Plan was to develop a conceptual statewide “least regrets”³ transmission plan, which individual CTPG members that are planning entities for their respective BAAs could consider and assess in greater detail as part of their own respective planning processes. Following the least regrets principle, the 2011 CTPG Plan updated the list of “high potential” and “medium potential” transmission elements identified in CTPG’s 2010 transmission plans. The list of these high and medium potential transmission elements can be found in Table 3 of the CTPG’s Plan.⁴

In order to identify high potential and medium potential transmission facilities, the CTPG performed an analysis of all Competitive Renewable Energy Zones (CREZs) to identify those CREZs that exhibited both high levels of commercial interest and correspondingly good environmental scores. As evidence of commercial interest in each CREZ the CTPG considered the renewable resources in the CPUC’s “discounted core” renewable resource development portfolio, the renewable resource projects in the portfolios of the publicly owned utilities (POUs) considered to have a similar level of commercial certainty, and the positions of the same resources in the generator interconnection queues of the ISO and the POU. CTPG updated the renewable net short estimate for the year 2020 that CTPG used in its 2010 studies. This update reflects the CEC staff’s May, 2011 retail sales load forecast for the state of California. In addition, CTPG also updated the renewable resources that count towards California’s 33% RPS requirement and that are either (i) on-line as of December 1, 2010, or (ii) expected to be in-service by December 31, 2011.

³ A general least regrets approach, used both in the CTPG process and in the ISO’s recently approved RTPP design, is intended to balance the objective of developing sufficient transmission to meet the 33 percent renewable energy target with the potentially competing objective of minimizing the exposure of transmission ratepayers to potential stranded investment due to under-utilized transmission, in the context of significant uncertainty about the timing and location of new renewable resources. The approach entails distinguishing, based on the best available information about new resource development, between needed transmission facilities that present relatively low risk of under-utilization versus ones that should be reconsidered in a later planning cycle when there is greater certainty about the resources that will use the facilities. In the ISO’s RTPP, these two types of facilities are referred to as Category 1 and Category 2 policy-driven transmission elements, respectively.

⁴ http://www.ctpg.us/images/stories/ctpg-plan-development/2012/2012-03-05_2011finalstatewidetransmissionplan.pdf

The 2011 CTPG Plan⁵ identifies in section 1.1 of the report areas of high potential and medium potential for transmission reinforcement to alleviate potential constraints. The report notes that CTPG is not a transmission or generation project decision-making body. Decisions relating to the addition of new transmission, generation or other actions for mitigating identified reliability standard violations will be made by project sponsors, by applicable BAs, and by regulatory entities with jurisdiction over those decisions.

The conceptual plan for the ISO BAA is based on the numerous studies and analyses conducted by the ISO, as well as inputs it has received from stakeholders. The majority of the present ISO plan consists of several transmission upgrades in the ISO BAA that are under development to access renewable generation in CREZs where substantial amounts of commercial development are already underway. The ISO conceptual statewide plan also includes some upgrades in the LADWP BAA intended to access renewable generation in the Tehachapi area. There are also several transmission upgrades in the IID BAA intended to access renewable generation in the Imperial County area. All of these projects plus several potential solutions to address three identified constrained areas within the ISO BAA constitute the ISO Conceptual Statewide Plan for the 2011/2012 planning cycle. Table 1 provides a comprehensive listing of the projects and needs that comprise this plan.

⁵ http://www.ctpg.us/images/stories/ctpg-plan-development/2012/2012-03-05_2011finalstatewidetransmissionplan.pdf

Table 1 – Projects Comprising the ISO 2011/12 Conceptual Statewide Plan

Balancing Authority	Area	Transmission
ISO	S. Nevada-East of Lugo area	Build Jasper 230 kV station. Build Coolwater – Jasper - Lugo 230 kV line.
ISO	S. Nevada-East of Lugo area	Build Primm 230 kV station. Rebuild existing 115kV Coolwater-Dunn Siding-Baker-Mountain Pass-Eldorado line to 230kV between Mountain Pass and El Dorado creating new 230kV Ivanpah-Primm No. 1 line and new 230kV Primm-El Dorado No. 1 line [EITP (Eldorado - Ivanpah 115 to 230 kV conversion)]
ISO	S. Nevada-East of Lugo area	Eldorado - Lugo 500 kV line loop-in to the new Pisgah 500 kV substation and Pisgah - Lugo 230 kV to 500 kV conversion
ISO	East of Palm Springs area	New Colorado River and RedBluff 500 kV substation, PVD 1 loop-in to Colorado River and RedBluff, and second Colorado River- RedBluff - Devers -Valley 500 kV line
ISO	East of Palm Springs area	West of Devers 230 kV reconductoring
ISO	Tehachapi area	Tehachapi Renewable Transmission Project
ISO	Tehachapi area	Add 500/230 kV transformer #2 and #3 at Whirlwind substation
ISO	Carrizo area	Build two new substations and loop Morro Bay - Midway #1 and #2 230 kV lines into them. Reconductor from Second station to Midway both circuits.
ISO	Bay Area	South of Contra Costa reconductoring
ISO	Path 15 area	Borden - Gregg 230 kV line reconductoring
ISO	Imperial County	Upgrades west of Mirage substation to increase transfer capacity on Path 42
ISO	Imperial County	Upgrades west of the Miguel 500 kV substation
ISO	San Joaquin Valley Area	Upgrades to increase utilization of Helms pump storage facilities for integrating renewable energy resources
ISO	Imperial Valley Area	Imperial #3 transformer
ISO	Humboldt Area	Humboldt 60 kV upgrades
LADWP	Tehachapi area	Barren Ridge-Haskell 230kV Lines and Barren Ridge-Rinaldi 230kV Line (upgrade)
LADWP	Tehachapi area	230 kV conversion of existing 115 kV line between Haskell Canyon and Sylmar substations and relocate transformers from Olive to Haskell Canyon.

Balancing Authority	Area	Transmission
IID	Imperial County	Upgrades east of Mirage substation to increase transfer capacity on Path 42
IID	Imperial County	Midway to Bannister Transmission Project
IID	Imperial County	Dixieland-Imperial Valley Substation Transmission Project
IID	Imperial County	Highline Substation to El Centro Switching Station (ECSS) Transmission Project
IID	Imperial County	Imperial Valley Substation (IV Sub) to El Centro Switching Station (ECSS) Transmission Project.

The projects listed in Table 1 provide a foundation plan for achieving a 33% RPS and can accommodate a wide range of different resource portfolios that vary with regard to the amounts of distributed generation, out-of-state renewable energy, and large-scale in-state renewable resources. Given this and the fact that there remains substantial uncertainty over renewable energy resource development throughout the state and broader western region, the ISO believes the projects and needs identified in Table 1 for the ISO BAA represent an adequate conceptual plan for now. The ISO BAA portion of this conceptual statewide plan, which is based on studies and analyses the ISO has conducted and assumptions the ISO has developed, consists of several major transmission projects that have been previously approved by the ISO and are fully permitted by the CPUC for construction, plus several transmission projects that the ISO’s interconnection studies have shown are needed to serve the interconnection customers for which those studies were done, but are still progressing through the approval process. Approving additional major transmission now would increase the risk of stranded investment. However, to the extent the key assumptions behind this assessment change over the next planning cycle (2012/2013) and beyond, the ISO will reevaluate and modify the plan accordingly.

The next section of this report provides an overview of the ISO BAA and includes more information on the renewable transmission upgrades located in the ISO BAA that are included in this ISO conceptual statewide plan. Background and details on the non-ISO BAAs can be found in the 2011 CTPG Plan.

Details of the ISO Conceptual Statewide Plan

California ISO Balancing Authority Area

The California ISO BAA is the largest BAA in California and serves over 80 percent of the electricity demand in the State. Figure 1 is a diagram of the ISO BAA.

Figure 1 – Diagram of ISO Balancing Authority Area



The ISO BAA portion of this conceptual statewide plan consists of several major transmission projects that have been previously approved by the ISO and are fully permitted by the CPUC for construction, plus several transmission projects that the ISO's interconnection studies have shown are needed to serve the interconnection customers for which those studies were done, but are still progressing through the approval process. These projects are set out in Table 2.

Table 2 – Summary of ISO Transmission Projects

Area	Transmission	Served CREZs	Renewable Deliverability Potential (MW)	ISO approval	CPUC approval	CTPG High potential
S. Nevada-East of Lugo area	Coolwater – Jasper - Lugo 230 kV line (Note 1)	Kramer/San Bernardino-Lucern	600	LGIA	Need to file CPCN	yes
S. Nevada-East of Lugo area	EITP (Eldorado - Ivanpah 115 to 230 kV conversion)	Mountain Pass	1400	LGIA	yes	yes
S. Nevada-East of Lugo area	Eldorado - Lugo 500 kV line loop-in to the new Pisgah 500 kV substation and Pisgah - Lugo 230kV to 500 kV conversion (Note 2)	Pisgah, Mountain Pass	1750	LGIA	Need to file CPCN	yes
East of Palm Springs area	New Colorado River and RedBluff 500 kV substation, PVD 1 loop-in to Colorado River and RedBluff, and second Colorado River-RedBluff - Devers -Valley 500 kV line	Riverside East, Palm Springs	4700	yes	yes	yes
East of Palm Springs area	West of Devers 230 kV reconductoring			Transition Cluster	Pending CPCN	yes
Tehachapi area	Tehachapi Renewable Transmission Project and Whirlwind #2 and #3 500/230 kV transformers	Tehachapi, Fairmont	5500	yes	yes	yes
Carrizo area	Build two new substations and loop Morro Bay - Midway #1 and #2 230 kV lines into them. Reconductor from Second station to Midway both circuits.	Carrizo South, Santa Barbara	900	Transition Cluster	yes	yes
Bay Area	South of Contra Costa reconductoring	Solano	300	Transition Cluster	Need to file CPCN or NOC	yes
Path 15 area	Borden - Gregg 230 kV line reconductoring	Westlands	800	Transition Cluster	Need to file CPCN or NOC	
Imperial County	West of Mirage (Path 42) Upgrades Note 3	Imperial	700	yes	Pending NOC	yes
Imperial County	West of Miguel Upgrades Note 3	Imperial	700	no		
San Joaquin Valley Area	Upgrades to increase Helms pump storage utilization Note 4	N/A	N/A	No		

Notes:

In addition to the projects in Table 2, the ISO has identified other constraints that are expected to limit the delivery of renewable generation.

1. The CPUC has indicated to the ISO that alternatives will need to be considered in the course of the Coolwater-Lugo CPCN application process. The ISO is intending to explore those alternatives in the course of the 2012/2013 planning cycle.
2. The Pisgah-Lugo project is in the CTPG Report and ISO 2011/2012 transmission plan and the generation triggering this upgrade remains in the ISO interconnection process. It is not being included in the 2012/2013 transmission planning base cases.
3. The ISO expects that renewable generation development in the Imperial County area will likely create the need for increasing the transfer capability between the Imperial Irrigation District (IID) and ISO systems in two places: across WECC Path 42, and west of the Miguel 500 kV substation. The upgrades related to WECC Path 42 were approved on May 18, 2011 by the ISO Board of Governors. Although the specific transmission facilities to address these constraints are not described here, the needs for these enhancements are part of this conceptual statewide plan.
4. The ISO has initiated a study of the transmission system in Central California as a part of the 2012/2013 planning cycle. The study is to assess the needs associated to the reliability of the area as well as potential policy or economic drivers of need. Integration of intermittent resources into the ISO BAA operations may potentially drive increased utilization of resources like the existing pumped storage facilities in California. The largest of these is the Helms pumped storage facility located in the Fresno area. However, transmission constraints in the San Joaquin Valley area transmission system limit the availability of the Helms facility primarily due to south to north transmission flow constraints. The possible need for transmission solutions to support Helms pumped storage availability is also part of this conceptual statewide plan.

The ISO has also continued discussions with CTPG members on the transmission paths between northern and southern California (WECC Path 15 and WECC Path 26) which will receive continued focus in future planning studies.

The facilities identified in Table 3, comprise the ISO BAA portion of the conceptual plan set out in Table 2. These facilities, combined with the projects for other BAA's set out in Table 1, have the combined potential to accommodate more than 17,000 MW of new resource capacity and deliver more than 48,000 GWh of renewable energy per year.

Conclusions and Next Steps

The projects that comprise the ISO Conceptual Statewide Plan provide a foundation for achieving a 33% RPS and can accommodate a wide range of different resource portfolios that vary with regard to the amounts of distributed generation, out-of-state renewable energy, and large-scale in-state renewable resources. Given this and the fact there remains substantial uncertainty over renewable energy resource development throughout the state and broader western region, the ISO believes the projects and needs identified in Table 1 for the ISO BAA represent an adequate conceptual plan for now. These projects have either been approved or are currently in some stage of the approval process.

Approving more major transmission now would increase the risk of stranded investment. However, to the extent the key assumptions behind this assessment change over the next planning cycle (2012/2013) and as the CTPG completes future study plans, the ISO will reevaluate and modify the conceptual plan accordingly for future ISO planning cycles.

Following the receipt of comments the ISO will utilize both the conceptual plan and the comments it receives as inputs to its continuing process to complete the 2012/2013 Comprehensive Transmission Plan for the ISO BAA. In determining which projects and additional elements should be included in the ISO comprehensive Transmission Plan, the ISO will not give undue weight or preference to the conceptual statewide plan or any other input in its planning process.