ATTACHMENT A

CALIFORNIA PUBLIC UTILITIES COMMISSION

Energy Division's Staff Paper on
Incorporating Land Use and Environmental Information into the RPS Calculator and Developing and Selecting RPS Calculator Portfolios

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1. Background

The Renewable Portfolio Standard (RPS) Calculator[1] is used by the RPS proceeding to forecast the types, amounts, and locations of renewable energy resources and associated transmission upgrades that are likely to be needed in future years to meet RPS goals. The forecasts generated by the RPS Calculator consist of portfolios of renewable energy resources and associated transmission infrastructure (RPS Calculator portfolios[2]) that serve as inputs for two major state planning processes: the Commission's Long Term Procurement Planning (LTPP) proceeding[3] and the California Independent System Operator's Transmission Planning Process (TPP).[4]

In October 2014, a staff proposal[5] for overhauling the RPS Calculator was entered into the record of Rulemaking (R.) 11-05-005 by way of the Administrative Law Judge's Ruling: (1) Issuing an Energy Division Proposal on the Renewables Portfolio Standards Calculator, (2) Entering the Proposal into the Record, and (3) Setting a Comment and Workshop Schedule (October 10,2015).[6] The staff proposal outlined three tracks for further development of the RPS Calculator: Track 1, Track 2a, and Track 2b.

Track 1 was intended to produce RPS Calculator portfolios for the purpose enabling the California Independent System Operator (CAISO) to perform a special study on >33% RPS scenarios as part of the 2015-2016 TPP. Track 2a was intended to develop portfolios for use in the 2016 LTPP and policy-preferred portfolios for the 2016-2017 CAISO TPP. Track 2b was intended to consider in greater detail several additional issues, including how best to incorporate environmental information into the RPS Calculator.

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[1] http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/RPS+Calculator+Home.htm

[2] **RPS Calculator Portfolio**: a set of renewable energy projects and associated transmission infrastructure that are forecast to be developed to achieve RPS goals by modeling a particular scenario in the RPS Calculator.

[3] http://www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/ (currently, 2014 TPP; R.13-12-010)

[4] https://www.caiso.com/planning/Pages/TransmissionPlanning/Default.aspx (currently 2015-2016 TPP)

[5] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M119/K145/119145136.PDF

[6] This proceeding is the successor proceeding to R.11-05-005. The record of R.11-05-005 was transferred to this proceeding by Ordering Paragraph 17 of R.15-02-020.

Plans for the Track 1 special study, which will facilitate the modeling of projects with energy only, rather than just full capacity deliverability status, were detailed as part of a public workshop on the RPS Calculator Version 6.0 held by the CPUC on February 10-11, 2015;[7] in the Draft 2015-2016 RPS Calculator Work Plan attached to the Administrative Law Judge's Ruling Seeking Post-Workshop Comments filed in R.15-02-020;[8] in CAISO's Transmission Study Plan;[9] and in a public teleconference held on June 29, 2015.[10] Results from the Track 1 special study are expected from CAISO in December 2015.

The first phase of Track 2a was to develop the functionality and data needed to enable the RPS Calculator to produce portfolios for LTPP and TPP. Informed by comments received in response to the post-workshop ruling, Energy Division staff modified the RPS Calculator. The modifications, as documented in the Draft 2015-2016 RPS Calculator Work Plan, were incorporated into RPS Calculator Version 6.1. RPS Calculator Version 6.1, [11] and a summary of the modifications made,[12] were published on the Commission's website on August 3, 2015. Energy Division staff plan to hold a public webinar to discuss the changes included in Version 6.1.

The second phase of Track 2a is to use the RPS Calculator to produce portfolios for 2016 LTPP and the 2016-2017 TPP. There are several outstanding issues to be resolved in the second phase of Track 2a, including: 1) how to select appropriate scenarios to model; 2) how to publicly vet and/ or modify portfolios to ensure they reflect the best available information and are suitable for "least regrets" generation and transmission planning; and 3) how to align both the substance and timing of RPS Calculator modeling inputs, assumptions and portfolios with LTPP and TPP schedules.

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[7] http://www.cpuc.ca.gov/NR/rdonlyres/02DC4541-8096-4655-B034-529D999F365F/0/RPSCalcWkshp_0303_EnergyOnly_CAISO.PPTX

[8] http://www.cpuc.ca.gov/NR/rdonlyres/C274A044-CE5A-4A09-A47F-1FDE7F6111BB/0/RPSCalcDraftWkPlan2015.pdf

[9] http://www.caiso.com/Documents/2015-2016FinalStudyPlan.pdf

[10] See materials under "50% RPS Energy Only Special Study Teleconference (6/29/2015)" at http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/RPS+Calculator+Home.htm

[11] http://www.cpuc.ca.gov/NR/rdonlyres/366CC464-6251-45CA-A8AE-1A164781C102/0/CPUC_RPSCalculator_v61.xlsm

[12] http://www.cpuc.ca.gov/NR/rdonlyres/CA26FDFE-2CE0-462D-A21F-1A301DF962DE/0/CPUC_RPSCalc_ReleaseNotes_v61_7292015.pptx

There are two primary issues to be resolved in Track 2b: 1) how best to represent land use information in the RPS Calculator and whether; and 2) how to align generation and transmission planning with renewable procurement. This paper's scope encompasses issues 1-3 of Track 2a and issue 1 of Track 2b. Issue 2 of Track 2b, the alignment of planning and procurement, is not addressed here and will be visited at a later date.

2. Purpose of Staff Paper

The purpose of this paper is not to recommend any specific outcomes. Rather, this paper serves to introduce and define the scope of several significant unresolved issues associated with Tracks 2a and 2b, and to solicit proposals from parties on how to address them. Specifically, the purpose of this paper is to:

1) Propose a set of guiding principles for developing Calculator portfolios;
2) Provide a rationale for representing land use and environmental information in the RPS Calculator;
3) Outline a range of options for representing land use and environmental information in the RPS Calculator;
4) Solicit proposals for methodologies that represent land use and environmental information in the RPS Calculator that are consistent with the guiding principles (see section 3);
5) Identify critical challenges associated with aligning the timing of inputs and assumptions of the RPS Calculator with LTPP and TPP;
6) Solicit proposals for aligning the RPS Calculator with LTPP and TPP that are consistent with the guiding principles.

Staff intends to hold a public workshop in the last quarter of 2015 to further explore the potential scope of data sources, methodologies, and processes reflecting land use considerations in RPS Calculator portfolios and for developing and selecting RPS Calculator portfolios to be used in LTPP and TPP. As noted above, staff requests two types of proposals from parties to inform the workshop: proposals for environmental methodologies and proposals for aligning RPS Calculator with LTPP and TPP.

Parties may propose either interim solutions that can be used to produce RPS Calculator portfolios for the upcoming 2016 LTPP and 2016-2017 TPP planning cycles, or permanent solutions to be used in future planning cycles (or both). Staff will prioritize the consideration of interim solutions during the final quarter of 2015. Staff plan to host another public workshop and solicit additional party feedback on final methodologies in early 2016 in time to inform the following year's transmission and generation planning activities.

There are many possible methodologies for incorporating environmental information into RPS Calculator portfolios. Any methodology may be proposed as a permanent solution, but due to time and resource constraints, only one type of approach is feasible for staff to consider as an interim solution. The interim solutions that staff will prioritize review in 2015 are geospatial datasets that can be used to limit the supply curve of generic renewable resources used by the RPS Calculator to meet a future RPS target.

Two types of datasets may be submitted for staff review for possible use as an interim solution: datasets that reflect land 1) where renewable energy development is prohibited; or 2) where existing restrictions are intended to limit renewable energy development.[13] Parties may also submit additional datasets reflecting land that does not meet one of those two definitions for use in a final methodology. In order to facilitate an efficient and orderly review process, a detailed protocol for submitting both interim and final environmental methodology proposals is presented in Appendix D.

In summary, staff requests the following types of proposals:

1A. Environmental Methodology (interim)
1B. Environmental Methodology (final)
2A. Portfolio Development and Selection Process (interim)
2B. Portfolio Development and Selection Process (final)

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[13] These criteria correspond to those used for the Renewable Energy Transmission Initiative (RETI) Category 1 and Category 2 land (see the Final RETI Phase 1B report, beginning on page 333 at: http://www.energy.ca.gov/2008publications/RETI-1000-2008-003/RETI-1000-2008-003-F.PDF)

The questions posed throughout sections 6 and 7 of this paper are intended both to guide the parties' development of proposals for submission and to inform Staff's review of submitted proposals. In any comments submitted in response to this paper, parties should clearly identify which type of proposal is being addressed.

3. Guiding Principles for Developing RPS Calculator Portfolios

In order to produce RPS Calculator portfolios that provide a sound basis for the planning activities that take place in LTPP and the TPP, Staff proposes the following guiding principles:

1) RPS Calculator portfolios should provide, at a minimum, the type and granularity of information needed by LTPP and TPP;

2) RPS Calculator portfolios should be plausible from economic, transmission, and land-use perspectives;

3) RPS Calculator portfolios should be consistent with efficient generation and transmission siting processes;

4) RPS Calculator portfolios should not prejudge transmission or generation permitting;

5) RPS Calculator portfolios should reflect multiple distinct and plausible futures that could result from different policy choices and market conditions;

6) RPS Calculator portfolios should be designed to facilitate the achievement of RPS goals at the least possible cost;

7) RPS Calculator portfolios should be developed on a regular schedule that permits both stakeholder review and timely transmittal to LTPP and TPP; and

8) RPS Calculator portfolios should be produced through a process that is as transparent and efficient as possible.

4. Rationale for Including Land Use and Environmental Information in RPS Calculator

The present section (4) presents four reasons why land use and environmental information should be included in future versions of the RPS Calculator. The next section (5) underscores the importance of including land use and environmental information in the RPS Calculator by describing modeling results that highlight the interactive effects of land use, portfolio composition, and the cost of achieving RPS goals.

a. Land Use and Environmental Information Restores the Generation and Transmission Planning Value of Super CREZs in RPS Calculator

In California, a Competitive Renewable Energy Zone (CREZ) usually refers to a planning area associated with the Renewable Energy Transmission Initiative (RETI) that was active from 2008-2010. Due to this historical association, the CREZ implies a relatively small and contiguous area of land with significant renewable energy development potential that has already been vetted for transmission and environmental suitability through a stakeholder process. Previous versions of the RPS Calculator (1-5) selected potential renewable energy resources from within the relatively small CREZ boundaries defined by RETI.

Over the next fifteen years, a significant increase in the demand for renewable energy is expected to be driven by the state's greenhouse gas reduction goals and potentially a correspondingly higher target for renewable energy (e.g., 50% by 2030). At the same time, the potential supply of renewable energy, particularly solar photovoltaic (PV) generation, has been vastly expanded in the past five years because of major cost reductions and technological improvements. Continuing to use the smaller RETI CREZ boundaries in the RPS Calculator could foreclose the possibility of considering resources with the best potential to help the state meet its RPS goals at the least possible cost. As a result, the draft RPS Calculator 6.0 introduced a new type of planning area called the "Super CREZ."

Super CREZ boundaries were designed to include all land inside and outside California with renewable energy resources that could be reasonably expected to serve loads economically within the balancing authority area of the California Independent

System Operator (CAISO). The Super CREZs were purposely designed to encompass a much greater land area than was captured by the RETI CREZ boundaries.

Unlike RETI CREZs, however, the Super CREZs in RPS Calculator 6.0 and 6.1 have not yet been vetted for land use suitability through a stakeholder process (although some land on which development is illegal or physically impractical is excluded – see section on "screening" below for details). Parties have called on the Commission to restore the historic meaning and land use planning value of the CREZ concept developed in the RETI process to the larger Super CREZs used when updating the RPS Calculator.

b. RPS Calculator Overhaul Provides Opportunity to Leverage New Land Use and Environmental Data and Data Tools

While land use and environmental considerations have always informed RPS Calculator portfolios, different methodologies have been used at different times. For the portfolios transmitted for use in the 2011 TPP, projects were assigned environmental scores based on a combination of the CREZ in which they were located and the renewable generation technology type. The project scores incorporated CREZ-wide scores based on a modified version of RETI environmental criteria.[14] For the 2012 TPP, the modified RETI approach was updated with a methodology that leveraged then-current data available from the Desert Renewable Energy Conservation Plan[15] to determine individual project scores.[16] For the 2013, 2014, and 2015 TPP cycles, land use information was not explicitly represented in the RPS Calculator portfolios transmitted

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[14] For a detailed description of the environmental methodology used for the 2011 TPP, see Administrative Law Judge's Ruling Modifying System Track 1 Schedule and Setting Pre-Hearing Conference, Attachment 2 ("Standardized Planning Assumptions (Part 2 – Renewables)"), filed February 10, 2011 in R.10-05-006.

[15] http://www.drecp.org/

[16] For a description of the environmental methodology used for the 2012 TPP, see Energy Division staff paper, "33% RPS Calculator Description of Updates", dated 3/23/2012, available at http://www.cpuc.ca.gov/NR/rdonlyres/6E7C875F-3BF2-4A07-9D4C-A7A3FE3BB0A2/0/DescriptionofCalculatorUpdates20120323_corrected.docx

to TPP. Instead, a "high DG, high DSM" option was used to reflect an environmentally preferred scenario.[17]

The current overhaul of the RPS Calculator provides an opportunity to establish a transparent and consistent approach for future portfolio development that leverages the most recent available data and data tools from land-use planning activities. For example, DataBasin[18] is a web-based geographic information system (GIS) data sharing platform maintained by the Conservation Biology Institute and used extensively by the California Energy Commission (CEC) in the development of DRECP. DataBasin could be used as means to transparently share, vet, and develop data that, in turn, would inform RPS Calculator portfolio development. Another notable tool is the DataViewer[19] produced by the Environmental Data Task Force (EDTF)[20] of the Western Electricity Coordinating Council (WECC).[21] DataViewer includes information on land outside of California, which could be useful for representing the land-use implications of out-of-state renewable resources.

c. Land Use and Environmental Information Improves the Plausibility of Portfolios and Facilitates Review of Applications for Certificates of Convenience and Public Necessity

As stated in the guiding principles, the RPS Calculator should not prejudge transmission or generation permitting. However, to the extent that the RPS Calculator could reflect a consensus of permitting agencies and stakeholders toward the relative risks associated with objectively-defined criteria, it could increase the plausibility of the forecasted portfolios from a generation and transmission permitting perspective. For example, the RPS Calculator portfolios transmitted to TPP may be used to justify a policy-preferred transmission upgrade project. When a utility later files an application for a Certificate of Convenience and Public Necessity (CPCN) with the Commission to initiate the permitting process, any land use related information used in the portfolio

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[17] **Scenario**: a specific possible version of the future and/or the combination of inputs and assumptions designed to allow a model to represent that possible version of the future.

[18] http://databasin.org/

[19] see https://www.wecc.biz/Reliability/EDTF-Fact-Sheet.docx for link

[20] https://www.wecc.biz/Reliability/EDTF-Fact-Sheet.docx

[21] https://www.wecc.biz

development process may facilitate review. Conversely, ignoring constraints to project development that are well-recognized by a broad range of permitting agencies and stakeholders creates implausible portfolios that do not facilitate planning and permitting.

d. Considering Land Use and Environmental Implications of Renewable Energy Development in Isolation May Have Adverse Consequences

Evaluating the land use and environmental implications of meeting the state's RPS goals is difficult without also considering the portfolio-specific economic value of potential renewable resources and the cost of possible transmission upgrades. The value to the state of developing renewable energy resources in a particular area is influenced by many factors, including the economic value of the resource potential, the cost of any transmission upgrade needed to deliver energy from that area, and the value of alternative uses of the land, including conservation uses. Economic resource values of variable resources like wind and solar PV are inherently dependent on the how electricity system on a whole is utilized. For example, the more solar PV is added to the electrical grid, the lower the incremental benefit of adding new PV to the system becomes. The value of a specific transmission upgrade, in turn, is similarly dependent on the available capacity in that area and the value of the resources the upgrade will make available to serve load.

In contrast, evaluating land use in isolation from portfolio-specific resource potential and transmission costs could lead to adverse consequences for generation and transmission planning processes. For example, considering land use issues in isolation could lead to overemphasis on areas that are unlikely to offer economically competitive resources. Another possible adverse consequence is that policies formulated on the basis of land use considerations alone could have unintended effects on the pattern of renewable energy development statewide. For example, a policy that restricts wind development in one area of the state could end up forcing the state to invest in additional storage solutions to accommodate higher penetrations of solar PV than would otherwise be needed, imposing an additional cost on ratepayers.

5. Scenarios Illustrating the Potential Significance of Land Use Policies on RPS Calculator Portfolio Composition and Costs

The previous section (4) provided a rationale for including land use and environmental information in the RPS Calculator. This section further underscores the importance of including land use and environmental information in the RPS Calculator by highlighting the interactive effects of land use, portfolio composition, and the cost of achieving RPS goals.

To illustrate the potential significance that different land use information and other policy considerations could have on RPS Calculator portfolio composition and revenue requirements, Energy Division staff modeled several different scenarios in the RPS Calculator. Each modeled scenario was compared to a reference scenario to evaluate its impacts on renewable energy resource development and costs. In all cases, the reference scenario includes the technology-specific land exclusions listed in Table 1, the RETI Category 1 exclusions[22] listed in Table 2, and models the achievement of a 50% RPS target in the year 2030. All modeled scenarios are listed in Table 3. Figure 1 shows how modeled scenarios were compared to reference scenarios to calculate impacts. Additional information regarding the modeling approach and results, including maps showing the geographic distribution of selected resources, can be found in Appendix A. Detailed scenario results are presented in Appendix B.

For most scenarios, two different versions of the scenario and reference case were prepared – one in which load-serving entities within CAISO's balancing authority have unlimited access to out-of-state (OOS) resources throughout the Western Electricity Coordinating Council (WECC) region, and one in which they have no access OOS resources. The assumption of no access to out-of-state resources is not consistent with current practice or policy and was made to simplify the modeling of two contrasting futures - one in which technical and economic barriers significantly restrict access to new OOS resources, and one in which ample OOS resources are readily available to serve CAISO loads.

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[22] For more information on how RETI categories were developed and vetted, see: http://www.energy.ca.gov/reti/steering/workgroups/environmental/

In all scenarios except the High DG scenario, project selection is based on the economic value of the competing resources. In the High DG scenario, wholesale distributed generation solar PV is forced into the portfolio even though its economic value is not competitive with other potential resources, such as central station solar PV.

It should also be noted that all results presented are based on an assumption that sufficient transmission is built to enable all resources to achieve full capacity deliverability status (FCDS).[23] Although RPS Calculator 6.1 does include the ability to model energy only projects, the assumptions used are still undergoing evaluation in the special study being performed in CAISO's 2015-2016 TPP to inform Track 1 of the RPS Calculator overhaul process. Because the rules that inform the modeling of energy only procurement have not yet been validated, FCDS was assumed for this staff paper. As a point of comparison, results assuming energy only procurement are presented in Appendix C.

The primary conclusions that can be drawn from the portfolios produced for these scenarios are summarized below. The scenario numbers that support each conclusion are shown parenthetically and refer to the scenario numbers in Table 3. In answering the questions posed in this paper below and developing proposals for how to incorporate land use and environmental information into the RPS Calculator, please consider and comment on how your proposal is informed by these results.

- Applying in-state land use restrictions:
  - Limits development of the highest-quality in-state wind resources. (2,3)
  - Develops more central station solar PV. (2,3)
- Limiting access to OOS wind resources:
  - Develops lower quality wind in an areas never previously studied. (e.g., Sacramento Valley). (1,2,3)
  - Raises costs associated with in-state land use restrictions. (2,3)
- The great majority of the state's salt-affected, idle farmland, by area, has economically competitive solar PV resources. (4)

[23] **Full capacity deliverability status** means a project has access to sufficient transmission capacity to deliver 100% of its nameplate capacity throughout the year. **Energy only** means a project may not be able to deliver its full nameplate capacity at certain times of the year due to transmission constraints. Historically, renewable energy projects serving CAISO load have tended to achieve FCDS.

- In the high DG scenario, distributed solar PV displaces substantial quantities of central station solar PV generation at a higher cost. (5)
- Energy only procurement: (preliminary results –see Appendix C)[24]
    - Reduces overall cost in reference cases.
    - Does not consistently dampen or exacerbate the impacts of land-use restrictions on resource mix or costs.

The conclusions above may be affected by other greenhouse gas mitigation strategies that could alter the load shape and potentially the portfolio composition in future years. These impacts will be further explored in Track 2B of the RPS Calculator overhaul.

[24] Energy only results are preliminary; energy only capacity limits are being evaluated by CAISO in a special study for the 2015-2016 TPP, and will inform Track 1 of the RPS Calculator overhaul.

Table 1. Technology-Specific Land Exclusions

<table>
<tr><th>Wind</th><th>Solar</th></tr>
<tr><td colspan="2">• Military Land
• Native American Land
• Mines
• Water
• Airports</td></tr>
<tr><td>• Military Flight Paths
• Slope >20%</td><td>• Slope >5%
• Farmland Security Zone</td></tr>
</table>

Table 2. Land Excluded under RETI Category 1 and RETI Category 2

RETI Category 1 Land Exclusions	RETI Category 2 Land Exclusions

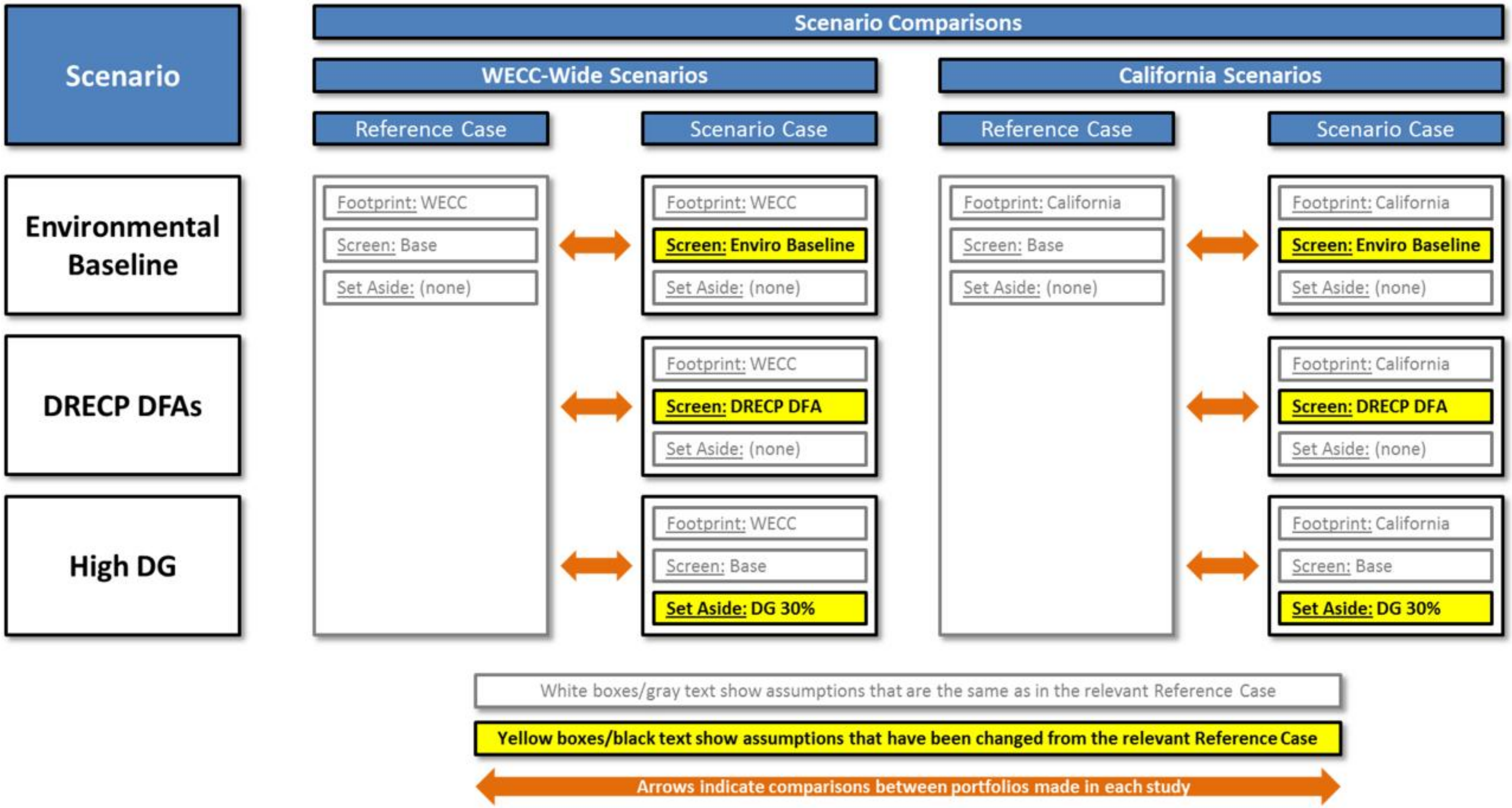
• Designated Federal Wilderness Areas
• Wilderness Study Areas
• National Wildlife Refuges
• Units of National Park System
• Inventoried Roadless Areas on USFS national forests
• National Historic and National Scenic Trails
• National Wild, Scenic and Recreational Rivers
• BLM King Range Conservation Area, Black Rock-High Rock National Conservation Area, and Headwaters Forest Reserve
• BLM National Recreation Areas
    • BLM National Monuments
    • Lands precluded by development under Habitat Conservation Plans and Natural Community Conservation Plans
• Lands specified as of May 1, 2008 in Proposed Wilderness Bills (S. 493, H.R. 3682)
• Existing Conservation Mitigation banks under conservation easement approved by the state Department of Fish and Game, U.S. Fish and Wildlife Service or Army Corps of Engineers
• CA state defined wetlands
• CA State Wilderness Areas
• CA State Parks
• DFG Wildlife Areas and Ecological Reserves
• Private preserves of The Wildlands Conservancy
	• BLM Areas of Critical Environmental Concern
	• USFWS designated Critical Habitat for federally listed endangered and threatened species
	• Special wildlife management areas identified in BLM's West Mojave Resource Management Plan. I.e., Desert Wildlife Management Areas and Mojave Ground Squirrel Conservation Areas
	• Lands purchased by private funds and donated to BLM, specifically the California Desert Acquisition Project by The Wildlands Conservancy
	• Proposed and Potential Conservation Reserves in HCPs and NCCPs

Table 3. Scenarios modeled in RPS Calculator 6.1*

#	Scenario Name	Land Use Screens		OOS Resource Assumption(s)		What Impacts Demonstrate
		Scenario	**Reference**	**Scenario**	**Reference**	
1	Base/Reference	N/A	Tech-specific RETI Cat. 1	N/A	Unlimited	N/A
2	Environmental Baseline	Tech-specific RETI Cat. 1 RETI Cat. 2	Tech-specific RETI Cat. 1	Unlimited	Unlimited	Effect of RETI Category 2 screen
				None	None	
3	DRECP DFA Only	Tech-specific RETI Cat. 1 RETI Cat. 2 non-DFA	Tech-specific RETI Cat. 1	Unlimited	Unlimited	Effect of DRECP DFA screen + RETI Category 2 screen
				None	None	
4	Salt-Affected Farmland	• N/A	• Tech-specific • RETI Cat. 1	N/A	None	Potential of marginal land to meet RPS target
5	High DG	• Tech-specific • RETI Cat. 1	• Tech-specific • RETI Cat. 1	Unlimited	Unlimited	Effect of high penetration of DG
				None	None	

*Both full capacity deliverability status and energy only versions of these scenarios were modeled. The energy-only results are presented in Appendix C.

Figure 1. Schematic diagram of how cases were compared to calculate the impact of each scenario.*



*Both full capacity deliverability status and energy only versions of these scenarios were modeled. The energy-only results are presented in Appendix C.

a. Reference Cases

The impacts for each of the scenarios studied for this paper are presented as the differences between the scenario and reference case in the total amount of generic solar PV, wind, and geothermal resources selected for a 50% in 2030 RPS portfolio and the associated total revenue requirement. In order to facilitate an understanding of those relative impacts in context, the total values associated with the reference cases are shown in Table 4. In general, scenarios that assume unlimited access to OOS resources involve portfolios with a greater proportion of wind development and a lower total cost.

Table 4. Total procurement of generic renewable energy resources in reference cases used to measure scenario impacts (Year 2030 data for 50% RPS in 2030 policy).

	Reference Case Totals	
Category	**Unlimited Access to Out-of-State Resources***	**No Access to Out-of-State Resources****
Solar PV (MW)	6,380	10,316
Wind (MW)	8,738	6,094
Geothermal (MW)	0	374
Yearly Cost, 2030 ($MM)	$43,134	$43,317

*assumes unlimited access to OOS renewable resources
**assumes no access to OOS renewable resources

b. Environmental Baseline Scenario

As stated previously, all scenarios and reference cases exclude land based on the the RETI Category 1 criteria listed in Table 1 and the technology-specific criteria listed in Table 2. The Environmental Baseline scenario was designed to show the impact of also excluding RETI Category 2 land. Table 5 shows the impact of the Environmental Baseline Scenario on the distribution of resources selected by the RPS Calculator to reach a hypothetical 50% RPS target in 2030. Excluding RETI Category 2 land reduces the amount of wind generation, increases the amount of solar PV generation, and increases costs relative to the 50% RPS reference case.

Notably, the impacts of a RETI Category 2 screen are strongly influenced by the availability of renewable resources outside California. When there is unlimited access to OOS resources, the impacts of excluding RETI Category 2 land on both the mix of solar PV and wind generation and total costs are substantially smaller. When out-of-state resources are restricted, the RPS is forced to accommodate environmental land use restrictions by selecting higher cost resources within California.

Table 5. Impacts on renewable energy procurement of excluding RETI Category 2 land (Year 2030 data for 50% RPS in 2030 policy).

	Impacts (Scenario-Reference)	
Category	**Unlimited Access to Out-of-State Resources***	**No Access to Out-of-State Resources****
Change in Solar PV (MW)	+347	+1,462
Change in Wind (MW)	-1,271	-2,609
Change in Geothermal (MW)	0	+513
Change in Yearly Cost, 2030 ($MM)	+$1 (0%)	+$195 (0.5%)

*scenario and reference both assume unlimited access to OOS renewable resources
**scenario and reference both assume no access to OOS renewable resources

c. DRECP DFA Only Scenario

Table 6 shows the impact of one possible alternative screen that excludes land that is within the DRECP but not within a Development Focus Area (DFA) as well as land in RETI Category 1, RETI Category 2, or the technology-specific land shown in Table 1. The impact of excluding DRECP land outside of DFAs in addition to excluding RETI Category 2 land is similar to the impact of excluding just the RETI Category 2 land in the Environmental Baseline scenario. Fewer wind resources are procured in comparison to the reference case and costs are higher.

These results are driven by the fact that the highest quality wind resources appear to be in RETI Category 2 or non-DFA areas in DRECP. When the highest quality California wind resources are excluded by land-use criteria, the RPS Calculator selects either OOS wind, at a relatively modest cost (if access to OOS resources is not limited), or additional in-state solar PV resources at a higher cost (if no access to OOS resources).

Like the Environmental Baseline scenario, the impacts of the DRECP DFA Only scenario are much lower under an assumption of unlimited access to OOS resources.

Table 6. Impacts on renewable energy procurement of excluding non-DFA land in DRECP and RETI Category 2 land (Year 2030 data for 50% RPS in 2030 policy).

	Impacts (Scenario-Reference)	
Category	**Unlimited Access to Out-of-State Resources***	**No Access to Out-of-State Resources****
Change in Solar PV (MW)	+726	+3,997
Change in Wind (MW)	-1,572	-3,366
Change in Geothermal (MW)	0	+181
Change in Yearly Cost, 2030 ($MM)	+$29 (0.1%)	+$365 (0.8%)

*scenario and reference both assume unlimited access to OOS renewable resources
**scenario and reference both assume no access to OOS renewable resources

d. Salt-Affected Farmland Scenario

The Salt-Affected Farmland scenario examines the impact of a hypothetical policy that encourages renewable energy development on salt-affected farmland that has been idle for at least six years. This scenario was not modeled explicitly within the RPS Calculator using a new land use screen. Instead, a reference portfolio that assumed no access to OOS resources was compared to the solar PV resource potential on idle, salt-affected land.

As shown in Table 7, the analysis revealed that 11 Super CREZs contain idle, salt affected land with developable solar PV resources. Of these, the RPS Calculator selects two Super CREZs for development in the reference scenario (Solano and Westlands), meaning the solar PV resources in those two Super CREZs are economically competitive with other available renewable resources for meeting RPS goals. Although there is salt-affected, idle farmland with solar PV resources in the other nine Super CREZs, this land was not selected economically. In the reference scenario, all of the salt-affected, idle land in the Solano and Westlands Super CREZs could theoretically provide economically competitive energy through solar PV generation.

The results indicate that much of the salt-affected, idle farmland in California is located in areas with economically competitive solar PV resources. Relaxing the criteria to include land that have only been idle for four years (rather than six) may further increase the extent to which salt-affected, idle farmland can help the state achieve its renewable energy goals.

Table 7. Solar PV resource potential of salt-affected, idle farmland and the amount of economic solar PV by Super CREZ (Year 2030 data for 50% RPS in 2030 policy).

Super CREZ	Salt-Affected Farmland Solar PV Resource Potential (MW)	Economically Selected Solar PV in WECC-wide Reference Case (MW)	Fraction of Salt-Affected Solar PV Potential That is Economic (%)
Carrizo North	0.1	0	0%
Imperial North	1.2	0	0%
Imperial South	4.6	0	0%
Los Banos	0.5	0	0%
Palm Springs	0.2	0	0%
Riverside East	192.4	0	0%
Sacramento River Valley	68.5	0	0%
San Benito County	3.1	0	0%
Santa Clara County	0.2	0	0%
Solano	21.4	932	100%
Westlands	1,389.6	1,751	100%
Total	**1,682**	**2,683**	**84%***

*calculated as (21.4*100% + 1,389.6*100%)/1,682

e. High DG Scenario

One of the potential land use and environmental benefits of distributed generation (DG) solar PV over central station solar PV is that DG PV requires less land. Since DG PV is typically installed on existing rooftops or above parking lots, new land is not needed for siting DG generation. Moreover, because DG serves load located within the local distribution system[25], new land is not needed for transmission infrastructure. The High DG scenario examines the impact of hypothetical polices and

[25] The Energy Division's RPS program defines distributed generation as generation of any capacity that is connected to the distribution system with no backflow to the transmission system.

market activity that result in a high penetration of wholesale DG PV in California at the expense of central station PV.

The High DG Scenario was developed using a new dataset created by Energy Division and included in RPS Calculator version 6.1.[26] The new dataset uses satellite imagery analysis and distribution infrastructure data to represent over 47,000 MW of solar PV resource potential associated with rooftops and parking lots in major urban areas. Since solar PV DG resources tend to have higher net costs than solar PV central resources, the High DG Scenario was created by forcing DG resources into the portfolio, bypassing the economic algorithm normally used for project selection. The DG penetration level was set at 30% of available substation peak capacity in major urban areas.

The impacts of the High DG scenario are shown in Table 8. The High DG scenario results in a large increase in the quantity of solar PV and an increase in costs relative to the reference cases. The high DG scenario forces DG into the portfolio, displacing 7.5 GW of central PV that would have otherwise provided a higher net value to ratepayers.

[26] See Release Notes and User Manual for Version 6.1 of the RPS Calculator for more information on the development of the DG PV potential dataset: http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/RPS+Calculator+Home.htm

Table 8. Impacts on renewable energy procurement of a high penetration of distributed solar PV (Year 2030 data for 50% RPS in 2030 policy).

	Impacts (Scenario-Reference)	
Category	**Unlimited Access to Out-of-State Resources***	**No Access to Out-of-State Resources****
Change in Solar PV (MW)	+4,288	+3,745
Change in Wind (MW)	-1,791	+328
Change in Geothermal (MW)	0	-374
Change in Yearly Cost, 2030 ($MM)	+$274 (0.6 %)	+$283 (0.7 %)

*scenario and reference both assume unlimited access to OOS renewable resources
**scenario and reference both assume no access to OOS renewable resources

6. Options for Representing Land Use and Environmental Information in the RPS Calculator

Section 4 of this paper provided a rationale for incorporating land use and environmental information in the RPS Calculator. Section 5 further underscored the importance of doing so by presenting modeling results that demonstrate how land use, portfolio composition, and the cost of achieving RPS goals interact with each other. This section (6) outlines a variety of options for representing land use and environmental information in the RPS Calculator portfolios used in LTPP and TPP for procurement and transmission planning.

Following the description of each option are questions designed to elicit guidance from parties on whether and how the option should be exercised. Staff will consider the responses to these questions when reviewing and evaluating environmental methodology proposals submitted by parties. The questions posed encompass issues that should be addressed by parties' interim environmental methodology proposals (1A) intended for use in 2015 as well as issues that need not be resolved until a final approach (1B) is instituted in 2016. Please clearly distinguish whether your answer applies to interim, final, or both types of environmental methodologies.

As stated previously, interim methodologies are intended for use in 2015 to develop RPS Calculator portfolios for use in the 2016 LTPP and 2016-2017 TPP cycles. Due to time and resource constraints, the only interim methodologies that Energy Staff will consider involve using geospatial datasets to limit the resource potential that the RPS Calculator considers for future renewable energy development. Final methodologies may include more complex approaches. In order to facilitate an efficient and orderly review of submitted methodologies, a detailed protocol for submitting proposals is included in Appendix D.

a. Screening, Scoring and Weighting

Three general techniques for representing land use information in the RPS Calculator are screening, scoring, and weighting. Screening entails removing land meeting certain criteria from the available supply of potential resources, thereby preventing the resources available on that land from being selected and included in a portfolio. Using this terminology, the interim environmental methodology proposals (1A) submitted by parties in response to this staff paper would be considered screens.

Scoring entails assigning relative values to different areas of land that meet certain criteria, or to combinations of land and types of renewable energy technology. Scoring does not necessarily remove resources from the supply curve. Weighting can refer either to adjusting the relative importance of factors that are used to calculate a land use score or adjusting the relative importance of land use relative to other non-land elements (e.g., energy value, capacity value) in producing or analyzing an RPS Calculator portfolio. Scoring and weighting are outside the scope of the interim environmental methodology proposals that staff will review for possible use in 2015 for developing portfolios for the upcoming LTPP and TPP cycles, but could be considered in the final methodology implemented in 2016 (1B).

i. Screening

There are two broad categories of screens[27] that could be implemented in future versions of the RPS Calculator. One category of screens, hereinafter referred to as a base screen,[28] is used to remove land meeting certain criteria from consideration in all portfolios produced by the RPS Calculator – for example, land that is prohibited from development by law. The RPS Calculator 6.1 uses a base screen that excludes land in RETI Category 1 as well as certain technology-specific types of land, such as land with an excessive slope or land on military flight paths. The technology-specific exclusions included in the RPS Calculator 6.1 base screen are shown in Table 1. Additional criteria could be added to the base screen, such as land in RETI Category 2. The specific areas excluded under RETI Category 1 and RETI Category 2 are listed in Table 2.

Another category of screens, hereinafter referred to as an alternative screen,[29] involves removing additional land that meets criteria that reflect specific proposed or enacted land use policies – for example, land that is outside a Development Focus Area (DFA) in the DRECP. One or more alternative screens could be incorporated into future versions of the RPS Calculator to allow development and comparison of the impacts of different land use policies. Using the terminology presented here, the interim environmental methodology proposals submitted by parties in response to this staff paper would be considered alternative screens.

RPS Calculator 6.1 includes two alternative screens, "Environmental Baseline," which reflects RETI Category 1, RETI Category 2, and technology-specific exclusions; and "DRECP DFA" which includes all the restrictions in the "Environmental Baseline" screen, but also excludes non-DFA land within DRECP.

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[27] **Screen**: a set of criteria used to exclude the renewable resource potential associated with a certain area of land from being included an RPS Calculator Portfolio; in RPS Calculator v.6.1, screens do not directly affect transmission solutions or costs.

[28] **Base Screen**: the screen that is reflected in the set of renewable energy resources that appear in all portfolios produced by the RPS Calculator; does not directly affect transmission solutions or costs.

[29] **Alternative Screen**: a screen that includes all the criteria in the base screen plus one or more additional criteria.

Questions (for both interim [1A] and final proposals [1B])

1. Are the criteria in the current RPS Calculator 6.1 base screen adequate (RETI Category 1 land and the technology specific exclusions shown in Table 1)? Why or why not?

2. If not, which criteria should be used to add or remove land from the RPS Calculator's base screen (e.g., remove all RETI Category 2 land; remove land that meets a specific subset of RETI Category 2 criteria; remove land that meets some criteria other than those in RETI Category 2)? Identify the sources of the criteria chosen and justify the value of those criteria for the uses of the RPS Calculator.

3. Should future versions of the RPS Calculator include one or more alternative screens to reflect specific land use policies?

4. If so, what policies should the alternative screens in the RPS Calculator represent (e.g., preferred procurement on salt-affected, idle farmland)? Why? What criteria should be included in each alternative screen to reflect that policy? Identify the sources of the criteria and justify their appropriateness for the purposes of the RPS Calculator.

5. If you are proposing a methodology for incorporating land use information into the RPS Calculator clearly identify what screen(s) should be used and what criteria should be included in each screen.

ii. Scoring

RPS Calculator 6.1 does not include land use scores.

If RPS Calculator 6.1 were to incorporate land scoring, there are two conceptually distinct steps for doing so: score determination and score application. Score determination refers to the process of developing a score for a particular project, area of land, land/project combination, or other relevant unit. Score application refers to the process of applying that score to the development of an RPS Calculator portfolio.

Many different criteria and approaches can be used to determine a land use score. As mentioned above, previous versions of the RPS Calculator (version 1-5) have used different approaches to determine land use scores at different times. An approach not previously used in the RPS Calculator would be to quantify the estimated environmental mitigation cost associated with developing different areas of land. Under that approach, the score could be represented as a financial cost rather than a subjective ranking value.

Two broad categories of approaches to applying a land use score can be distinguished by whether or not they are included in the RPS Calculator's project selection algorithm. If included, a project's land use score would, along with the other factors (such as energy value and capacity value), be used to determine which resources and areas are selected for development. Alternatively, land use scoring could be applied after a portfolio is produced to facilitate cross-project and cross-portfolio comparisons of land use impacts. There are two ways to apply land-use scoring such that it affects the RPS Calculator's project selection algorithm. One way is to use the score to adjust project development risk, which in turn reduces the expected capacity and energy contribution from the project. Another way is to develop a scoring approach that calculates a financial cost include it in the valuation of prospective resources.

Scoring could also be applied outside of the project selection algorithm, after a portfolio is generated. There are many ways that a post-algorithm scoring approach could be used. Among other possibilities, scoring could be used to 1) compare the relative scores across portfolios; 2) compare the relative scores of different projects within a portfolio; 3) compare the scores of Super CREZs within a portfolio; or 4) to facilitate transmission cost estimation by identifying project locations based on land-use scores and using those locations to determine transmission distance and cost.[30]

Questions (for final proposals [1B])

6. Should future versions of the RPS Calculator implement a scoring methodology to represent land use information? Why or why not? Should scoring be used in addition to screening? Why or why not? Does your answer depend on the screening and/or scoring approach? If so, explain how.

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[30] Identifying project locations in this way would be for the sole purpose of estimating transmission costs and would not imply pre-judgment of permitting.

7. If so, should RPS Calculator implement scoring within its project selection algorithm, or external to its project selection algorithm? What type of scoring systems or criteria should be considered? Explain and provide examples.

8. Is scoring needed for projects throughout the WECC region, throughout the state, or only in particular areas within and/or outside the state? In other words, are there areas that are so unlikely to be developed, a detailed scoring approach is not needed? What criteria should be used to determine what areas merit the use of a scoring approach (as distinct from a screening approach)?

9. Should land use scoring account for technology-specific environmental impacts (e.g., wind turbines may not preclude use of land for farming)? Why or why not?

10. If you are proposing a methodology for incorporating land use information into the RPS Calculator, clearly identify how your proposal addresses the scoring-related questions above.

iii. Weighting

RPS Calculator 6.1 does not use any weighting of environmental information.

There are two general categories of weighting relevant to representing land use information in the RPS Calculator. Weighting can be used to adjust the relative contribution of subcomponents of a land use score in score determination, and weighting can be used to adjust the influence of the land use score relative to other factors that affect whether a project is selected for inclusion in the RPS Calculator portfolio.

When used within the RPS Calculator's project selection algorithm, the purpose of weighting would be to adjust the relative significance of the individual elements used for resource valuation in the RPS Calculator project selection algorithm – such as land-use impacts (if present), capacity value, energy value, curtailment costs, or integration costs – in order to calibrate the model against an external benchmark, or to represent a particular policy or market condition. Weighting provides a way to adjust the calculation of resource value to emphasize one or another element of value. The primary pitfall of implementing weighting within the project selection algorithm is that it could arbitrarily undermine the detailed calculation underlying each element of value.

Questions (for final proposals [1B])

11. Should one or more factors used in the RPS Calculator project selection algorithm be weighted? Explain how weighting would improve on the calculations that underlie each element of value used for project selection.

12. What relative weights, if any, should be assigned to different types of values that influence resource ranking (e.g., land-use, capacity, energy, curtailment value, integration)? Please justify your answer.

13. If you are proposing a methodology for incorporating land use and environmental information in the RPS Calculator, please describe the role of weighting, if any.

b. Infrastructure Types

Three types of infrastructure associated with renewable energy projects affect land use: 1) generation plants; 2) transmission lines needed to deliver produced energy to load; 3) roads needed to build and access generation and transmission equipment. No matter what approaches to representing land use information in the RPS Calculator are used, such information could be applied to one, two, or all three types of infrastructure.

Questions (for both interim [1A] and final proposals [1B])

14. Should the RPS Calculator include land use information related to generation, transmission, roads, or a combination thereof? Which types of infrastructure are most important to include? Why or why not? Be specific and provide examples. It may be useful to consider your answer in the context of the geographic granularity discussion presented in the next section.

15. Should the RPS Calculator include land use information related to generation, transmission, or roads for all areas of the state, or for specific areas? Which areas are most important to include for which types of infrastructure? Why?

16. Should the RPS Calculator include land use information related to generation, transmission, or roads for states throughout the WECC or for specific areas within the WECC? Which areas are most important to include for which types of infrastructure? Why?

c. Geographic Granularity

Land use information is available and can be applied at different geographic scales. The broadest, or least granular, geographic unit used in RPS Calculator 6.1 is the Super CREZ. Super CREZs vary in area across the state, but are roughly the same scale as counties. The least granular application of land use information would assign the same land use-related values to all land within a Super CREZ. In contrast, the most granular dataset likely to be used might distinguish between parcels roughly on the scale of tens of acres. Relatively granular data can be aggregated and applied to larger areas, whereas less granular data cannot be disaggregated without additional information. As a result, the granularity of available data limits the granularity at which land use screens or scores can be applied.

Economical wind resource potential tends to be concentrated in relatively specific locations. Economical solar PV potential, in contrast, tends to be abundantly available throughout the state with some regional variation in capacity factor. As a result, the interactions between land use and wind development are somewhat more straightforward to represent in the RPS Calculator than the interactions between land use and solar PV development.

For example, the RPS Calculator can identify a large amount of generic, economical solar PV potential in the Westlands Super CREZ. However, it is not possible to forecast where, within that area, PV development will occur without additional information about transmission or land-use constraints. This lack of geographic resolution inhibits the ability of the planning processes in which the RPS Calculator is embedded to evaluate potentially significant tradeoffs within a Super CREZ.

One option for improving the planning value of the portfolios produced by the RPS Calculator is to include a site selection algorithm. The site selection algorithm would calculate approximate locations for project development within a Super CREZ based on land-use related screens and/or scores. In a recent academic paper, Wu et al.[31] provides an example of such an algorithm that maximizes resource quality while minimizing environmental impact of additional transmission and road connection. Similarly, an algorithm specifically designed to work with RPS Calculator portfolios was created by The Nature Conservancy and used in a recent study.[32]

Questions (for both final proposals [1B])

17. Should the RPS Calculator include an algorithm for selecting project locations within Super CREZ boundaries? If so,

    a. To what resource type(s) should the algorithm be applied (e.g., solar PV, wind, geothermal, etc.) and why?

    b. What is the minimum set of variables that an algorithm should use to select sites (e.g., land-use score of generation project location; land-use score of transmission infrastructure required to serve project; land-use score or cost of roads required to serve project; capacity factor or resource quality of project land;)? Which variables are most important? Which variables are least important?

    c. Should each variable receive the same weight? Why or why not? If different weights, what weight should each receive? Please justify your answer.

    d. At what level of granularity should sites be selected (e.g., best quadrant of the Super CREZ; best location of minimum possible footprint to produce energy forecasted for the Super CREZ)? Are different levels of granularity appropriate for different regions?

    e. Are there any existing publicly available tools that could be adapted to identify project locations for generic resources selected in portfolios

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[31] Wu, G. C.; Torn, M. S.; Williams, J. H. Incorporating Land-Use Requirements and Environmental Constraints in Low-Carbon Electricity Planning for California. *Environmental Science and Technology* 2014, 49, 2013-2021.

[32] Integrating Land Conservation and Renewable Energy Goals in California, report by The Nature Conservancy, 2015. Available at http://scienceforconservation.org/downloads/ORB_report.

produced by the RPS Calculator? Provide names of any appropriate tools and describe in how the tool could be adapted to identify project locations for RPS Calculator portfolios.

18. In your proposal for a methodology for incorporating land use and environmental information into the RPS Calculator, please clearly state and justify the level of geographic granularity that your methodology would use and:

    a. whether and/or how that granularity would vary across the state; and

    b. whether and/or how that granularity would vary across the WECC.

7. Criteria for Developing RPS Calculator Portfolios

Section 4 of this paper provided a rationale for incorporating land use and environmental information in the RPS Calculator. Section 5 further underscored the importance of doing so by presenting modeling results that demonstrate how land use, portfolio composition, and the cost of achieving RPS goals can interact. Section 6 outlined a variety of options for representing land use information in the RPS Calculator portfolios. The present section (7) describes key considerations and potential criteria for determining how to develop and select the portfolios that will inform generation and transmission planning processes.

Land use related policy is just one type of policy that could be represented by a portfolio produced with the RPS Calculator. California's ambitious 2030 greenhouse gas reduction goals give rise to a wide range of policy choices and plausible scenarios that could be modeled.[33] Others include the retirement of specific large conventional generation resources, such as Diablo Canyon, the shape of future loads as a result of the adoption of electric vehicles, or the amount of distributed generation on the system.

Questions for parties are included after a discussion of each type of criteria. Parties are asked to provide a proposal for how to align RPS Calculator portfolio development and selection with LTPP and TPP for two different time frames: 1) for the remainder of 2015 and 2016; and 2) on an ongoing, annual basis. Proposals should

[33] http://www.arb.ca.gov/html/fact_sheets/e3_2030scenarios.pdf

clearly address each of the questions posed with explicit reference to the relevant question numbers.

a. Criteria for Selecting Scenarios for Least Regrets Planning

In TPP, the modeling that uses RPS Calculator portfolios typically falls into one of two categories – 1) policy preferred needs assessments; and 2) special studies. Modeling of RPS Calculator portfolios performed for the purpose of policy preferred needs assessment is intended to identify transmission infrastructure needed for compliance with specific policies, such as RPS. Transmission upgrades that are justified by the need to comply with these state policies are authorized by a vote of CAISO's Board of Governors, whose members are appointed by the Governor of California.

In contrast, modeling performed in special studies examines technical issues in order to develop information that may then inform future needs assessment studies. Special studies are particularly useful in years prior to large changes in policies or policy goals (such as an increase in the RPS goal to 50%) to ensure that subsequent modeling is adequate to facilitate planning in the new policy regime once it takes effect.

Because needs assessment studies have the potential to justify large financial investments in transmission, a "least regrets" approach was adopted[34] to ensure that identified needs were common to a range of plausible futures. CAISO's tariff specifies that it will examine a baseline scenario and one or more stress scenarios for the purpose of determining transmission needed to fulfill policy goals.[35] However, specific criteria for selecting the RPS Calculator portfolios to transmit to CAISO for use as baseline and stress cases have not been formally established. While the LTPP process itself identifies a range of scenarios for modeling (work product #3 in Figure 1) it may also be useful to develop an independent set of criteria to determine which RPS Calculator portfolios to generate.

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[34] Memorandum of Understanding, available at http://www.caiso.com/Documents/100517DecisiononRevisedTransmissionPlanningProcess-CPUCMOU.pdf

[35] California Independent System Operator Corporation, Fifth Replacement FERC Electric Tariff, May 19, 2014. Section 24.4.6.6, p. 603-605.

Possible criteria for selecting which RPS Calculator portfolios are developed and selected for transmittal to TPP include:

1) Portfolios are plausible from economic, transmission, and land-use perspectives.

2) Portfolios are materially distinct from one another.

3) Portfolios reflect uncertainty in

   a) transmission, integration, and energy costs;

   b) future loads;

   c) land use restrictions;

   d) transmission project approval; or

   e) other credible policy or physical influences.

4) Portfolios reflect key possible pathways to meeting the state greenhouse gas reduction goals;[36] or

5) Portfolios reflect multi value transmission solutions.[37]

It is important to note that staff resource constraints restrict the development RPS Calculator portfolios to no more than 8 (excluding sensitivities that do not require significant additional effort to construct or analyze). CAISO is unlikely to study more than four RPS Calculator portfolios in the TPP.

Questions (for both interim [2A] and final proposals [2B])

19. Are the criteria described above sufficient for selecting appropriate scenarios for use in "least regrets" planning in LTPP and TPP? If not, what changes are needed and why?

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[36] See a description of the PATHWAYS project here: https://ethree.com/public_projects/energy_principals_study.php

[37] For more information about multi value transmission analysis, see https://www.misoenergy.org/Planning/TransmissionExpansionPlanning/Pages/MVPAnalysis.aspx

20. Given that less time is available for developing scenarios for the upcoming 2016 LTPP and 2016-2017 TPP launching in early 2016, are different criteria appropriate? What criteria are appropriate specifically for the upcoming LTPP and TPP cycles and which criteria are likely to be generally appropriate on an annual basis for all future LTPP and TPP cycles?

21. If the RPS Calculator is used to generate multiple scenarios,

    a. What types of scenarios are most likely to be essential to adequately reflect a range of plausible results that would be useful for developing a "least regrets" portfolio for LTPP? For TPP? Explain your reasoning, with quantitative examples if relevant. Please address comparative value of all scenarios you identify.

        i. Environmental Baseline

        ii. High DG

        iii. Alternative 2030 load shape (account for the effect of other possible GHG mitigation strategies on load shape in 2030, as modeled in PATHWAYS project[38])

        iv. Other? Please describe the scenario, including an explanation of why it is plausible and why it is essential.

22. In your proposal for a process for selecting the appropriate scenarios to model in RPS Calculator, please include an approach for how to select "least regrets" portfolios for use in LTPP and TPP that addresses the questions above.

b. Criteria for Adjusting RPS Calculator Portfolios

The RPS Calculator was designed to serve as a high-level planning tool. It necessarily relies on simplifying assumptions, generalizations, and the quality and vintage of the data used as inputs. As a result, the portfolios generated by the RPS Calculator may not appropriately optimize all values due to the limitations of a

[38] See a description of the PATHWAYS project here: https://ethree.com/public_projects/energy_principals_study.php

spreadsheet model. For example, there may be practical restrictions on development in certain areas that were not reflected at the time the portfolio was produced or, conversely, agreements that open development in areas that were previously thought to be restricted. Suboptimal future portfolios can also result from the project selection algorithm operating on an annual basis. For example, a project that offers significant value in 2030 may never be selected because transmission capacity in the region becomes filled with projects that were more competitive in previous years. To ensure that the portfolios are as plausible as possible, it may be useful to "post-process," or modify portfolios by adding or removing a subset of projects without changing any other model parameters and re-running the model.

Possible criteria for post-processing include:

1) The change reduces the total cost of the portfolio in the target year.
2) The change appropriately resolves a clearly articulated technical, market, or policy problem not adequately represented in the RPS Calculator.

<u>Questions (for both interim [2A] and final proposals [2B])</u>

23. Are the criteria presented above necessary and sufficient for determining whether a portfolio produced by the RPS Calculator should be manually modified for use in LTPP and TPP? If not, which of the above criteria should be removed or modified and/or what additional criteria should be added? Justify your answer.
24. Please address whether and how portfolios should be "post-processed" in your proposal for aligning RPS Calculator portfolios development and selection with LTPP and TPP.

c. Criteria Related to Alignment with LTPP and TPP

i. <u>Alignment of Inputs and Assumptions</u>

In 2010, a Memorandum of Understanding between CPUC and CAISO on the revised TPP recognized the value of considering alternative planning scenarios in order to identify the infrastructure needs of "least regret."[39] Subsequently, staff at CPUC, CEC, and CAISO implemented a practice of jointly developing the inputs and assumptions that define the scenarios to be modeled in both the LTPP and TPP. The renewable portfolio and associated transmission upgrade requirements produced as an output by the RPS Calculator constitute a subset of the inputs and assumptions developed for these two planning processes.

The RPS Calculator also relies on a set of inputs and assumptions that together define the scenario it is modeling. In some cases, similar kinds of information serve as inputs for both the RPS Calculator and the modeling done in LTPP and TPP. For example, the load forecasts produced by CEC as a part of its Integrated Energy Policy Report (IEPR) are inputs into all three modeling exercises. As a result, it is important to ensure that the inputs and assumptions used by the RPS Calculator are consistent with those used in LTPP and TPP. However, it is possible that variations in some of the inputs that are common to LTPP, TPP, and the RPS Calculator will not materially affect the portfolios the RPS Calculator produces.

Questions (for both interim [2A] and final proposals [2B])

25. Which RPS Calculator inputs and assumptions are most important to align with LTTP and TPP (e.g., load assumptions, plant retirement assumptions, etc.)? Please justify your answer with respect to the impact of the inputs and assumptions on the composition of RPS Calculator portfolios and the sensitivity of LTPP and TPP outcomes to variations in RPS Calculator portfolios.
26. Are some inputs and assumptions more important than others for facilitating planning for 2030 (e.g. load shape)? Which ones are most important and why?

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[39] Available at http://www.caiso.com/Documents/100517DecisiononRevisedTransmissionPlanningProcess-CPUCMOU.pdf

ii. Alignment of Timing

Pursuant to current process alignment language posted on the websites of the Commission, the CEC, and CAISO,[40] the typical schedule for the LTPP and TPP processes is book-ended by the availability of TPP study results around August and the need to provide recommended inputs and assumptions for the next TPP cycle in February.[41] Figure 2 and Table 9 show how RPS Calculator portfolio construction and selection could fit within the existing LTPP and TPP schedule. As is evident, this creates a challenge for aligning inputs and assumptions with the RPS Calculator while also permitting stakeholder review of RPS Calculator portfolios prior to use in LTPP and TPP.

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[40] http://www.cpuc.ca.gov/NR/rdonlyres/7040DF9F-11F5-4935-8F80-0457E7F9208E/0/ProcessDiagram_v38.pdf

[41] This is a simplification. LTPP is a two-year cycle; TPP is an annual cycle. The cycles are described in detail here: http://www.cpuc.ca.gov/NR/rdonlyres/367DF06D-05A4-4819-A632-1AF64368A0D4/0/ProcessAlignmentText.pdf

Table 9. Annual Timeline of Activities for Constructing and Selecting RPS Calculator Portfolios for Use in LTPP and TPP. See also Figure 1.

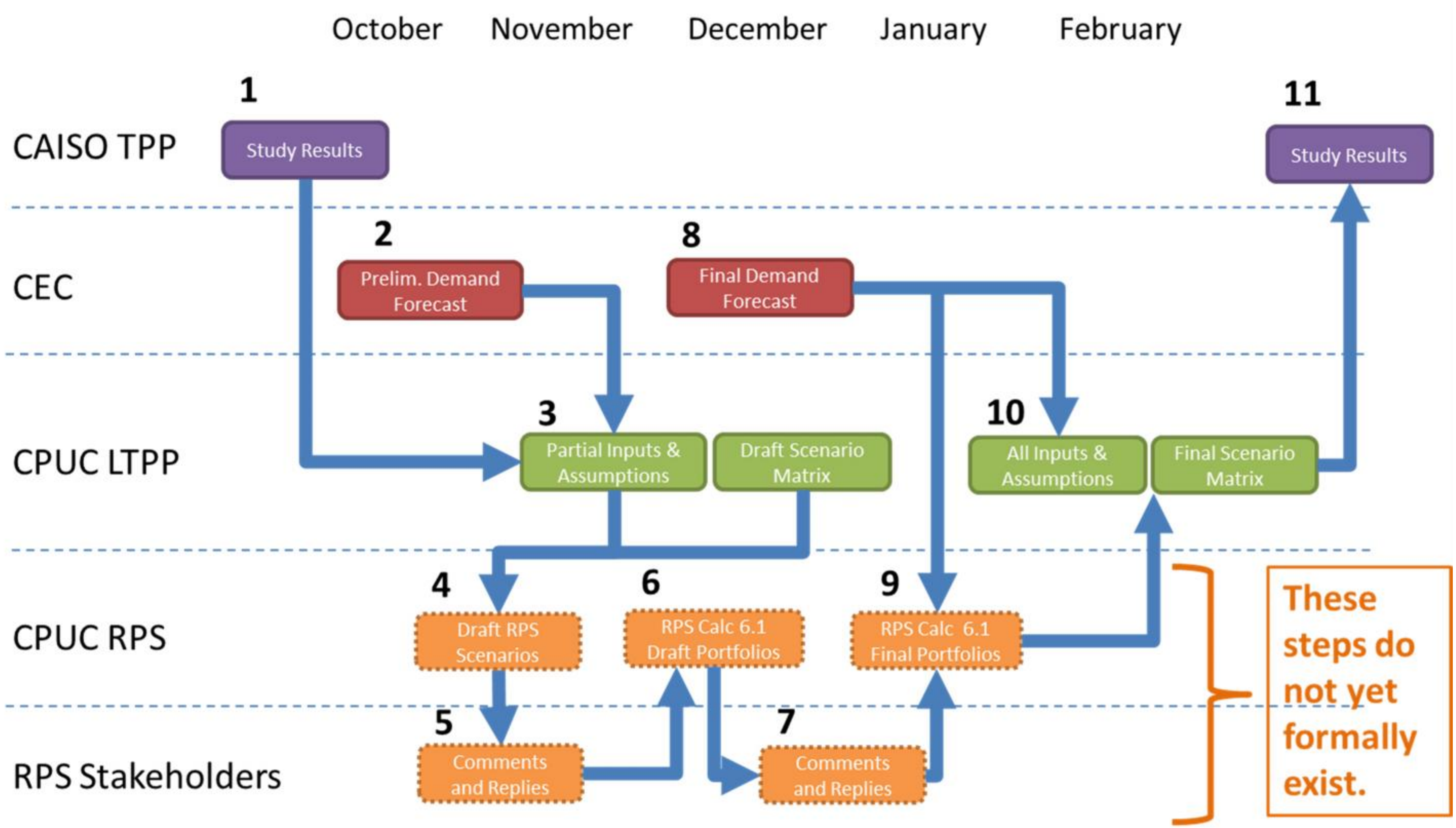
<table>
<tr><th>#</th><th>Agent</th><th>Activity</th><th>Month</th></tr>
<tr><td>1</td><td>CAISO</td><td>Releases TPP Study Results</td><td>August</td></tr>
<tr><td>2</td><td>CEC</td><td>Releases Demand Forecast Preliminary</td><td>October</td></tr>
<tr><td>3</td><td>LTPP</td><td>Releases Draft Inputs and Assumptions & Scenario Matrix</td><td>October</td></tr>
<tr><td>4</td><td>RPS</td><td>Releases Draft Scenario Definitions In Ruling</td><td>October</td></tr>
<tr><td>5</td><td>RPS Parties</td><td>• Review Scenarios
• Propose Alternatives As Comments in Proceeding</td><td>November</td></tr>
<tr><td>6</td><td>RPS Parties</td><td>• Select Scenarios
• Run Model
• Release Portfolios In Ruling</td><td>November</td></tr>
<tr><td>7</td><td>RPS Parties</td><td>• Review Portfolios
• Propose Adjustments As Comments in Proceeding</td><td>December</td></tr>
<tr><td>8</td><td>CEC</td><td>Releases Final Demand Forecast</td><td>December</td></tr>
<tr><td rowspan="2">9</td><td>RPS</td><td>• Re-Runs Model
• Post-Processes Portfolios</td><td rowspan="2">December</td></tr>
<tr><td>CPUC</td><td>• Adopts Portfolio Via Resolution for use in LTPP</td></tr>
<tr><td rowspan="2">10</td><td>LTPP</td><td>Releases Final Inputs and Assumptions & Scenario Matrix</td><td rowspan="2">February</td></tr>
<tr><td>CAISO</td><td>Begins TPP Cycle</td></tr>
<tr><td>11</td><td>CAISO</td><td>Releases TPP Study Results</td><td>August</td></tr>
</table>

Questions (for both interim [2A] and final proposals [2B])

27. Do points 5 and 7 on the schematic diagram presented in Figure 2 reflect sufficient opportunity for party review of RPS Calculator portfolios prior to their use in LTPP and TPP? If not, please suggest alternative points where review is necessary and the amount of time needed for each party review process? (Please note that party comments, in and of themselves, may not alter the schedules of LTPP and TPP.)

28. Please address the timing challenges above in your proposal for how to align RPS Calculator portfolio development and selection with LTPP and TPP. Your proposal should reflect a process that can be repeated on an annual basis. It may also include an alternative proposal for the upcoming LTPP and TPP cycles.

Figure 2. Possible Alignment of RPS Calculator Portfolio Development with LTPP and TPP. Numbers reflect chronological order and are cross-referenced in Table 3.



The schedule in Table 9 and Figure 2 assumes RPS Calculator portfolios are used to inform policy-preferred needs assessments that result in recommendations for transmission upgrades that are approved by a vote of the CAISO Board of Governors. The schedule for providing RPS Calculator portfolios that are used in special studies, which do not result in Board-approved transmission upgrades, allows for later transmittal of portfolios and later delivery of study results (roughly May and December, respectively). For example, results from the special study being performed in the 2015-2016 TPP to inform Track 1 of the RPS Calculator overhaul will be available in December 2015.

The overhaul of the RPS Calculator, and the need to resolve the outstanding issues in Track 1, 2a, and 2b, make the schedule in Table 10 and Figure 1 even more challenging in 2015. For example, since results of the TPP special study that will inform Track 1 will not be available until December 2015, there is very little time to incorporate the results into portfolios that would then also be vetted by parties, aligned with LTPP, and transmitted to CAISO by February 2015. As a result, it will be difficult for RPS Calculator portfolios to inform policy-preferred needs assessments that would identify transmission upgrades for Board approval as a part of the 2016-2017 TPP. Instead, like the 2015-2016 TPP, the upcoming 2016-2017 TPP will probably evaluate RPS calculator portfolios in a special study.

In light of the challenges associated with the typical LTPP and TPP schedule, and the particularly acute challenges associated with resolving outstanding issues in Tracks 1, 2a, and 2b of the RPS Calculator overhaul in 2015, it is most likely that the 2017-2018 TPP will be the first TPP cycle to rely on portfolios from the completely overhauled new RPS Calculator for policy-preferred needs assessments.

<u>Questions (for interim [2A] proposals)</u>

29. Are there any alternative approaches to developing RPS Calculator portfolios and aligning them with LTPP and TPP in 2015 that could resolve the timing challenges above?

30. Please ensure your proposal for aligning RPS Calculator portfolio development with LTPP and TPP addresses the particular timing challenges of 2015.

Appendix A.

Environmental Scoping Exercise:

Methodological Overview and Summary of Results

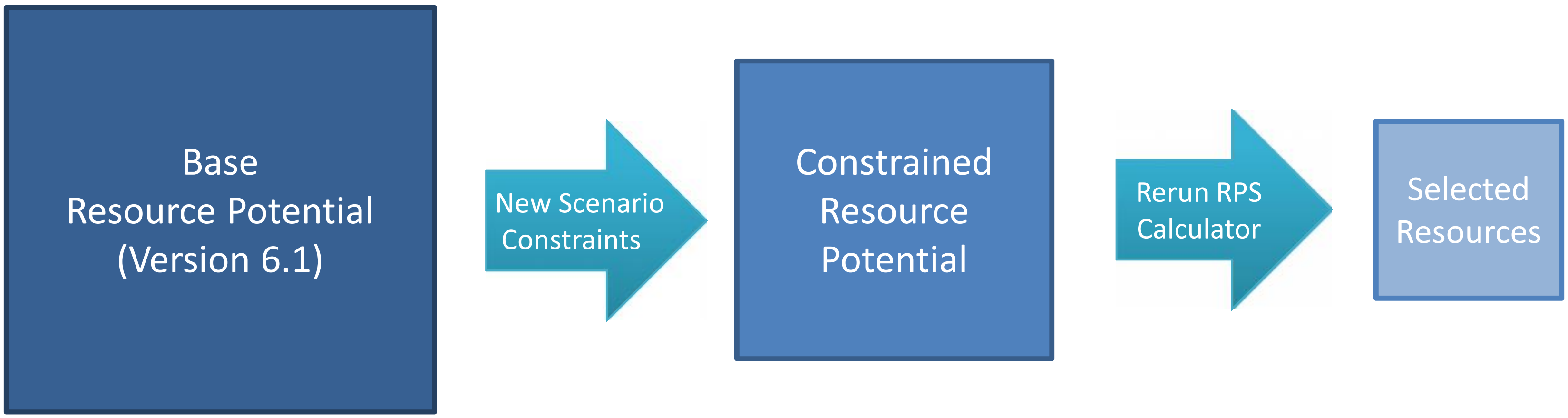
Environmental Scoping Exercise: Methodological Overview and Summary of Results

August 19, 2015

Objective and Scope

- The purpose of this analysis is to highlight potential tradeoffs that might need to be considered when developing an environmental/land use methodology for use in the RPS calculator
  - Analysis will be used to evaluate stakeholder proposals
- Scope of analysis:
  - Quantify how land use screens impact resource location and transmission solutions
  - Quantify how land use screens can impact portfolio costs
  - Quantify tradeoff between central generation/transmission vs. DG
  - Quantify tradeoff between in-state and out-of-state resources
  - Quantify how Energy Only generation and transmission impact land use considerations
- Analysis will produce the following for each land use scenario:
  - Cost of RPS Compliance
  - Types of resources selected
  - Super CREZ development location
  - MW of generation which requires new transmission and upgrades to existing transmission

Methodology for Enviro Scoping Exercise



- Resources:
  - Solar
  - Wind
  - Geothermal
  - Bioenergy
  - Distributed
  - In and out of state potential
- Locations based on current RPS calculator assumption screening

- Existing and potential resources overlaid with new exclusion ("screen")
- Using new exclusions, a revised set of resources are identified that replaces the base set

- Assess how different land use screens change key portfolio attributes:
  - Cost
  - Resources selected
  - Super CREZ selection
  - Land use
  - Transmission

Methodology (8 Steps)

1. Use existing (base) Black & Veatch renewable resource assessment datasets to identify attractive renewable energy resources
2. Identify reference case 50% RPS renewable portfolios (WECC-wide and CA-only)
3. Apply a series of hypothetical environmental constraints for scenario analysis
4. Modify renewable energy resource potential datasets for each scenario, to reflect each type of constraint
5. Import constrained resource datasets to RPS calculator
6. RPS calculator model selects future renewable energy portfolios, from each constrained potential dataset
7. Calculate annual revenue requirements (costs) for each selected portfolio
8. Compare resulting portfolio and costs to the reference case portfolio and cost

Approach Details

- Changes in MW and cost across scenarios are relative to 50% RPS reference case(s)
  - Most scenarios have two reference cases: WECC-wide and CA-only
  - Two scenarios examine impact of CA-only restriction, so are only compared to WECC-wide reference
- Enviro and land use screens largely focused on wind and solar
- New enviro and land use screens not applied to the following resources (reflects either lower land use footprint and/or higher siting flexibility):
  - Bioenergy
  - Geothermal
  - Distributed generation (DG)
  - Existing projects
  - Projects in development (PPAs)
  - Out of state resources
- Not all cases reflect RPS content category requirements, i.e., staff only modeled category 1 transactions (1^{st} point of interconnection is the CAISO balancing area)
- Land use scenarios were modeled as fully deliverable
  - Land use scenarios were also modeled as energy only for comparison purposes

Land Use Scenarios

Note: all scenarios are modeled assuming resources have full capacity deliverability status (FCDS)

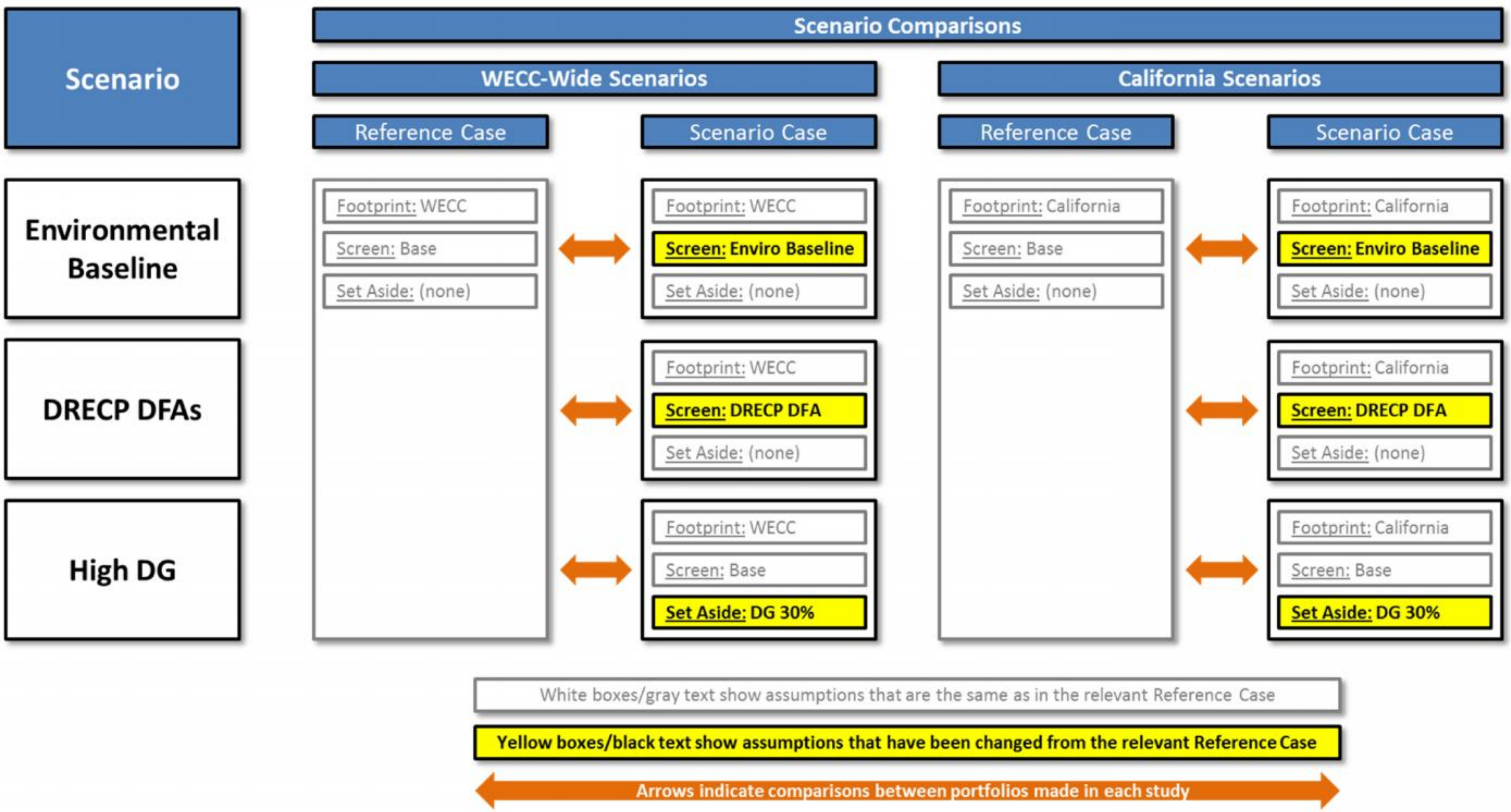
#	Scenario	Description
0	33% and 40% RPS	Allow the RPS calculator to select optimal resource portfolio to meet 33% and hypothetical 40% RPS. Procure resources from WECC-wide locations.
1	50% Reference Case	Select optimal portfolio to meet hypothetical 50% RPS – **incremental to 33% portfolio above**. No additional land use restrictions beyond what is currently in the RPS calculator (RETI Category 1, EDTF Category 4).
2	50% RPS - Environmental Baseline	Exclude development on lands categorized as RETI Category 1 and Category 2 ("development limited"). No additional EDTF screens applied outside of CA.
3	50% RPS - DRECP Development Focus Areas	RETI Category 1 and 2 plus restricts development in the DRECP to only Development Focus Areas (DFAs). Procure resources from WECC-wide locations.

Land Use Scenarios

Note: all scenarios are modeled assuming resources have full capacity deliverability status (FCDS)

#	Scenario	Description
4.	50% RPS – Salt-Affected Farmland Potential	Identifies farmland that is salt-affected and idle for potential priority solar PV development. Not a new restriction (no change to the supply curve relative to Case 4).
5.	50% RPS - High Wholesale DG	Require selection of in-state wholesale DG first, up to 30 percent of distribution circuit loading (roughly 10 GW of new DG). No additional screens beyond base case.

Scenario Analysis Methodology



Energy-Only Land Use Scenarios

- Scoping exercise focuses on scenarios that assume sufficient transmission for a resource to achieve FCDS
- Although RPS calculator (6.1) does include the ability to model EO projects, assumptions used are currently being vetted in CAISO's 2015 special study.
- Consequently, EO scenarios are being only provided for comparison purposes until 2015 special study is complete
- Ver. 6.1 models EO by assuming incremental resources needed for 50% RPS will connect to the existing transmission system, i.e., no transmission upgrades are allowed
- EO assumption was applied to the 50% RPS base case and all land use scenarios (see slides 34-35 for preliminary results)

SUMMARY OF SCENARIO RESULTS

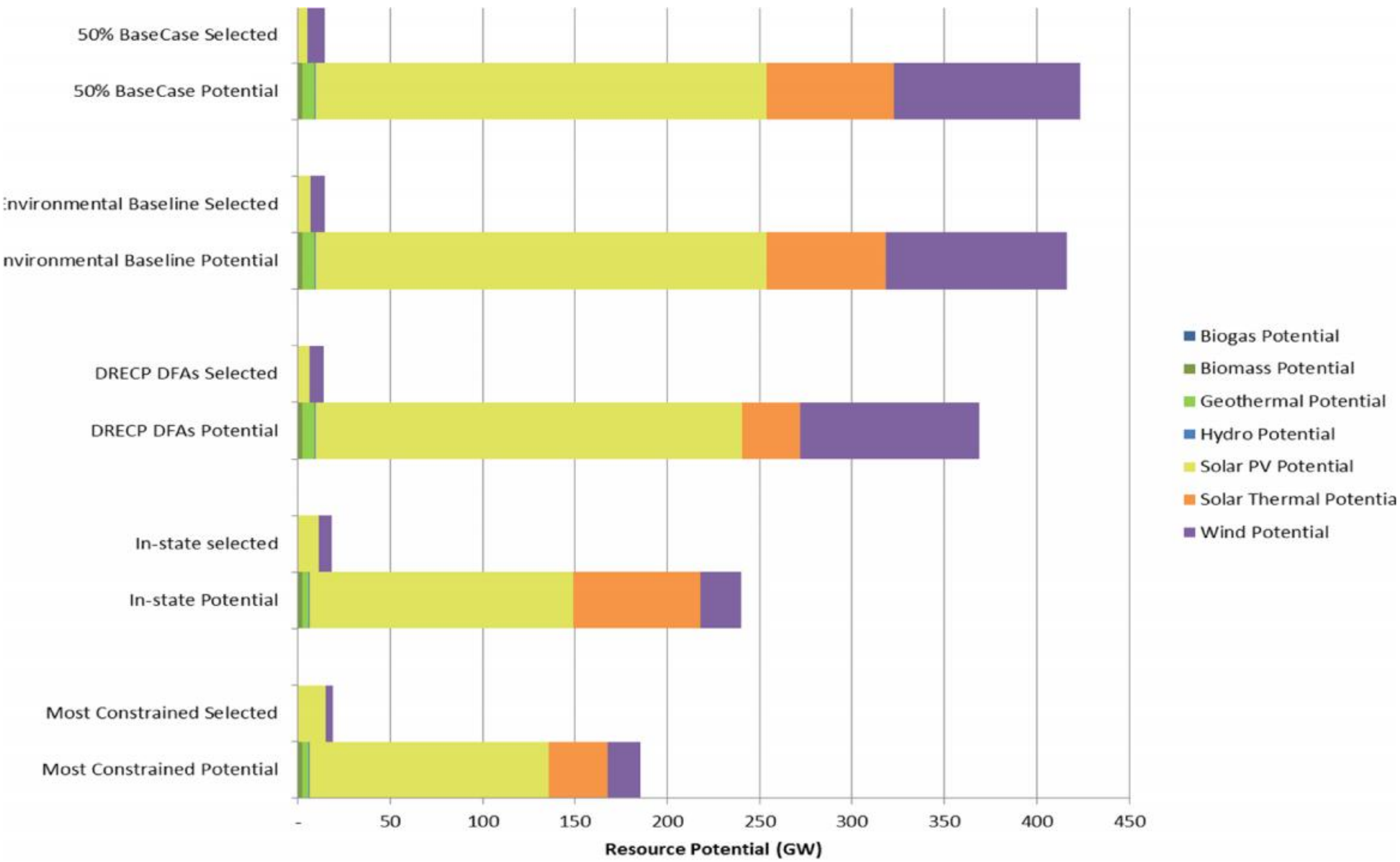
Results Sensitive to Small Differences in Net Market Value

- Differences in net market value between selected an unselected resources in any given year are often small
- Model will select bundles of resources at the highest net market value even if differences are small (“knife-edge” effect)
  - For example, in large Westlands Super CREZ, capacity factor of solar resource in Kern County is slightly higher than in Tulare County, so all Westlands projects are assigned to Kern County
- More confidence in areas excluded in each case than exactly where the resources will be built
- Changes in some Super CREZs too small to be visible at this scale - See Appendix B for more details

Summary of Preliminary Scenario Results

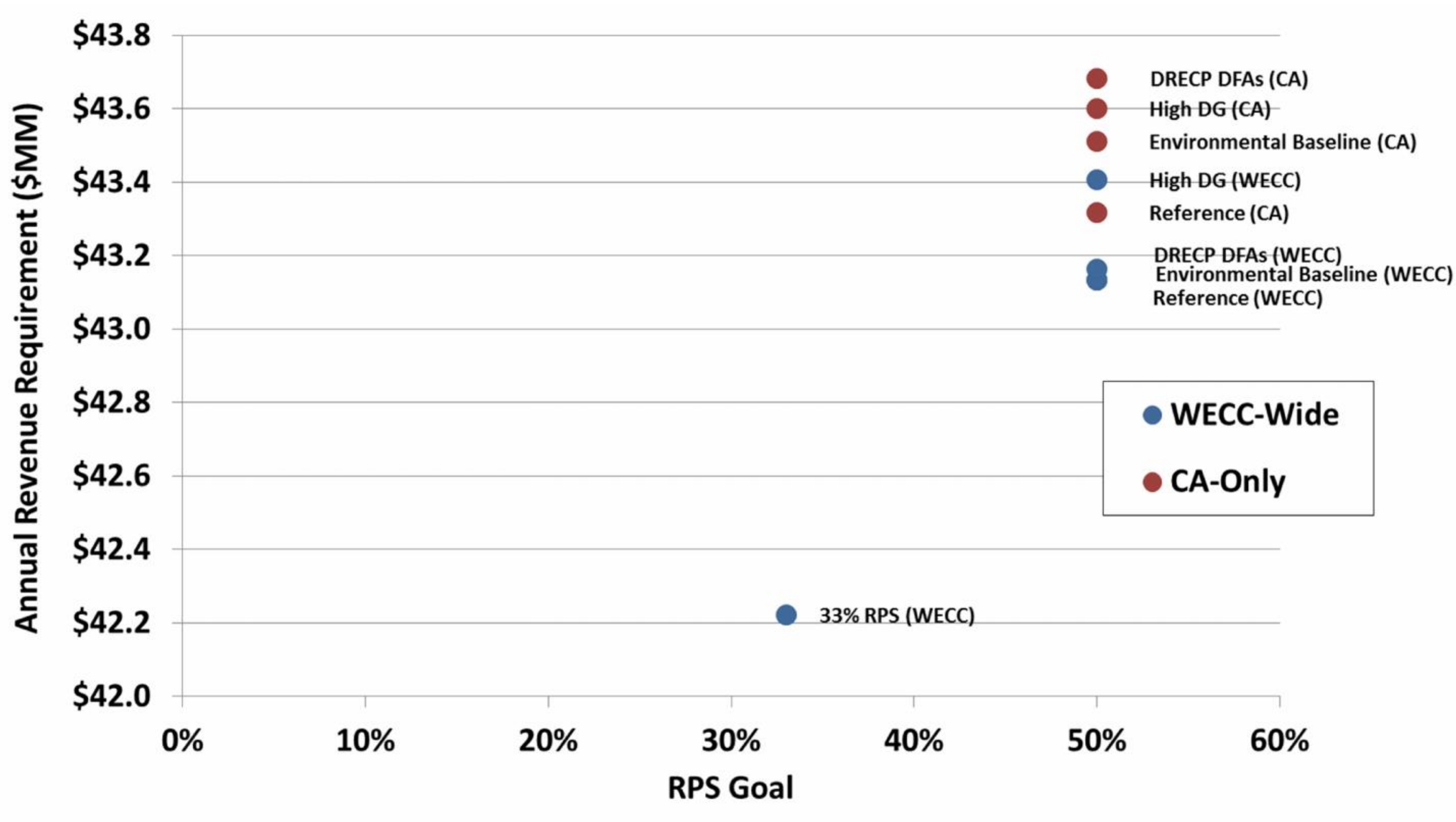
- In-state only cases increase RPS compliance costs and drives wind development to other locations in CA that haven't seen wind development (e.g., Sacramento River Valley)
- Allowing out-of-state resources lowers the cost of compliance and reduces the impact of CA land use restrictions
- High DG scenarios currently have the highest costs
- Significant amounts of salt-affected farmland could be used for renewable development with little impact on net cost
- Energy Only procurement reduces overall cost in reference cases and does not consistently dampen or exacerbate the impacts of land-use restrictions on resource mix or costs.
- Preliminary results indicate that certain land use screens have a significant impact on where selected resources are located and transmission solutions

Additional Land Use Constraints Reduce Resource Potential (FCDS)



- Wind: greatest impact occurs in CA-only scenarios (reductions of ~80 GW from WECC-wide baseline)
- Solar PV: while reduced by up to 100 GW in some scenarios, resource potential is still very large
- 84% risk adjustment applied to total MW capacity for all resources in selected portfolios

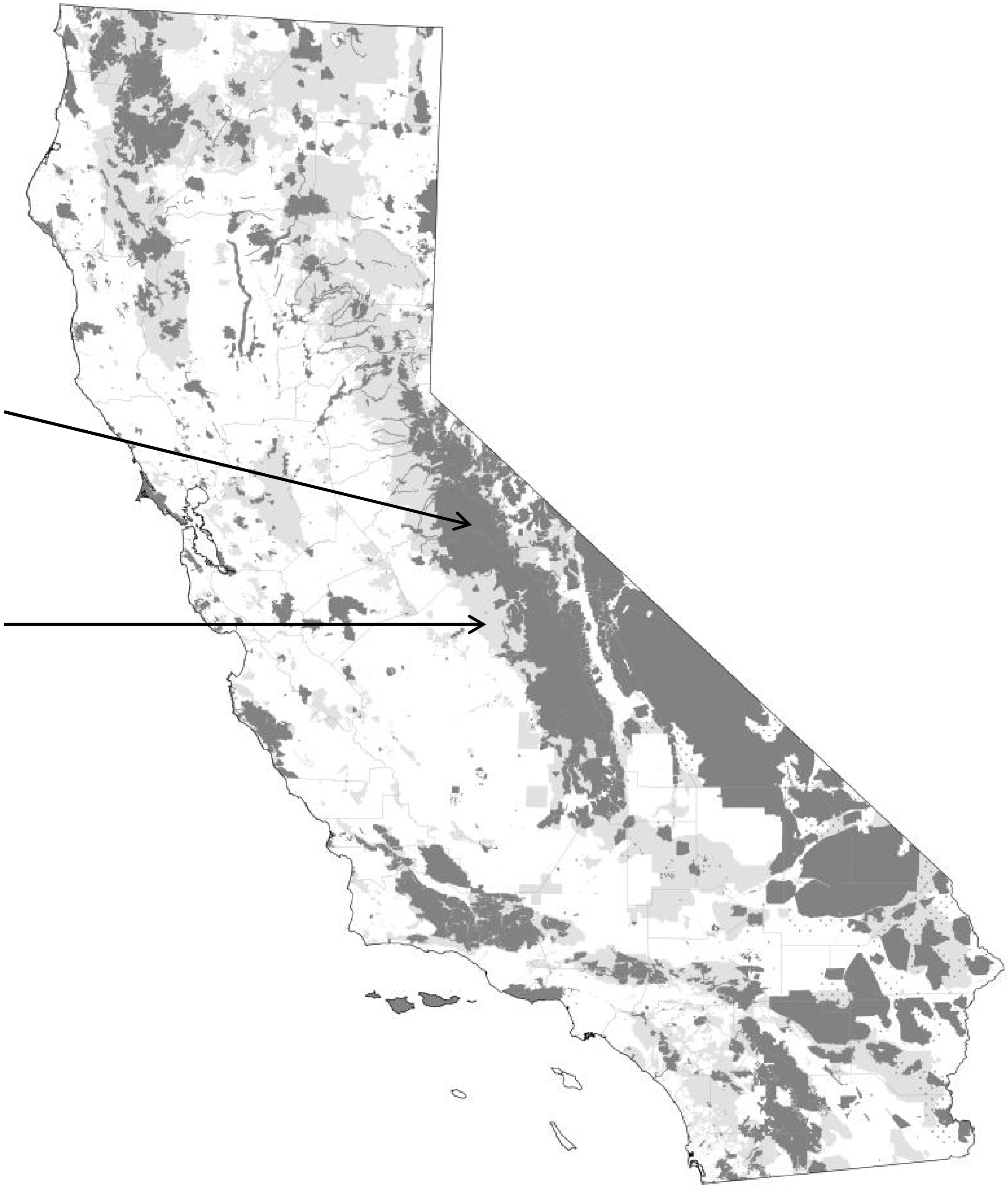
Scenario Cost Summary (FCDS)



DETAILED SCENARIO RESULTS AND MAPS

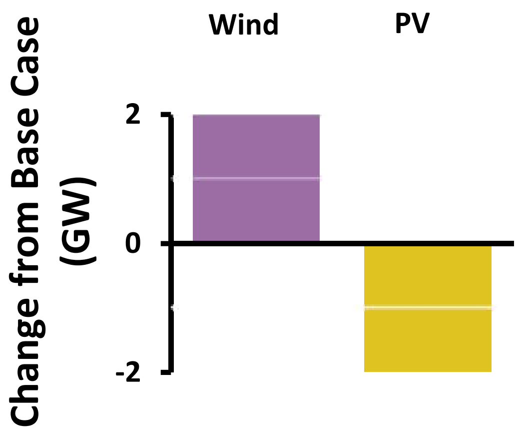
Key to Scenario Maps

- For each map in the following slides:
  - Dark gray areas represent environmental and land use constraints assumed in all scenarios (e.g., national parks). See slide 21 for land exclusions
  - Light gray areas represent scenario-specific 50% RPS land use constraints, <u>beyond what is already constrained in the 50% RPS base case</u>
  - Example: light grey areas in Most Constrained scenario reflect the combined land use constraints



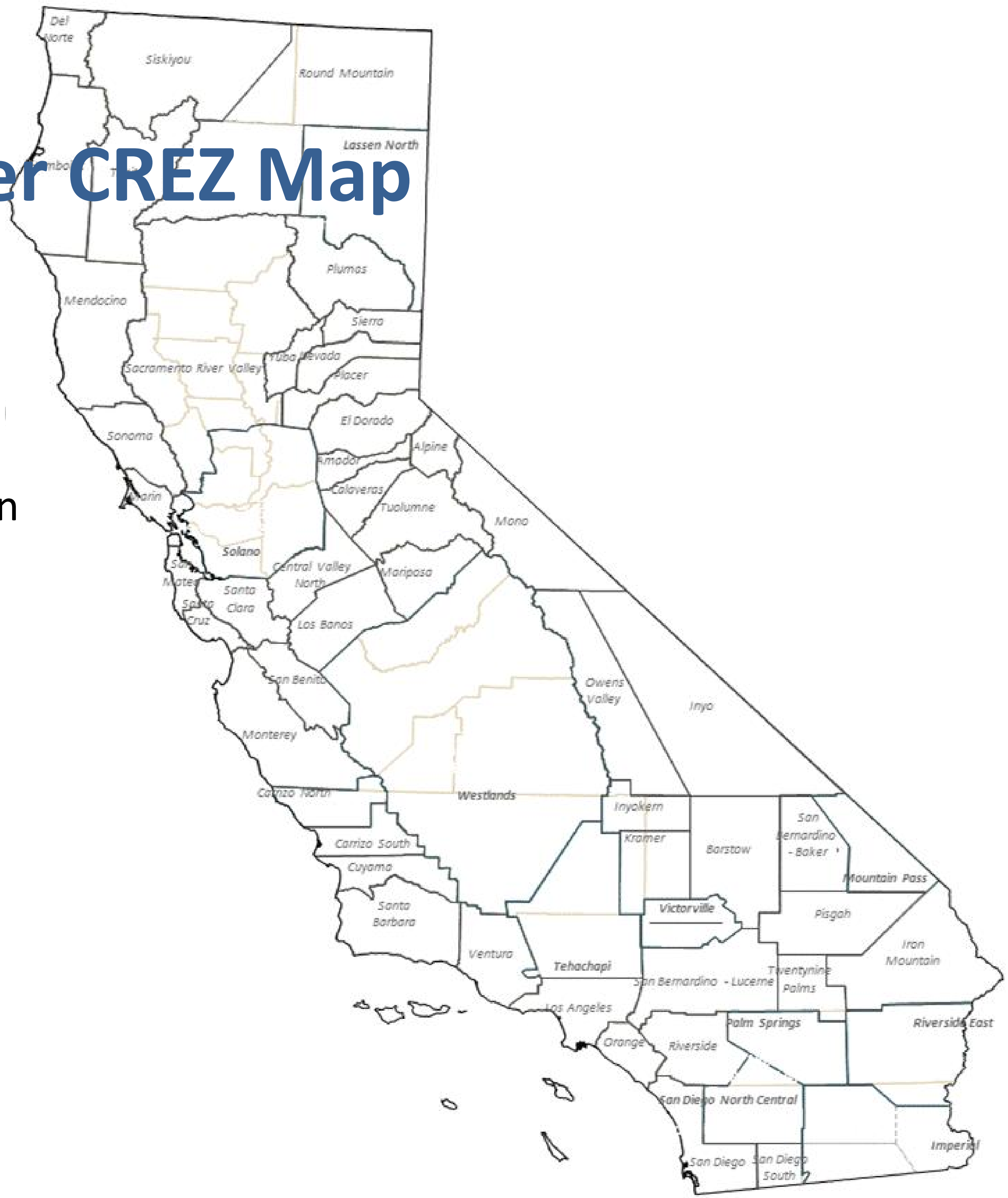
Key to Bar Charts in Scenario Maps

- For each map in the following slides, Super CREZs with bar charts show the change from the 50 percent RPS base case
  - Each Super CREZ represents a renewable energy resource area with shared transmission (see next slide)



Super CREZ Map

- Each Super CREZ represents a renewable energy resource area with shared transmission
- Super CREZ boundaries align with the CAISO's electrical areas used for transmission planning



50% RPS Reference Case Land Exclusions

- RETI Category 1 land exclusions listed below are reflected in all 50% RPS land use scenarios, not just the 50% RPS base case

RETI Category 1

- Designated Federal Wilderness Areas
- Wilderness Study Areas
- National Wildlife Refuges
- Units of National Park System
- Inventoried Roadless Areas on USFS national forests
- National Historic and National Scenic Trails
- National Wild, Scenic and Recreational Rivers
- BLM King Range Conservation Area, Black Rock-High Rock National Conservation Area, and Headwaters Forest Reserve
- BLM National Recreation Areas
- BLM National Monuments
- Lands precluded by development under Habitat Conservation Plans and Natural Community Conservation Plans

RETI Category 1 (continued)

- Lands specified as of May 1, 2008 in Proposed Wilderness Bills (S. 493, H.R. 3682)
- Existing Conservation Mitigation banks under conservation easement approved by the state Department of Fish and Game, U.S. Fish and Wildlife Service or Army Corps of Engineers
- CA state defined wetlands
- CA State Wilderness Areas
- CA State Parks
- DFG Wildlife Areas and Ecological Reserves
- Private preserves of The Wildlands Conservancy

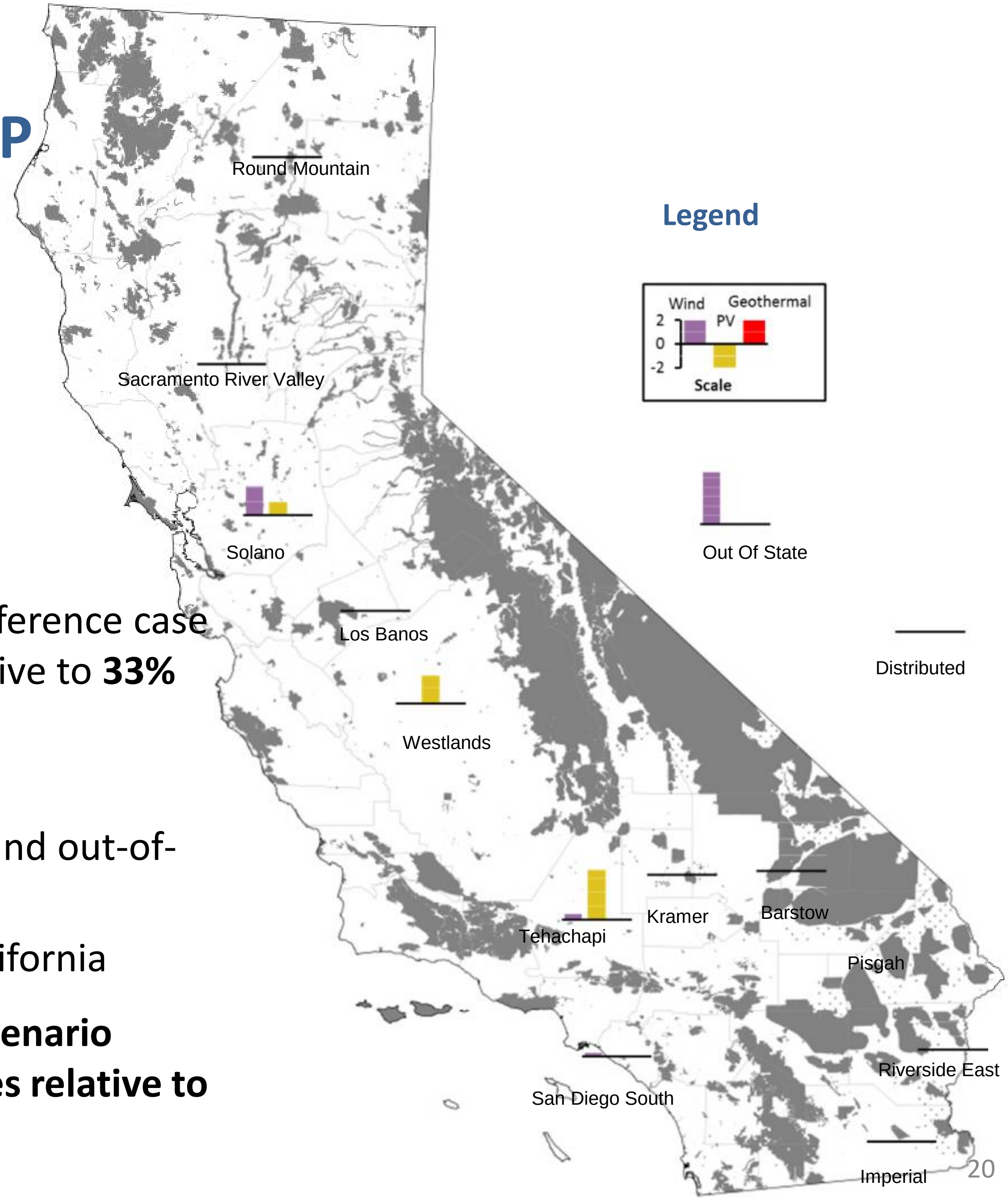
Other Exclusions: (technology-specific)

- Slope
- Military flight paths

50% RPS REFERENCE CASE MAP (WECC-WIDE)

Total Generic Resources Selected	
Solar (MW)	+6,380
Wind (MW)	+8,738
Geothermal (MW)	0
Yearly Cost, 2030 ($MM)	$43,134

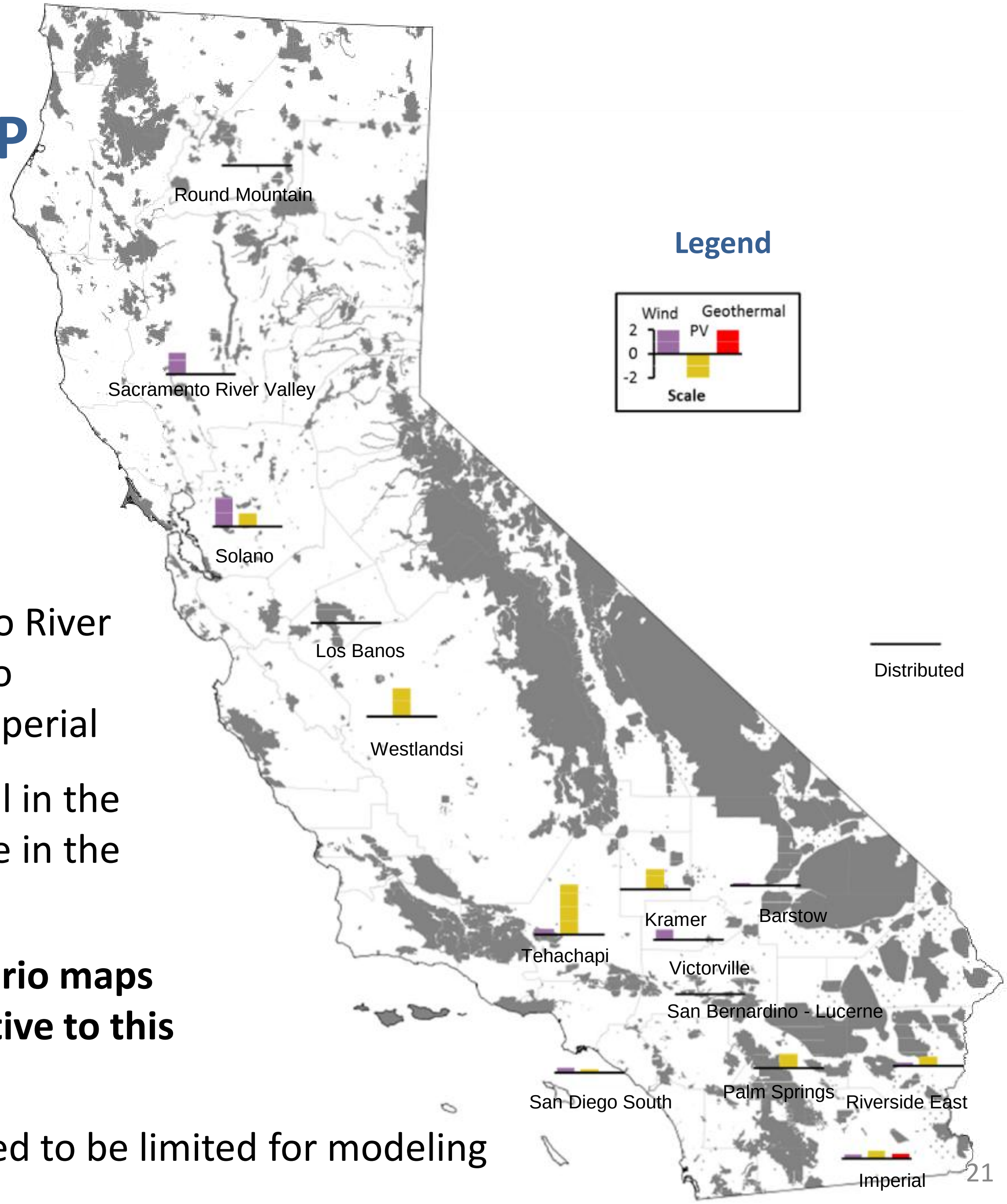
- Resource bars in 50% RPS reference case map show the increase relative to **33% RPS portfolio**
- Resources selected:
  - Wind energy in Solano and out-of-state
  - Solar PV in southern California
- **All remaining WECC-wide scenario maps show resource changes relative to this 50% RPS base case**



50% RPS REFERENCE CASE MAP (CA-ONLY*)

Change Relative to 33% RPS	
Solar (MW)	+10,316
Wind (MW)	+6,094
Geothermal (MW)	+374
Yearly Cost, 2030 ($MM)	$43,317

- Wind resource in Sacramento River Valley selected, in addition to Victorville, Riverside East, Imperial
- Note presence of geothermal in the portfolio where there is none in the WECC-wide scenario
- **All remaining CA-Only scenario maps show resource changes relative to this 50% RPS base case**



*Access to OOS resources assumed to be limited for modeling purposes only.

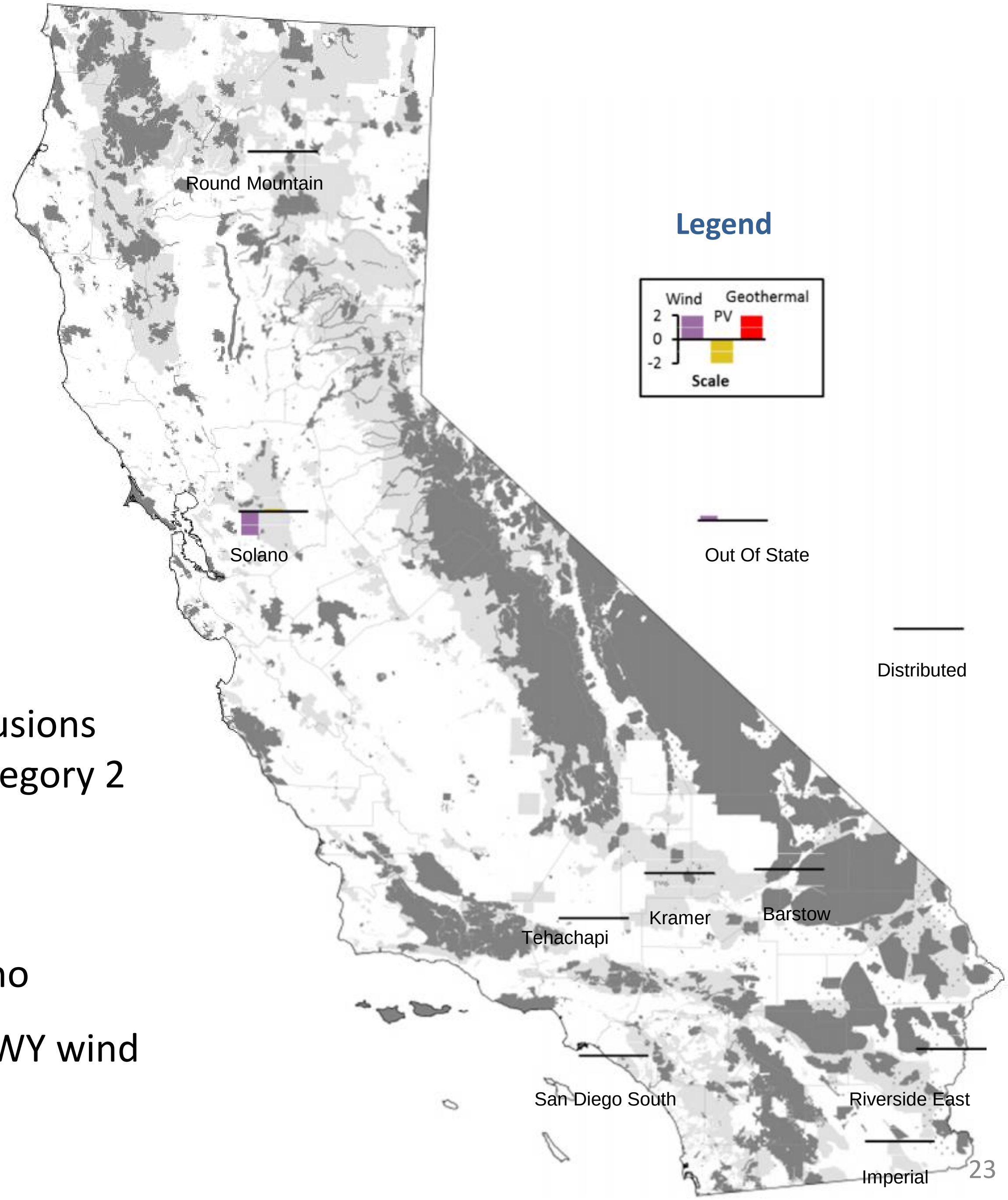
ENVIRONMENTAL BASELINE SCENARIO

- Scenario screens RETI Category 2 (development limited) in addition to the RETI Category 1 screen (development prohibited) used in the 50% RPS base case scenario
  - Pre-identified RPS projects (active PPAs) were allowed to be developed on these lands
  - Includes WECC-wide renewable resources
- RETI Category 2 Areas (development limited):
  - BLM Areas of Critical Environmental Concern
  - USFWS designated Critical Habitat for federally listed endangered and threatened species
  - Special wildlife management areas identified in BLM's West Mojave Resource Management Plan. I.e., Desert Wildlife Management Areas and Mojave Ground Squirrel Conservation Areas
  - Lands purchased by private funds and donated to BLM, specifically the California Desert Acquisition Project by The Wildlands Conservancy
  - Proposed and Potential Conservation Reserves in HCPs and NCCPs

ENVIRONMENTAL BASELINE SCENARIO MAP (WECC-WIDE)

Change Relative to 50% RPS WECC-Wide Reference Case	
Solar (MW)	+347
Wind (MW)	-1,271
Geothermal (MW)	+0
Change in Yearly Cost, 2030 ($MM)	+$1 (0%)

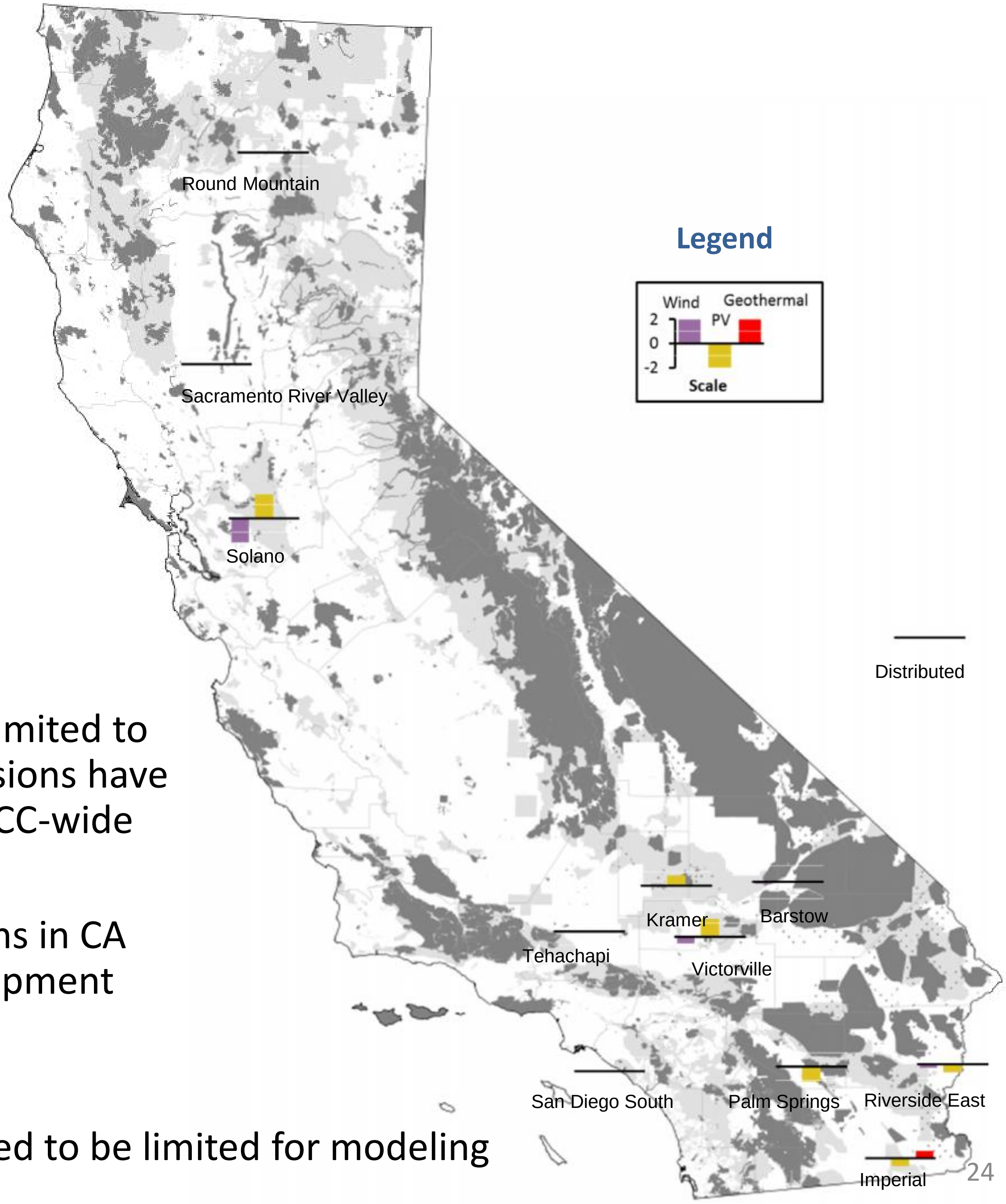
- Light grey denotes new exclusions beyond Base Case – RETI category 2 screens
- Net impact:
  - Decreased wind in Solano
  - Increase of 570 MW of WY wind



ENVIRONMENTAL BASELINE SCENARIO MAP (CA-ONLY*)

Change Relative to 50% RPS CA-Only Reference Case	
Solar (MW)	+1,462
Wind (MW)	-2,609
Geothermal (MW)	+513
Change in Yearly Cost, 2030 ($MM)	+$195 (0.5%)

- When resource choices are limited to CA-only, environmental decisions have more impact than in the WECC-wide scenario
- Adding environmental screens in CA increases geothermal development



*Access to OOS resources assumed to be limited for modeling purposes only.

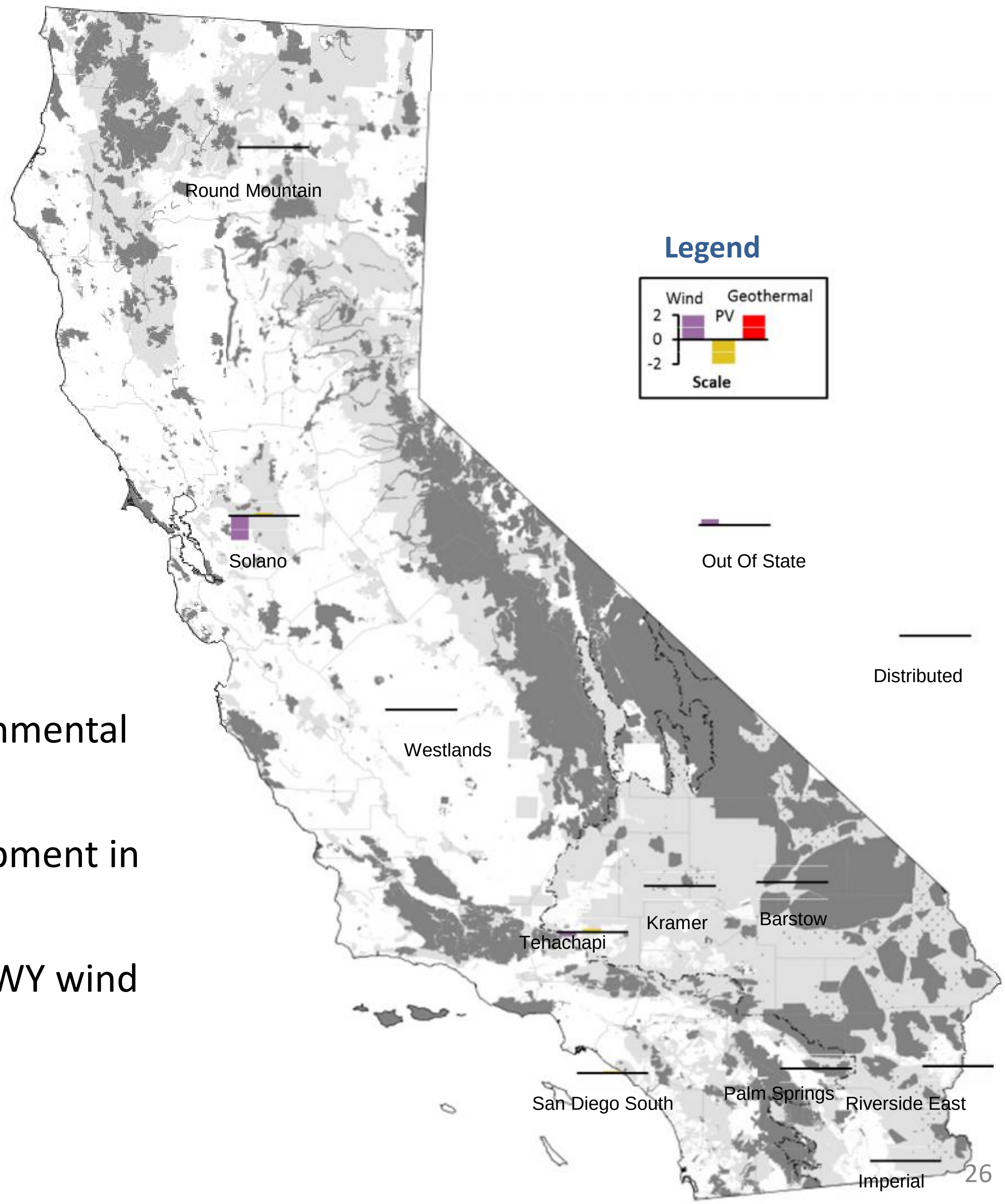
DRECP DEVELOPMENT FOCUS AREA (DFA) ONLY SCENARIO

- Scenario screens RETI Category 2 (development limited), RETI Category 1 (development prohibited) lands and limits development in the DRECP to only DFAs
  - Uses "Development Focus Areas, Preferred Alt." dataset from DataBasin http://databasin.org/datasets/c77425c9badf460b9bbcf80517bcf91f
  - WECC-wide renewable resources

DRECP DFA ONLY SCENARIO MAP (WECC-WIDE)

Base Case New Capacity	
Solar (MW)	+726
Wind (MW)	-1,572
Geothermal (MW)	+0
Change in Yearly Cost, 2030 ($MM)	+$29 (0.1%)

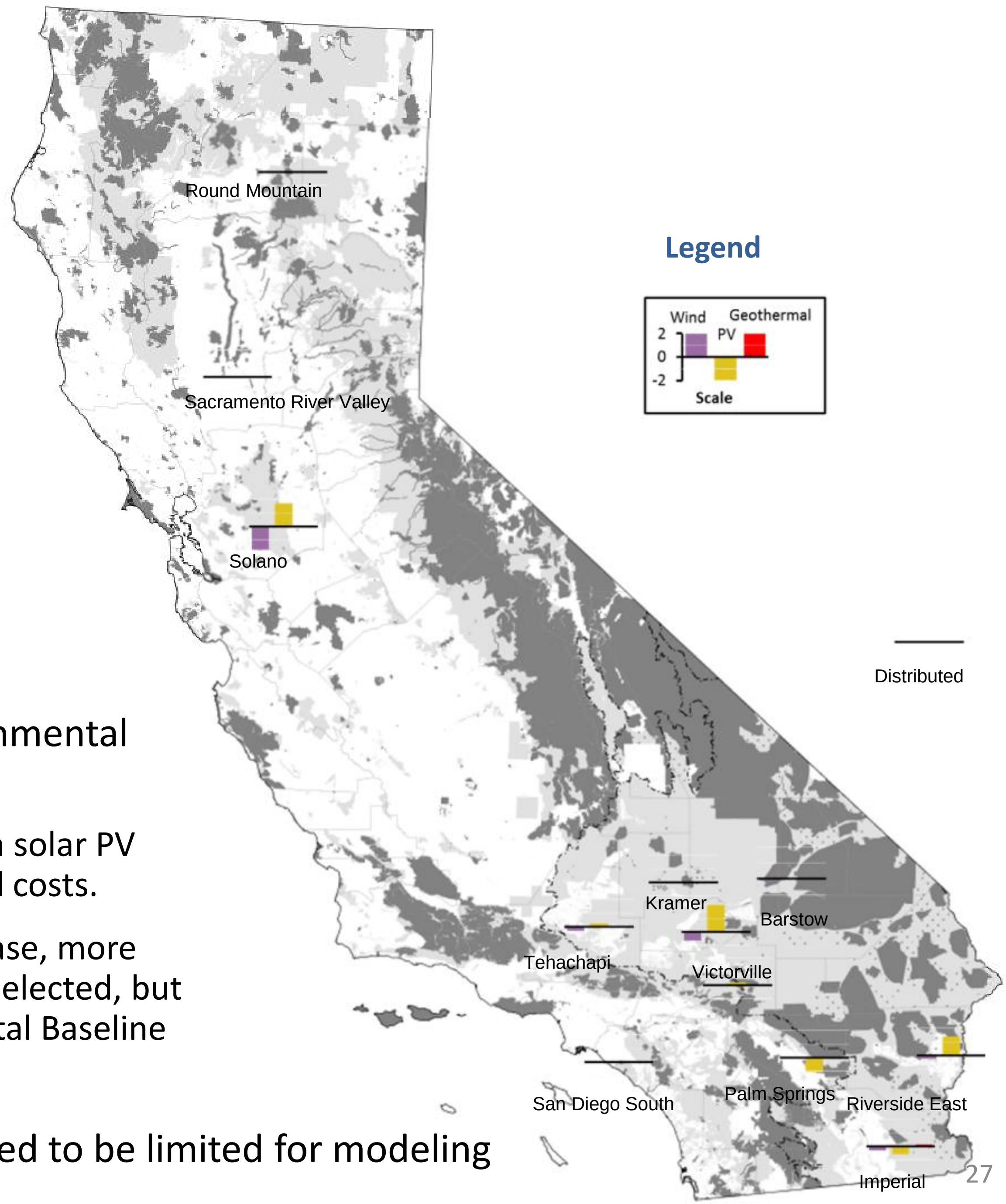
- Results are similar to Environmental Baseline Scenario
  - Decreased wind development in Solano
  - Increase of 640 MW of WY wind



DRECP DFA ONLY SCENARIO MAP (CA-ONLY*)

Change Relative to 50% RPS CA-Only Reference Case	
Solar (MW)	+3,997
Wind (MW)	-3,366
Geothermal (MW)	+181
Change in Yearly Cost, 2030 ($MM)	+$365 (0.8%)

- Results are similar to Environmental Baseline Scenario
  - Larger impact on impact on solar PV and wind development and costs.
  - Relative to the reference case, more geothermal resources are selected, but less so than in Environmental Baseline



*Access to OOS resources assumed to be limited for modeling purposes only.

Salt-Affected Farmland Scenario: Methodology

- This farmland scenario explores what would happen if marginally productive and physically impaired areas of farmland were targeted for renewable energy development
  - Also in-state only
  - Does not impose new land use restrictions
- Exclusions applied to Solar only; wind energy assumed to be compatible with agricultural land use
- Marginally productive and physically impaired lands:
  - Long-term idle, as identified in USDA GIS data (>6 yrs)
  - Salt-affected soils, as identified in USGS National Soil Conservation Survey

RENEWABLE POTENTIAL ON SALT-AFFECTED FARMLAND

Super CREZ	Salt-Affected Farmland Solar Resource Potential (MW)	RPS Calculator Selected Resources Case 1 (WECC-wide)
Carrizo North	0.1	0
Imperial North	1.2	0
Imperial South	4.6	0
Los Banos	0.5	0
Palm Springs	0.2	0
Riverside East	192.4	0
Sacramento River Valley	68.5	0
San Benito County	3.1	0
Santa Clara County	0.2	0
Solano	21.4	932
Westlands	1,389.6	1,751
Total	**1,682**	**2,683**

Much of the salt-affected , long-term idle farmland is in Westlands, which has an economically competitive solar PV resource (1,751 MW picked by RPS Calculator)

Salt-Affected Farmland Scenario: Conclusions

- 1.7 GW solar PV could be developed on salt-affected farmland using <u>conservative assumptions</u>
  - Less conservative assumptions, for example reducing the "idle" definition to 4 years or including other layers, would increase the potential
- Majority (82%) of solar PV resource on salt-affected land is in the Westlands Super CREZ
  - Westlands Super CREZ is very large; more detail needed in order to site projects from a transmission perspective
- The solar PV resource in Westlands is economically competitive - selected for development of 1.7 GW in WECC-wide reference case

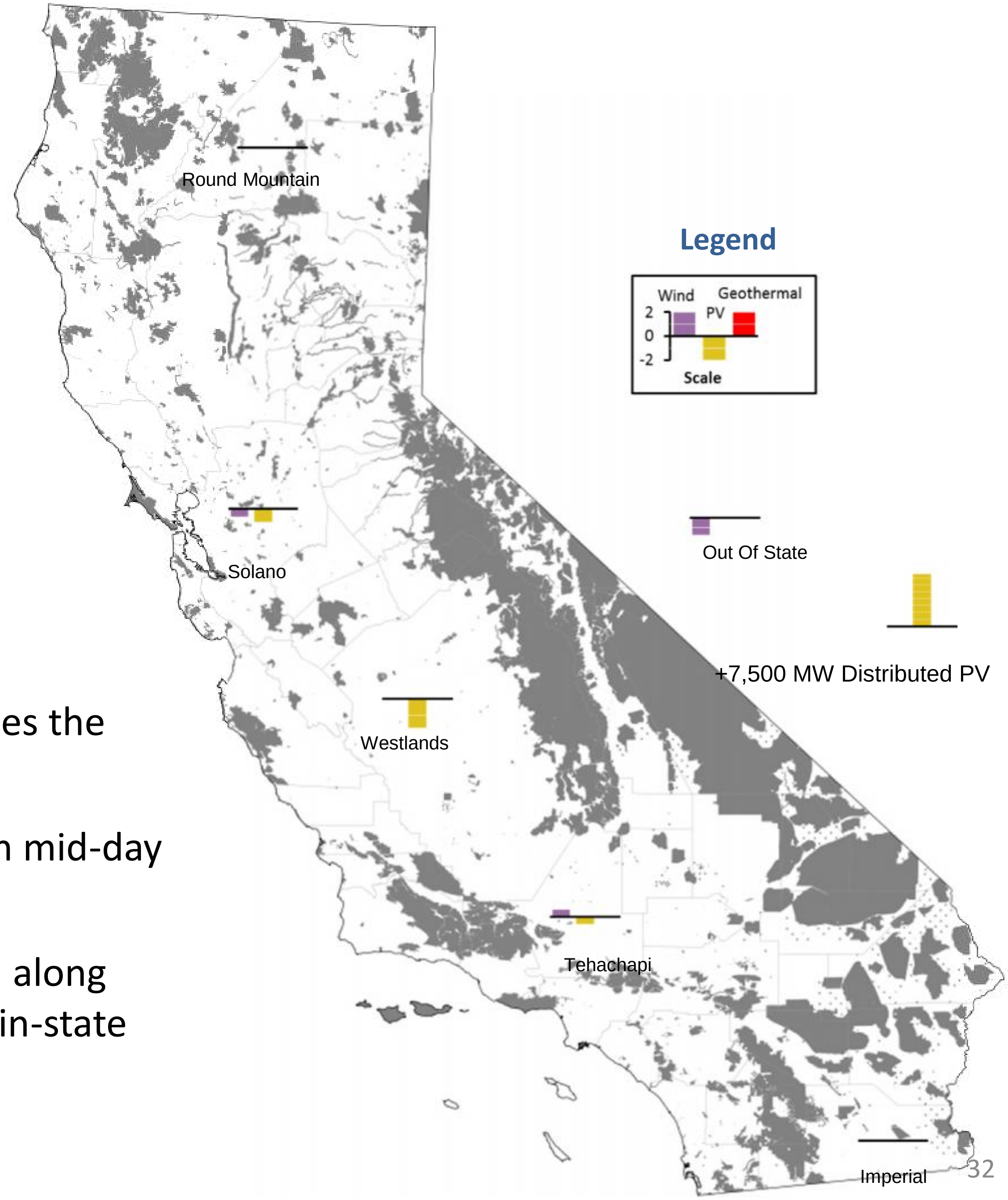
High DG Scenario: Methodology

- This scenario was developed to better understand the land use implications of a high DG future relative to a central station-centric renewable development plan
- RPS calculator selects DG resources first up to 30 percent circuit penetration (e.g., DG is forced into the portfolio), then selects least-cost resources until 50 percent RPS is met
  - Allows WECC-wide resources
  - DG is defined as a resource interconnecting at the distribution system with no backflows; and there is no project size limitation

HIGH DG SCENARIO MAP (WECC-WIDE)

Change Relative to 50% RPS WECC-Wide Reference Case	
Solar (MW)	+4,288
Wind (MW)	-1,791
Geothermal (MW)	+0
Change in Yearly Cost, 2030 ($MM)	+$274 (0.6%)

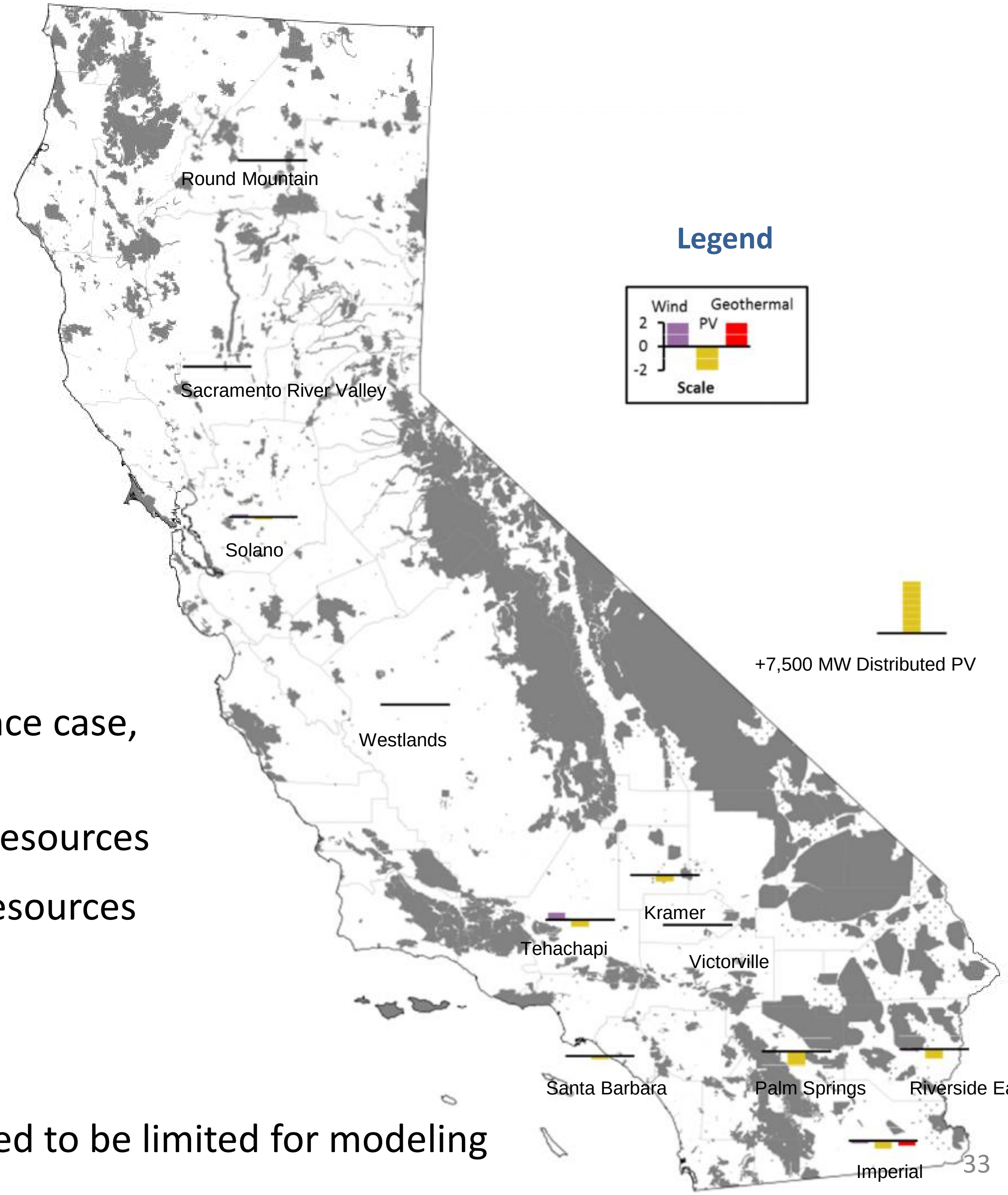
- Prioritizing DG favors increases the cost of meeting 50% RPS
- System experiences very high mid-day peak generation
- Out of state wind is reduced, along with a significant amount of in-state central station solar PV



HIGH DG SCENARIO MAP (CA-ONLY*)

Change Relative to 50% RPS CA-Only Reference Case	
Solar (MW)	+3,745
Wind (MW)	+328
Geothermal (MW)	-374
Change in Yearly Cost, 2030 ($MM)	+$283 (0.7%)

- Relative to a CA-Only reference case, prioritizing DG
  - increases in-state wind resources
  - decreases geothermal resources



*Access to OOS resources assumed to be limited for modeling purposes only.

Energy Only (EO)
Land Use Scenario Results (WECC-Wide)

- Given very preliminary nature of EO analysis, results are provided for comparison purposes only

Category	Reference	Environmental Baseline	DRECP DFAs	High DG
	All Generic Resources	Change Relative to 50% RPS WECC-Wide Reference Case		
Solar (MW)	7,787	+503	+426	+2,570
Wind (MW)	7,478	-443	-436	+107
Geothermal (MW)	0	0	0	0
Change in Yearly Cost, 2030 ($MM)	$42,644	+$50 (0.1%)	+$73 (0.2%)	+$471 (1.1%)

Energy Only (EO)
Land Use Scenario Results (CA-Only*)

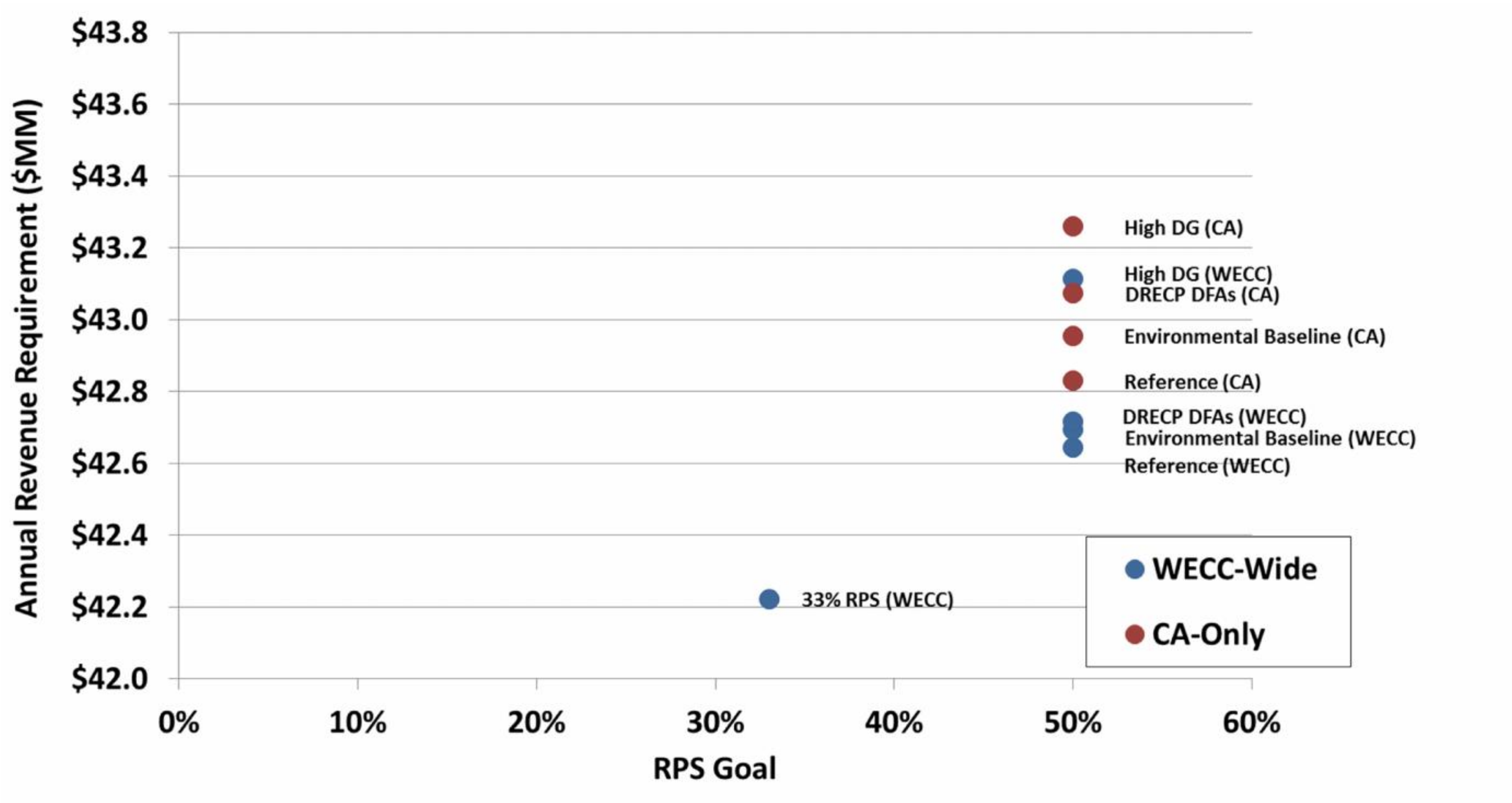
- Given very preliminary nature of EO analysis, results are provided for comparison purposes only

Category	Reference	Environmental Baseline	DRECP DFAs	High DG
	All Generic Resources	Change Relative to 50% RPS WECC-Wide Reference Case		
Solar (MW)	10,616	+1,567	+2,401	+1,575
Wind (MW)	6,652	-1,042	-1,458	+868
Geothermal (MW)	0	0	0	0
Change in Yearly Cost, 2030 ($MM)	$42,830	+$126 (0.3%)	+$243 (0.6%)	+$430 (1%)

*Access to OOS resources assumed to be limited for modeling purposes only.

EO Scenario Cost Summary

- EO reduces reference case costs relative to FCDS



Appendix B.

Detailed Results of Land Use and Policy Scenario Analysis

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Full Deliverability

	Base (MW)					Environmental Baseline (MW)					Difference (MW)				
Super CREZ	**Biogas**	**Biomass**	**Geotherm**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherm**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherm**	**Solar PV**	**Wind**
Barstow	-	-	-	-	91	-	-	-	-	86	-	-	-	-	(5)
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	20	-	-	-	-	31	-	-	-	-	11
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	-	96	-	-	-	-	143	-	-	-	-	47
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	52	-	-	-	-	57	-	-	-	-	5	-
Lassen North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Banos	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-
Mountain Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	-	104	-	-	-	104	-	-	-	-	104	(104)
Round Mountain - A	-	-	-	28	-	-	-	-	-	-	-	-	-	(28)	-
Round Mountain - B	-	-	-	-	-	-	-	-	-	28	-	-	-	-	28
Sacramento River	-	-	-	-	37	-	-	-	-	37	-	-	-	-	-
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	-	226	-	-	-	-	179	-	-	-	-	(47)
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solano	-	-	-	932	2,084	-	-	-	1,130	386	-	-	-	198	(1,698)
Tehachapi	-	-	-	3,618	389	-	-	-	3,685	321	-	-	-	68	(68)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	1,751	-	-	-	-	1,751	-	-	-	-	-	-

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Full Deliverability

	Base (MW)					Environmental Baseline (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
AZ_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_CT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UT_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WA_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EA	-	-	-	-	-	-	-	-	-	223	-	-	-	-	223
WY_EC	-	-	-	-	3,000	-	-	-	-	3,000	-	-	-	-	(0)
WY_NO	-	-	-	-	2,658	-	-	-	-	3,000	-	-	-	-	342
WY_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**6,380**	**8,738**	**-**	**-**	**-**	**6,727**	**7,467**	**-**	**-**	**-**	**347**	**(1,271)**

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Full Deliverability

	Base (MW)					DRECP (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
Barstow	-	-	-	-	91	-	-	-	-	59	-	-	-	-	(32)
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	20	-	-	-	-	33	-	-	-	-	13
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	-	96	-	-	-	-	-	-	-	-	-	(96)
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	52	-	-	-	-	84	-	-	-	-	32	-
Lassen North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Banos	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-
Mountain Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	-	104	-	-	-	102	-	-	-	-	102	(104)
Round Mountain - A	-	-	-	28	-	-	-	-	-	-	-	-	-	(28)	-
Round Mountain - B	-	-	-	-	-	-	-	-	-	28	-	-	-	-	28
Sacramento River	-	-	-	-	37	-	-	-	-	37	-	-	-	-	-
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	-	226	-	-	-	143	179	-	-	-	143	(47)
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solano	-	-	-	932	2,084	-	-	-	1,130	386	-	-	-	198	(1,698)
Tehachapi	-	-	-	3,618	389	-	-	-	3,894	113	-	-	-	276	(276)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	1,751	-	-	-	-	1,751	-	-	-	-	(0)	-

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Full Deliverability

	Base (MW)					DRECP (MW)					Difference (MW)				
Super CREZ	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**
AZ_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_CT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UT_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WA_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EA	-	-	-	-	-	-	-	-	-	300	-	-	-	-	300
WY_EC	-	-	-	-	3,000	-	-	-	-	3,000	-	-	-	-	(0)
WY_NO	-	-	-	-	2,658	-	-	-	-	3,000	-	-	-	-	342
WY_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**6,380**	**8,738**	**-**	**-**	**-**	**7,106**	**7,167**	**-**	**-**	**-**	**726**	**(1,572)**

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Full Deliverability

Super CREZ	Base (MW)					DG30 Set-Aside (MW)					Difference (MW)				
	Biogas	Biomass	Geotherm	Solar PV	Wind	Biogas	Biomass	Geotherm	Solar PV	Wind	Biogas	Biomass	Geotherm	Solar PV	Wind
Barstow	-	-	-	-	91	-	-	-	-	91	-	-	-	-	-
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	20	-	-	-	7,535	19	-	-	-	7,535	(2)
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	-	96	-	-	-	-	96	-	-	-	-	0
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	52	-	-	-	-	52	-	-	-	-	-	-
Lassen North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Banos	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-
Mountain Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	-	104	-	-	-	-	104	-	-	-	-	-
Round Mountain - A	-	-	-	28	-	-	-	-	-	-	-	-	-	(28)	-
Round Mountain - B	-	-	-	-	-	-	-	-	-	28	-	-	-	-	28
Sacramento River	-	-	-	-	37	-	-	-	-	37	-	-	-	-	-
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	-	226	-	-	-	-	226	-	-	-	-	-
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solano	-	-	-	932	2,084	-	-	-	-	1,516	-	-	-	(932)	(568)
Tehachapi	-	-	-	3,618	389	-	-	-	3,081	926	-	-	-	(537)	537
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	1,751	-	-	-	-	-	-	-	-	-	(1,751)	-

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Full Deliverability

	Base (MW)					DG30 Set-Aside (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
AZ_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_CT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UT_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WA_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EC	-	-	-	-	3,000	-	-	-	-	3,000	-	-	-	-	0
WY_NO	-	-	-	-	2,658	-	-	-	-	872	-	-	-	-	(1,786)
WY_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**6,380**	**8,738**	**-**	**-**	**-**	**10,667**	**6,947**	**-**	**-**	**-**	**4,288**	**(1,791)**

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Energy Only

	Base (MW)					Environmental Baseline (MW)					Difference (MW)				
Super CREZ	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**
Barstow	-	-	-	-	91	-	-	-	-	86	-	-	-	-	(5)
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	19	-	-	-	-	19	-	-	-	-	-
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	-	303	-	-	-	-	303	-	-	-	-	(0)
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	432	-	-	-	-	432	-	-	-	-	(0)	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	120	-	-	-	-	126	-	-	-	-	5	-
Lassen North	-	-	-	-	268	-	-	-	-	257	-	-	-	-	(11)
Los Banos	-	-	-	-	143	-	-	-	-	143	-	-	-	-	(0)
Mountain Pass	-	-	-	471	-	-	-	-	471	-	-	-	-	(0)	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	-	-	-	-	1,072	-	-	-	-	0	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	1,602	228	-	-	-	2,056	-	-	-	-	454	(228)
Round Mountain - A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Round Mountain - B	-	-	-	-	107	-	-	-	-	107	-	-	-	-	-
Sacramento River	-	-	-	-	493	-	-	-	-	464	-	-	-	-	(29)
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	222	249	-	-	-	(2)	(87)
Santa Barbara	-	-	-	-	399	-	-	-	-	276	-	-	-	-	(123)
Solano	-	-	-	-	1,016	-	-	-	-	253	-	-	-	-	(763)
Tehachapi	-	-	-	3,865	367	-	-	-	3,911	321	-	-	-	46	(46)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Energy Only

	Base (MW)					Environmental Baseline (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
AZ_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_CT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_EA	-	-	-	-	1,566	-	-	-	-	1,543	-	-	-	-	(23)
NM_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_SO	-	-	-	-	-	-	-	-	-	872	-	-	-	-	872
OR_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UT_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WA_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EC	-	-	-	-	2,141	-	-	-	-	2,141	-	-	-	-	(0)
WY_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**7,787**	**7,478**	**-**	**-**	**-**	**8,290**	**7,034**	**-**	**-**	**-**	**503**	**(443)**

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Energy Only

	Base (MW)					DRECP (MW)					Difference (MW)				
Super CREZ	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**
Barstow	-	-	-	-	91	-	-	-	-	59	-	-	-	-	(32)
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	19	-	-	-	-	19	-	-	-	-	-
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	-	303	-	-	-	-	-	-	-	-	-	(303)
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	432	-	-	-	-	432	-	-	-	-	0	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	120	-	-	-	-	152	-	-	-	-	32	-
Lassen North	-	-	-	-	268	-	-	-	-	257	-	-	-	-	(11)
Los Banos	-	-	-	-	143	-	-	-	-	143	-	-	-	-	(0)
Mountain Pass	-	-	-	471	-	-	-	-	-	-	-	-	-	(471)	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	-	-	-	-	2	-	-	-	-	(1,070)	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	1,602	228	-	-	-	3,307	-	-	-	-	1,705	(228)
Round Mountain - A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Round Mountain - B	-	-	-	-	107	-	-	-	-	107	-	-	-	-	-
Sacramento River	-	-	-	-	493	-	-	-	-	464	-	-	-	-	(29)
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	222	249	-	-	-	(2)	(87)
Santa Barbara	-	-	-	-	399	-	-	-	-	276	-	-	-	-	(123)
Solano	-	-	-	-	1,016	-	-	-	-	253	-	-	-	-	(763)
Tehachapi	-	-	-	3,865	367	-	-	-	4,097	135	-	-	-	232	(232)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Energy Only

	Base (MW)					DRECP (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
AZ_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_CT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_EA	-	-	-	-	1,566	-	-	-	-	1,362	-	-	-	-	(204)
NM_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_SO	-	-	-	-	-	-	-	-	-	1,106	-	-	-	-	1,106
OR_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UT_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WA_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EC	-	-	-	-	2,141	-	-	-	-	2,612	-	-	-	-	471
WY_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**7,787**	**7,478**	**-**	**-**	**-**	**8,212**	**7,042**	**-**	**-**	**-**	**426**	**(436)**

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Energy Only

	Base (MW)					DG30 Set-Aside (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
Barstow	-	-	-	-	91	-	-	-	-	175	-	-	-	-	83
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	19	-	-	-	7,535	19	-	-	-	7,535	-
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	-	303	-	-	-	-	303	-	-	-	-	0
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	432	-	-	-	-	144	-	-	-	-	(288)	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	120	-	-	-	-	52	-	-	-	-	(68)	-
Lassen North	-	-	-	-	268	-	-	-	-	268	-	-	-	-	-
Los Banos	-	-	-	-	143	-	-	-	-	143	-	-	-	-	(0)
Mountain Pass	-	-	-	471	-	-	-	-	-	-	-	-	-	(471)	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	-	-	-	-	-	-	-	-	-	(1,072)	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	1,602	228	-	-	-	-	228	-	-	-	(1,602)	-
Round Mountain - A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Round Mountain - B	-	-	-	-	107	-	-	-	-	107	-	-	-	-	-
Sacramento River	-	-	-	-	493	-	-	-	-	420	-	-	-	-	(74)
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	-	335	-	-	-	(225)	-
Santa Barbara	-	-	-	-	399	-	-	-	-	399	-	-	-	-	-
Solano	-	-	-	-	1,016	-	-	-	-	1,016	-	-	-	-	(0)
Tehachapi	-	-	-	3,865	367	-	-	-	2,626	926	-	-	-	(1,239)	558
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	273	-	-	-	-	273
Westlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Generic Resources Selected for 50% RPS by 2030 (WECC-Wide)

Energy Only

	Base (MW)					DG30 Set-Aside (MW)					Difference (MW)				
Super CREZ	Biogas	Biomass	Geotherm:	Solar PV	Wind	Biogas	Biomass	Geotherm:	Solar PV	Wind	Biogas	Biomass	Geotherm:	Solar PV	Wind
AZ_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AZ_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_CT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BC_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BJ_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ID_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NM_EA	-	-	-	-	1,566	-	-	-	-	361	-	-	-	-	(1,205)
NM_SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NV_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OR_WE						-	-	-	-	-	-	-	-	-	-
UT_WE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WA_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_EC	-	-	-	-	2,141	-	-	-	-	2,612	-	-	-	-	471
WY_NO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WY_SO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**7,787**	**7,478**	**-**	**-**	**-**	**10,356**	**7,585**	**-**	**-**	**-**	**2,570**	**107**

Generic Resources Selected for 50% RPS by 2030 (CA-Only)

Full Deliverability

	Base (MW)					Environmental Baseline (MW)					Difference (MW)				
	Biogas	Biomass	Geotherm:	Solar PV	Wind	Biogas	Biomass	Geotherm:	Solar PV	Wind	Biogas	Biomass	Geotherm:	Solar PV	Wind
Barstow	-	-	-	-	175	-	-	-	-	92	-	-	-	-	(83)
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	105	-	-	-	-	200	-	-	-	-	95
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	564	303	-	-	-	-	303	-	-	-	(564)	(0)
Imperial North	-	-	347	-	-	-	-	861	-	-	-	-	513	-	-
Imperial South	-	-	27	-	-	-	-	27	-	-	-	-	-	-	-
Inyokern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	1,427	-	-	-	-	2,182	-	-	-	-	756	-
Lassen North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Banos	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-
Mountain Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	103	-	-	-	-	-	-	-	-	(1,072)	(103)
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	701	228	-	-	-	104	-	-	-	-	(597)	(228)
Round Mountain - A	-	-	-	28	-	-	-	-	-	-	-	-	-	(28)	-
Round Mountain - B	-	-	-	-	-	-	-	-	-	28	-	-	-	-	28
Sacramento River	-	-	-	-	1,537	-	-	-	-	1,537	-	-	-	-	0
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	69	-	-	-	-	69	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	134	249	-	-	-	(90)	(87)
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solano	-	-	-	932	2,084	-	-	-	2,630	386	-	-	-	1,698	(1,698)
Tehachapi	-	-	-	3,618	389	-	-	-	3,685	321	-	-	-	68	(68)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	733	-	-	-	1,292	268	-	-	-	1,292	(465)
Westlands	-	-	-	1,751	-	-	-	-	1,751	-	-	-	-	-	-
Total	**-**	**-**	**374**	**10,316**	**6,094**	**-**	**-**	**888**	**11,778**	**3,486**	**-**	**-**	**513**	**1,462**	**(2,609)**

Generic Resources Selected for 50% RPS by 2030 (CA-Only)

Full Deliverability

	Base (MW)					DRECP (MW)					Difference (MW)				
	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
Barstow	-	-	-	-	175	-	-	-	-	60	-	-	-	-	(115)
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	105	-	-	-	-	213	-	-	-	-	107
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	564	303	-	-	-	-	-	-	-	-	(564)	(303)
Imperial North	-	-	347	-	-	-	-	509	-	-	-	-	161	-	-
Imperial South	-	-	27	-	-	-	-	27	-	-	-	-	-	-	-
Inyokern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	1,427	-	-	-	20	1,523	-	-	-	20	97	-
Lassen North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Banos	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-
Mountain Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	103	-	-	-	2	16	-	-	-	(1,070)	(86)
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	701	228	-	-	-	2,085	-	-	-	-	1,384	(228)
Round Mountain - A	-	-	-	28	-	-	-	-	-	-	-	-	-	(28)	-
Round Mountain - B	-	-	-	-	-	-	-	-	-	28	-	-	-	-	28
Sacramento River	-	-	-	-	1,537	-	-	-	-	1,537	-	-	-	-	0
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	69	-	-	-	185	-	-	-	-	185	(69)
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	222	249	-	-	-	(2)	(87)
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solano	-	-	-	932	2,084	-	-	-	2,630	386	-	-	-	1,698	(1,698)
Tehachapi	-	-	-	3,618	389	-	-	-	3,894	113	-	-	-	276	(276)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	733	-	-	-	2,021	94	-	-	-	2,021	(638)
Westlands	-	-	-	1,751	-	-	-	-	1,751	-	-	-	-	-	-
Total	**-**	**-**	**374**	**10,316**	**6,094**	**-**	**-**	**556**	**14,313**	**2,728**	**-**	**-**	**181**	**3,997**	**(3,366)**

Generic Resources Selected for 50% RPS by 2030 (CA-Only)

Full Deliverability

	Base (MW)					DG30 Set-Aside (MW)					Difference (MW)				
	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
Barstow	-	-	-	-	175	-	-	-	-	175	-	-	-	-	-
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	105	-	-	-	7,535	108	-	-	-	7,535	3
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	564	303	-	-	-	-	96	-	-	-	(564)	(207)
Imperial North	-	-	347	-	-	-	-	-	-	-	-	-	(347)	-	-
Imperial South	-	-	27	-	-	-	-	-	-	-	-	-	(27)	-	-
Inyokern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	1,427	-	-	-	-	954	-	-	-	-	(472)	-
Lassen North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Banos	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-
Mountain Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	103	-	-	-	-	-	-	-	-	(1,072)	(103)
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	701	228	-	-	-	-	104	-	-	-	(701)	(124)
Round Mountain - A	-	-	-	28	-	-	-	-	-	-	-	-	-	(28)	-
Round Mountain - B	-	-	-	-	-	-	-	-	-	28	-	-	-	-	28
Sacramento River	-	-	-	-	1,537	-	-	-	-	1,537	-	-	-	-	0
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	69	-	-	-	-	69	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	-	226	-	-	-	(225)	(110)
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solano	-	-	-	932	2,084	-	-	-	741	2,275	-	-	-	(191)	191
Tehachapi	-	-	-	3,618	389	-	-	-	3,081	926	-	-	-	(537)	537
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	733	-	-	-	-	846	-	-	-	-	113
Westlands	-	-	-	1,751	-	-	-	-	1,751	-	-	-	-	(0)	-
Total	**-**	**-**	**374**	**10,316**	**6,094**	**-**	**-**	**-**	**14,061**	**6,422**	**-**	**-**	**(374)**	**3,745**	**328**

Generic Resources Selected for 50% RPS by 2030 (CA-Only)

Energy Only

	Base (MW)					Environmental Baseline (MW)					Difference (MW)				
	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
Barstow	-	-	-	-	91	-	-	-	-	86	-	-	-	-	(5)
Carrizo North	-	-	-	-	-	-	-	-	-	56	-	-	-	-	56
Carrizo South	-	-	-	-	58	-	-	-	235	177	-	-	-	235	119
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	31	-	-	-	-	81	-	-	-	-	50
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	1,211	303	-	-	-	1,381	303	-	-	-	170	(0)
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	432	-	-	-	-	432	-	-	-	-	(0)	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	120	-	-	-	-	126	-	-	-	-	5	-
Lassen North	-	-	-	-	1,244	-	-	-	-	1,332	-	-	-	-	89
Los Banos	-	-	-	-	143	-	-	-	-	143	-	-	-	-	(0)
Mountain Pass	-	-	-	471	-	-	-	-	471	-	-	-	-	(0)	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	151	-	-	-	1,072	16	-	-	-	0	(134)
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	3,220	228	-	-	-	3,582	-	-	-	-	362	(228)
Round Mountain - A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Round Mountain - B	-	-	-	-	133	-	-	-	-	133	-	-	-	-	(0)
Sacramento River	-	-	-	-	2,027	-	-	-	-	1,939	-	-	-	-	(89)
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	222	249	-	-	-	(2)	(87)
Santa Barbara	-	-	-	-	525	-	-	-	-	388	-	-	-	-	(137)
Solano	-	-	-	-	1,016	-	-	-	-	386	-	-	-	-	(630)
Tehachapi	-	-	-	3,865	367	-	-	-	3,911	321	-	-	-	46	(46)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	-	-	-	-	-	751	-	-	-	-	751	-
Total	**-**	**-**	**-**	**10,616**	**6,652**	**-**	**-**	**-**	**12,183**	**5,610**	**-**	**-**	**-**	**1,567**	**(1,042)**

Generic Resources Selected for 50% RPS by 2030 (CA-Only)

Energy Only

	Base (MW)					DRECP (MW)					Difference (MW)				
	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind	Biogas	Biomass	Geotherma	Solar PV	Wind
Barstow	-	-	-	-	91	-	-	-	-	59	-	-	-	-	(32)
Carrizo North	-	-	-	-	-	-	-	-	-	56	-	-	-	-	56
Carrizo South	-	-	-	-	58	-	-	-	606	50	-	-	-	606	(8)
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	31	-	-	-	-	213	-	-	-	-	181
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	1,211	303	-	-	-	146	-	-	-	-	(1,064)	(303)
Imperial North	-	-	-	-	-	-	-	-	1,538	-	-	-	-	1,538	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	432	-	-	-	-	432	-	-	-	-	0	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	120	-	-	-	-	152	-	-	-	-	32	-
Lassen North	-	-	-	-	1,244	-	-	-	-	1,332	-	-	-	-	89
Los Banos	-	-	-	-	143	-	-	-	-	143	-	-	-	-	(0)
Mountain Pass	-	-	-	471	-	-	-	-	-	-	-	-	-	(471)	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	151	-	-	-	2	16	-	-	-	(1,070)	(134)
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	3,220	228	-	-	-	3,436	-	-	-	-	216	(228)
Round Mountain - A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Round Mountain - B	-	-	-	-	133	-	-	-	-	133	-	-	-	-	(0)
Sacramento River	-	-	-	-	2,027	-	-	-	-	1,939	-	-	-	-	(89)
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	222	249	-	-	-	(2)	(87)
Santa Barbara	-	-	-	-	525	-	-	-	-	388	-	-	-	-	(137)
Solano	-	-	-	-	1,016	-	-	-	233	482	-	-	-	233	(534)
Tehachapi	-	-	-	3,865	367	-	-	-	4,097	135	-	-	-	232	(232)
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Westlands	-	-	-	-	-	-	-	-	2,151	-	-	-	-	2,151	-
Total	**-**	**-**	**-**	**10,616**	**6,652**	**-**	**-**	**-**	**13,016**	**5,194**	**-**	**-**	**-**	**2,401**	**(1,458)**

Generic Resources Selected for 50% RPS by 2030 (CA-Only)

Energy Only

	Base (MW)					DG30 Set-Aside (MW)					Difference (MW)				
	Biogas	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**	**Biogas**	**Biomass**	**Geotherma**	**Solar PV**	**Wind**
Barstow	-	-	-	-	91	-	-	-	-	175	-	-	-	-	83
Carrizo North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carrizo South	-	-	-	-	58	-	-	-	-	23	-	-	-	-	(35)
Central Valley North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuyama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Distributed	-	-	-	-	31	-	-	-	7,535	20	-	-	-	7,535	(11)
El Dorado	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial East	-	-	-	1,211	303	-	-	-	-	303	-	-	-	(1,211)	0
Imperial North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Imperial South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inyokern	-	-	-	432	-	-	-	-	144	-	-	-	-	(288)	-
Iron Mountain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kramer	-	-	-	120	-	-	-	-	52	-	-	-	-	(68)	-
Lassen North	-	-	-	-	1,244	-	-	-	-	1,368	-	-	-	-	124
Los Banos	-	-	-	-	143	-	-	-	-	143	-	-	-	-	(0)
Mountain Pass	-	-	-	471	-	-	-	-	422	-	-	-	-	(49)	-
Owens Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palm Springs	-	-	-	1,072	151	-	-	-	-	151	-	-	-	(1,072)	-
Pisgah	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riverside East	-	-	-	3,220	228	-	-	-	507	228	-	-	-	(2,713)	-
Round Mountain - A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Round Mountain - B	-	-	-	-	133	-	-	-	-	133	-	-	-	-	-
Sacramento River	-	-	-	-	2,027	-	-	-	-	1,903	-	-	-	-	(124)
San Bernardino - Baker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Bernardino - Lucerne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego North Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego South	-	-	-	225	335	-	-	-	225	335	-	-	-	-	-
Santa Barbara	-	-	-	-	525	-	-	-	-	525	-	-	-	-	-
Solano	-	-	-	-	1,016	-	-	-	-	1,016	-	-	-	-	(0)
Tehachapi	-	-	-	3,865	367	-	-	-	3,307	926	-	-	-	(558)	558
Twentynine Palms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victorville	-	-	-	-	-	-	-	-	-	273	-	-	-	-	273
Westlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**10,616**	**6,652**	**-**	**-**	**-**	**12,190**	**7,521**	**-**	**-**	**-**	**1,575**	**868**

Appendix C.

Scenario Results Assuming Energy Only Procurement

a. Energy Only Scenario Results

Version 6.1 of the RPS Calculator includes the ability to simulate procurement of resources that are contracted to provide energy, but not capacity. Such projects are called "energy only" (EO) projects in contrast to projects that achieve "full capacity deliverability status" (FCDS). Because they do not require transmission infrastructure to deliver capacity, the RPS Calculator does not trigger transmission system upgrades on behalf of EO projects.

CAISO estimated the regional capacity limits for adding new EO renewable resources. A special study is being performed by CAISO in the 2015 TPP that will assess the validity of those estimates and inform Track 1 of the RPS Calculator overhaul process. Because the regional capacity limits have not yet been validated, the scenarios presented in the staff paper "Incorporating Land Use and Environmental Information into the RPS Calculator and Developing and Selecting Portfolios" assume all projects achieve Full Capacity deliverability status.

For the sake of comparison, the scenarios were also modeled assuming generic resources are always EO projects (unless existing transmission infrastructure allows them to be FCDS projects). These results are presented below. All other inputs and assumptions associated with each scenario and reference case are the same as those described in the staff paper.

There were two notable results from this analysis, which should be considered preliminary.

1. Energy Only procurement reduced the overall cost in reference cases.
2. Energy Only procurement did not consistently dampen or exacerbate the impacts of land-use restrictions on resource mix or costs.

b. Reference Cases

Table C1. Total procurement of generic renewable energy resources in reference cases used to measure scenario impacts (Year 2030 data for 50% RPS in 2030 policy).

Category	Reference Case Totals	
	Unlimited Access to Out-of-State Resources*	No Access to Out-of-State Resources**
Solar PV (MW)	7,787	10,616
Wind (MW)	7,478	6,652
Geothermal (MW)	0	0
Yearly Cost, 2030 ($MM)	$42,644	$42,830

*assumes unlimited access to OOS renewable resources
**assumes no access to OOS renewable resources

c. Environmental Baseline Scenario

Table 4. Impacts on renewable energy procurement of excluding RETI Category 2 land (Year 2030 data for 50% RPS in 2030 policy), assuming energy-only procurement and no transmission upgrades.

Category	Impacts	
	Unlimited Access to Out-of-State Resources*	No Access to Out-of-State Resources**
Solar PV (MW)	+503	+1,567
Wind (MW)	-443	-1,042
Geothermal (MW)	0	0
Change in Yearly Cost, 2030 ($MM)	+$50 (0.1%)	+$126 (0.3%)

*scenario and reference both assume unlimited access to OOS renewable resources.
**scenario and reference both assume no access to OOS renewable resources

d. DRECP DFAs Scenario

Table 5. Impacts on renewable energy procurement of excluding non-DFA land in DRECP and RETI Category 2 land (Year 2030 data for 50% RPS in 2030 policy) , assuming energy-only procurement and no transmission upgrades.

	Impacts	
Category	**Unlimited Access to Out-of-State Resources***	**No Access to Out-of-State Resources****
Solar PV (MW)	+426	+2,401
Wind (MW)	-436	-1,458
Geothermal (MW)	0	0
Change in Yearly Cost, 2030 ($MM)	+$73 (0.2%)	+$243 (0.6%)

*scenario and reference both assume unlimited access to OOS renewable resources.
**scenario and reference both assume no access to OOS renewable resources.

e. Salt-Affected Farmland Scenario

Table 8. Solar PV resource potential of salt-affected, idle farmland and the amount of economic solar PV by SuperCREZ (Year 2030 data for 50% RPS in 2030 policy).

SuperCREZ	Salt-Affected Farmland Solar PV Resource Potential (MW)	Economic Solar PV in Reference Case (MW)	Fraction of Salt-Affected Solar PV Potential That is Economic (%)
Carrizo North	0.1	0	0%
Imperial North	1.2	0	0%
Imperial South	4.6	0	0%
Los Banos	0.5	0	0%
Palm Springs	0.2	1,072	100%
Riverside East	192.4	1,602	100%
Sacramento River Valley	68.5	0	0%
San Benito County	3.1	0	0%
Santa Clara County	0.2	0	0%
Solano	21.4	0	0%
Westlands	1,389.6	0	0%
Total	**1,682**	**2,674**	**11%***

*Calculated as (0.2*100% + 192.4*100%)/1,682

The differences between the EO and FCDS results for the Salt-Affected Farmland scenario are driven by the fact that when projects are selected as EO resources only, Westlands is not selected for development. This in turn, is driven by the apparent lack existing transmission capacity available to serve Westlands resources. It is possible that further study of the Westlands area may reveal additional transmission capacity and alter these results.

f. High DG Scenario

Table 9. Impacts on renewable energy procurement of excluding out of state renewable energy resources (Year 2030 data for 50% RPS in 2030 policy), assuming energy-only procurement and no transmission upgrades.

	Impacts	
Category	**Unlimited Access to Out-of-State Resources***	**No Access to Out-of-State Resources****
Solar PV (MW)	+2,570	+1,575
Wind (MW)	+107	+868
Geothermal (MW)	0	0
Change in Yearly Cost, 2030 ($MM)	+$471 (1.1%)	+$430 (1.0%)

*scenario and reference both assume unlimited access to OOS renewable resources.
**scenario and reference both assume no access to OOS renewable resources

Appendix D.

Protocol for Submitting Environmental Methodology Proposals

a. Environmental Methodology Proposal Submittal Guidelines

Energy Division will review and evaluate proposals for incorporating land use and environmental in the RPS Calculator. Based on the proposals received, Energy Division plans to prepare a set of methodologies for further stakeholder vetting at a public webinar and/or workshop. Each dataset Energy Division prepares for public review may reflect a unique methodology or combination of methodologies submitted by parties.

Parties may submit two types of methodologies: interim or final. Only interim methodologies will be reviewed in 2015. Interim methodologies are limited to geospatial datasets that reflect land meeting the definition of either RETI Category 1 or RETI Category 2 (see definitions below and footnote 13 and the section "Screening" in the staff paper for additional information). These datasets will be used to create alternative versions of the resource potential that could be used for multi-scenario, least-regrets planning. Final methodologies will be reviewed in 2016 and presented in a separate public workshop.

i. Proposal Review Criteria

For a proposal to be considered, at least three types of information must be transmitted: rationale, references, and GIS data. If the proposed methodology consists of something other than geospatial datasets that can be used to modify the resource potential, then parties must also submit a methodology specification. Table D1 provides a summary of the types of information that must be submitted for each proposed environmental methodology and how to submit each type of information.

The rationale, references, and specification (if applicable) should be filed as formal comments in response to this ruling together any other comments related to questions or requests in the staff paper and/or ruling.

Use the Commission's file transfer protocol (ftp) site to transmit GIS data representing your proposed screen. Instructions for accessing and using the Commission's ftp site are provided at the end of this appendix. Within the ftp site, please transmit files to Forest Kaser using the email address Forest.Kaser@cpuc.ca.gov. Please do not email your files directly using your email program as size and storage limits may prevent your files from being successfully transmitted.

ii. <u>GIS Data Naming Convention</u>

Please observe the following naming convention for GIS data uploaded to the ftp site:

"6.1_[proposal type]_[RETI category]_[party abbreviation]_[descriptive title]"

Example:

"6.1_interim_2_ORA_NoSacValleyWind"

The elements of the naming convention are described below.

<u>Proposal Type</u>

- interim: for use in 2015 for developing portfolios for 2016 LTPP and 2016-2017 TPP only
- final: for use in 2016 and later

<u>RETI Category</u>

- 1: areas where law or policy currently prohibits renewable development
- 2: areas where existing restrictions are intended to limit potential renewable development
- X: not applicable (for other type of methodology – not permitted for interim proposals)

<u>Party Abbreviation:</u> a short abbreviation of the submitting party's name

<u>Descriptive Title:</u> a short title for the dataset that reflects its most important characteristic(s)

Table D1. Summary of Guidelines for Submitting Interim Environmental Methodology Proposals for RPS Calculator

Content	Type of Communication	Record Status	Filing Location	Acceptable Formats
1. Rationale for the dataset a. Uniqueness b. Significance c. Plausibility	Formal Comments	On Record	e-file: http://efile.cpuc.ca.gov/thin/cp.exe	Portable Document Format /Archive(.pdf/a)
2. References to data sources used to build dataset				
3. Specification (required only if proposal is other than a geospatial dataset)				
4. GIS dataset	Communication to Staff	Off Record	ftp site: https://cpucftp.cpuc.ca.gov/ naming convention: "6.1_[proposal type]_[RETI category]_[party abbreviation]_[descriptive title]"	GIS datasets: • layer package (.lpk) • shapefile (.shp, .shx, dbf, .sbn) • ESRI db (.mdb, .gdb) • Google earth file

iii. Detailed Explanation of Proposal Content Requirements

The rationale must include a narrative justification for evaluating the screen that addresses the following criteria: uniqueness, significance, and plausibility. Proposals will be evaluated based on the extent to which they meet these criteria.

- Uniqueness refers to the difference between the proposed screen and the other screens available in RPS Calculator version 6.1 (for example, RETI Category 1, RETI Category 2, and DRECP DFA).[1] Proposed screens must be materially different from the other, currently available, screens.
- Significance refers to the expected impact of the screen on portfolio composition or resource locations. In general, the larger the impact on a particular resource type in a particular area, the greater the significance of the screen.
- Plausibility refers to the likelihood that the screen reflects a realistic market, policy, or technical constraint or set of constraints. For example, a screen to exclude land in odd-numbered zip codes would be implausible because there is no reasonable market, policy, or technical constraint that would be reflected in such a screen.

The references section of the proposal should include a description of any data sources used to generate the screen as well as information on where and how to obtain the data, such as a URL.

The specification section of the proposal is only required if the proposed methodology is something other than a geospatial dataset. If included, the specification should list the inputs, outputs, and key functional attributes of the methodology. If scoring or weighting is used, a detailed explanation of the scoring and/or weighting criteria and valuation approach must be included.

The GIS data should use closed polygons to delineate those areas that parties propose to exclude from the supply curve used in the RPS Calculator. Attributes associated with the polygons should indicate to which resource types (solar PV, wind, bioenergy, etc.) the exclusion applies. Please also include the party name and screen name in the metadata.

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[1] Datasets representing the screens available in the RPS Calculator version 6.1 can be accessed on DataBasin at: http://databasin.org/maps/9f1b0370b3a64147b3f07c996f5e58af

CPUC Secure File Transfer (SFTP) – How to access and exchange files on the CPUC SFTP website/interface

SUMMARY

This article explains how to access the CPUC Secure File Transfer Protocol (SFTP) website/interface to receive and send large files (up to 500 MB) securely between external user and CPUC.

Note: if a SFTP account that is not used (logged in to) in 30 days, the inactive account is deleted along with all files uploaded within the account. The external user will need to click on the "**I don't have an account yet**" link to re-register.

HOW TO ACCESS THE CPUC SFTP WEBSITE/INTERFACE (https://cpucftp.cpuc.ca.gov):

1. As an External user
2. Via email invitation from CPUC

QUICK LINKS:

- Receiving files from CPUC
- Sending files to CPUC
- File Management

HOW TO ACCESS THE CPUC SFTP WEBSITE/INTERFACE

1. **External user** can go to CPUC SFTP website/interface and click on the "**I don't have an account yet**" link to register. (See Figure 1)

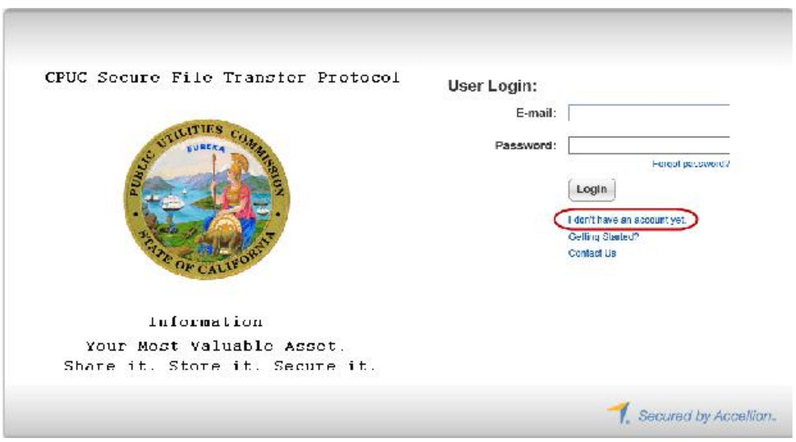


Figure 1

1A. In the E-mail field, type in your email address (e.g. sam@abc.com) and click on the "**Register**" button. (See Figure 1A)

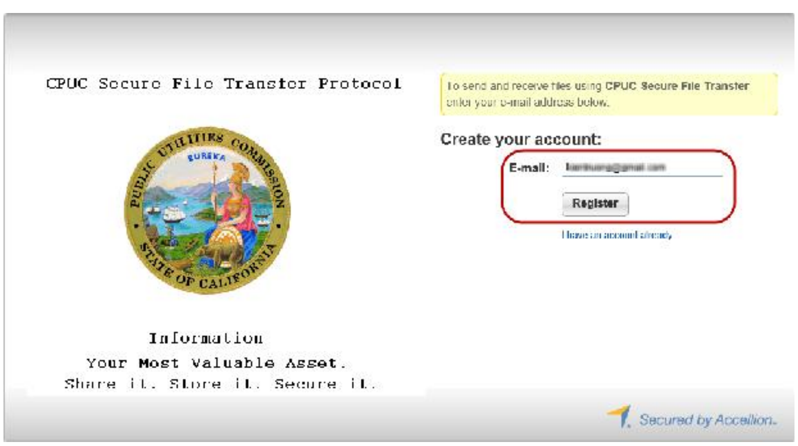


Figure 1A

1B. Go to your email inbox and look for an email coming from “**ftpadmin@cpuc.ca.gov”** with a subject line of “**CPUC Secure FTP Registration Email Verification**”. Click on the “**https:…**” link in the email to continue with the registration. If you have not received the registration email after a short period of time, please check your spam folder. (See Figure 1B)

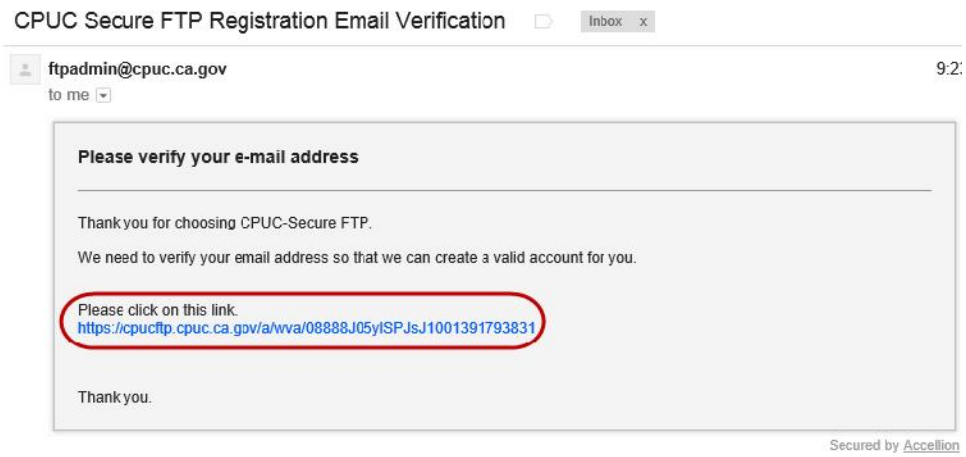


Figure 1B

1C. In the “**Create a Password**” and “**Re-type Password**” field, type in the password and click on the “**Register**” button. (See Figure 1C). Password must be at least 6 characters long (must contain 1 number, 1 uppercase - ie: “Password1”).

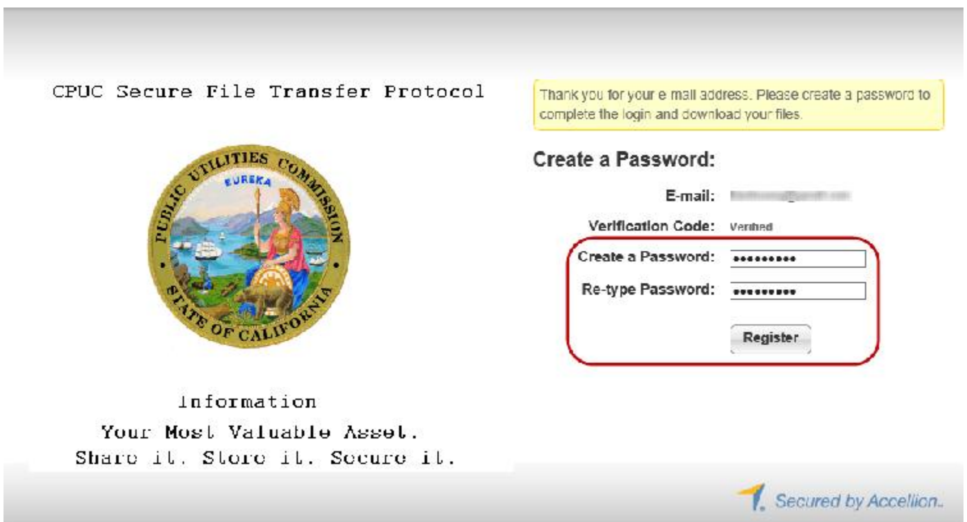


Figure 1C

1D. Upon successful registration, the below message should appear, and immediately forward you to the home page of the [CPUC SFTP website/interface](#) to login. (See Figure 1D)

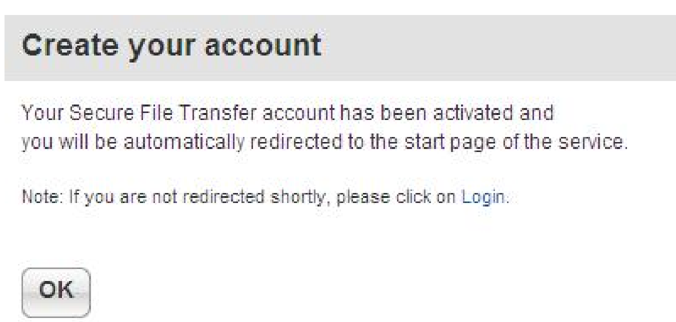


Figure 1D

2. **Via email invitation from CPUC**. Below is an example of the invitation to the external user. The invitation link is only valid for 7 hours. Click on the "**https:…**" link in the email to continue with the registration. (See Figure 2)

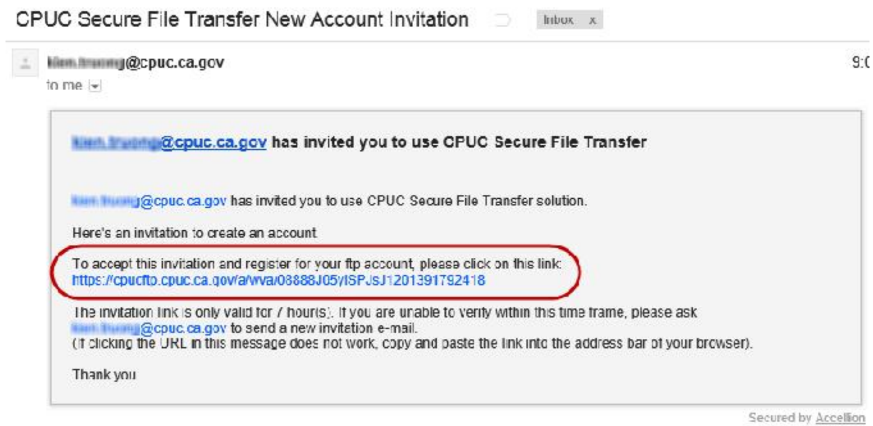


Figure 2

2A. In the "**Create a Password**" and "**Re-type Password**" field, type in the password and click on the "**Register**" button. (See Figure 2A). Upon successful registration, you will be re-directed to the CPUC SFTP website/interface to login.

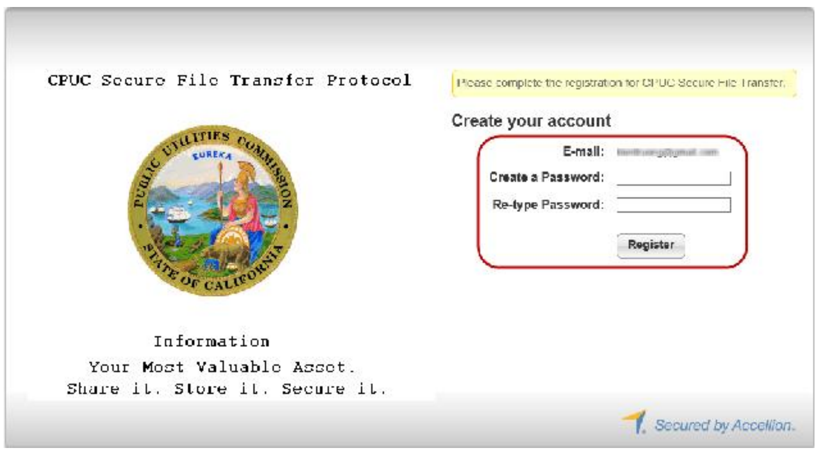


Figure 2A

RECEIVING FILES FROM CPUC: Below is an example of a secure message from CPUC. User has 2 ways to download the file.

1. User can click on the download link in the email to download the file via a secure link. (See Figure 3).
2. User can also go directly to CPUC SFTP website/interface to login and download the file.

NOTE: If you are receiving a secure message from CPUC for the first time, clicking on the link will start the registration process. Please follow the registration wizard.

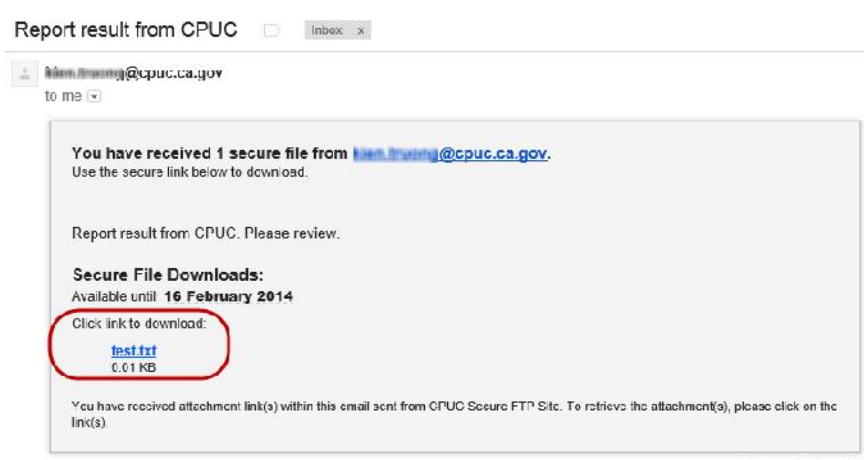


Figure 3

Before you can download the file, type in your email address (e.g. sam@abc.com) and click on the "**Submit**" button. (See Figure 3A)

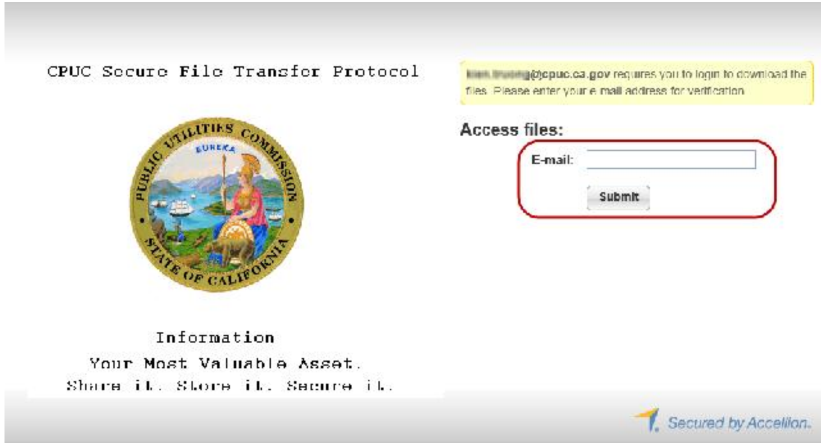


Figure 3A

Then type in your password and click on the "**Download**" button. (See Figure 3B)

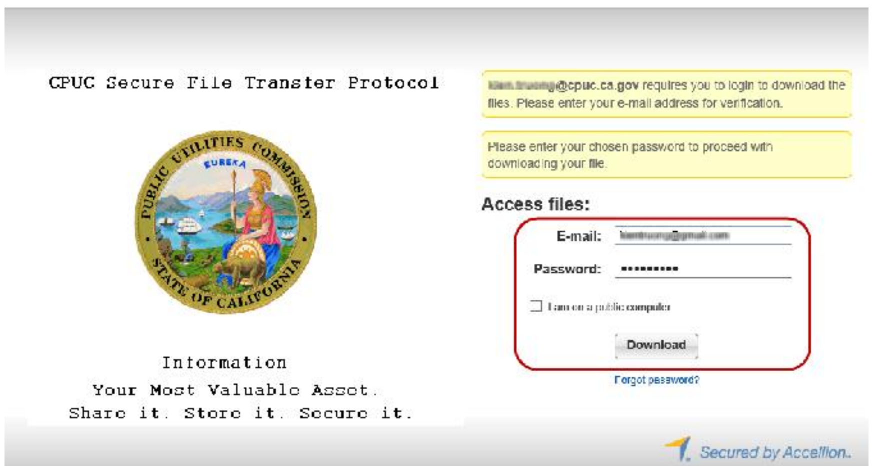


Figure 3B

In the "**Download Files**" window, you will have the options to Open or Save the file. (See Figure 3C)

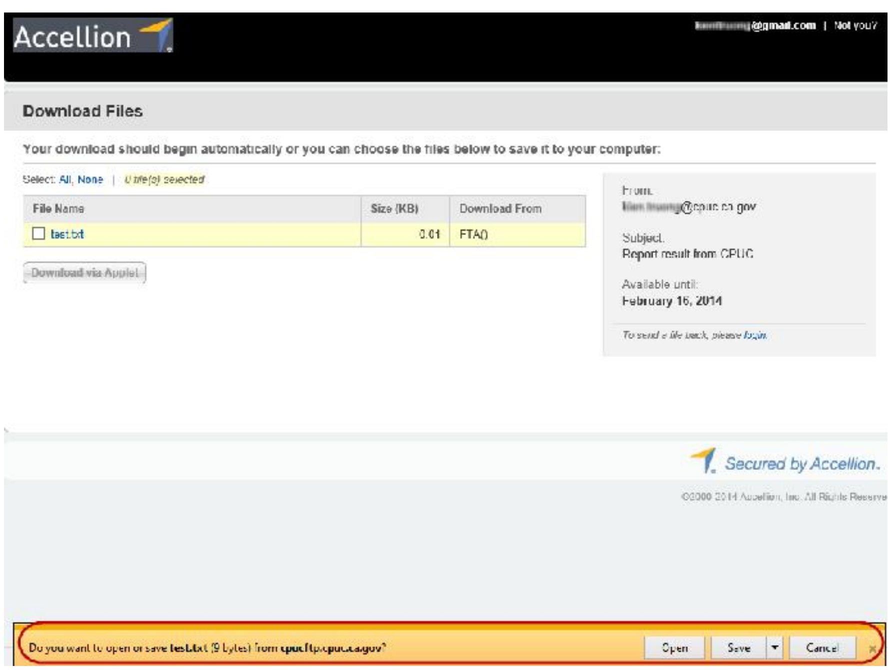


Figure 3C

SENDING FILES TO CPUC: The external user will need to log into the [CPUC SFTP website/interface]() and type in your email and password. Click on the “Login” button to login. (See Figure 4A)

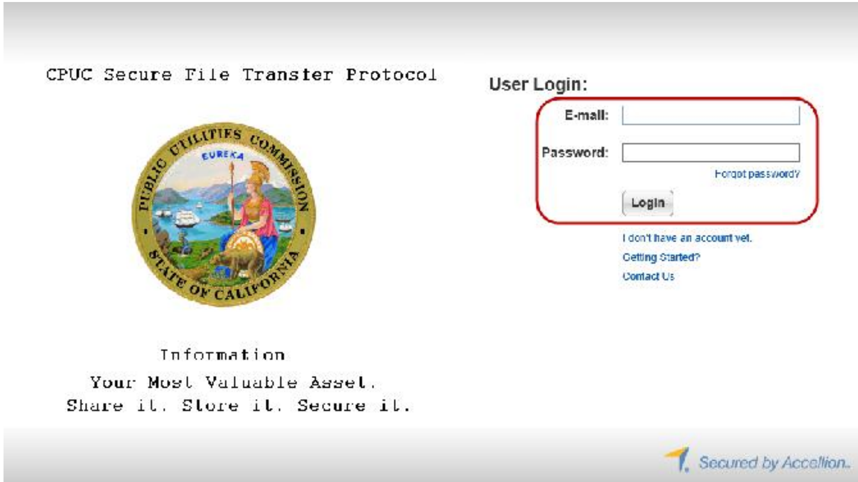


Figure 4A

To send a file, click on the “**Send File**” tab. Please complete fields and click on the “**Send**” button when ready to send. (See Figure 4B)

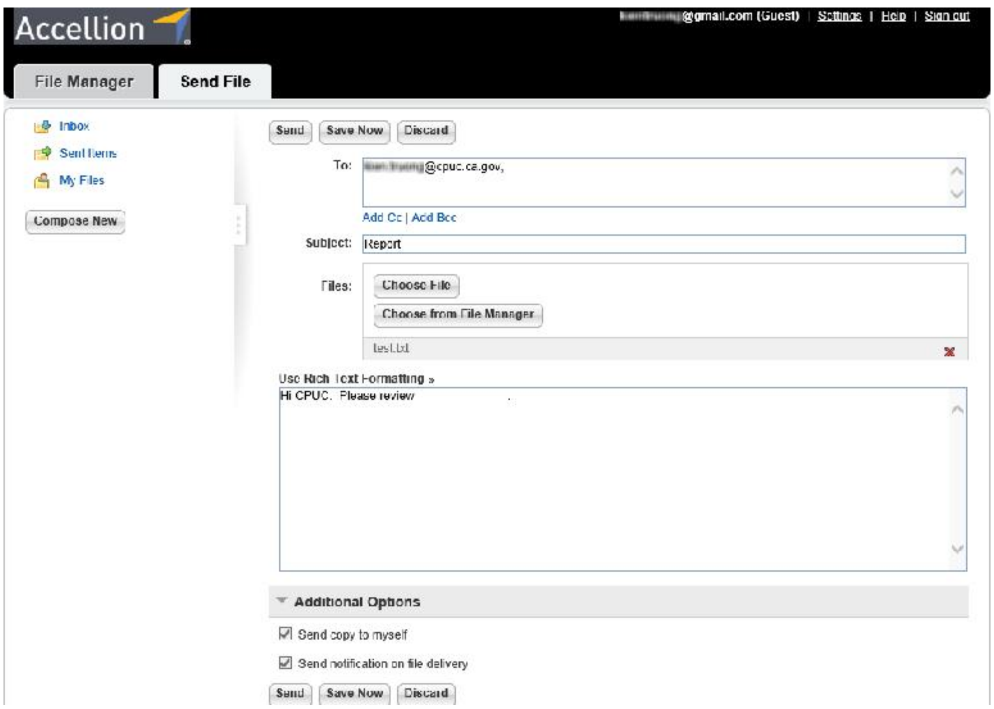


Figure 4B

A “**Send File**” window will appear. Click on the “**OK**” button to continue. (See Figure 4C)

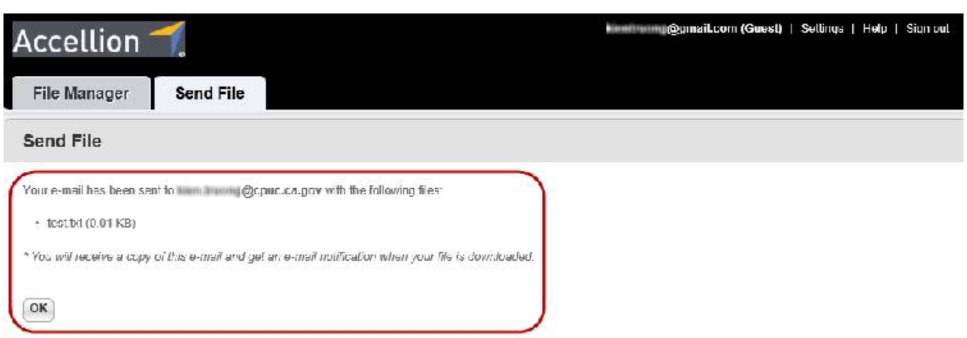


Figure 4C

Once the message is sent to CPUC, the sender will also receive a copy of the outbound email. (See Figure 4D)

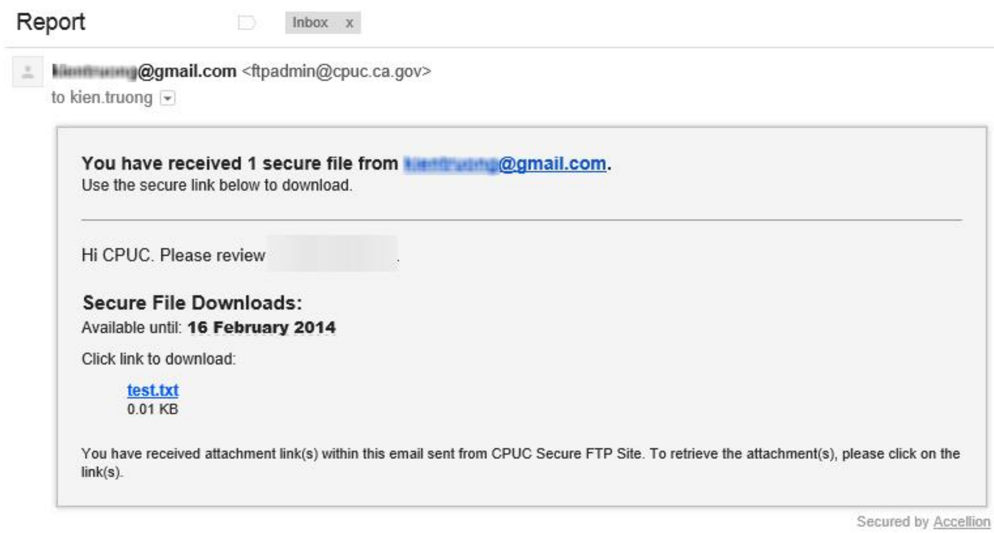


Figure 4D

Once the recipient (CPUC) download the file, the sender will receive a receipt notification email. (See Figure 4E)

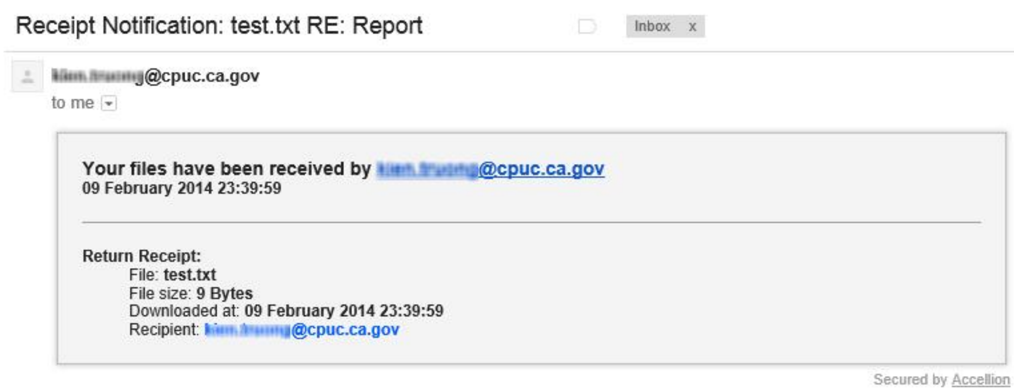
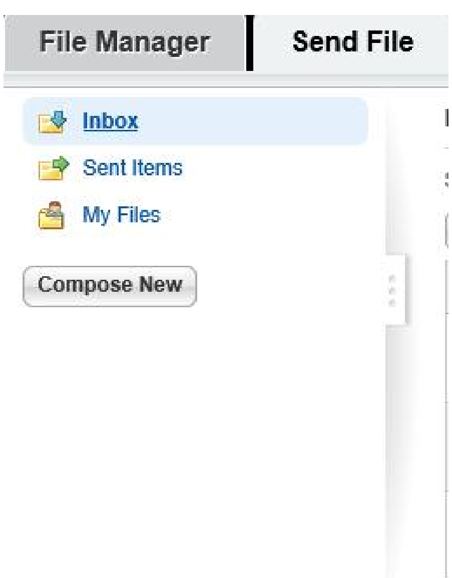


Figure 4E

FILE MANAGEMENT



- **Inbox** shows a list of messages and files you have received.
- **Sent Items** shows the files you have sent. From here, you can re-send only the file or re-send message with the attachment.
- **My Files** shows all the files you have uploaded. From here, you can send files, download your files, delete files, view reports on your files, or add files.

Appendix E.

History of Environmental Information in Generation and Transmission Planning Activities

Table E1. Overview environmental methodologies in previous generation and transmission planning activities in the Western U.S..

	RETI Phase 1B and 2B	WREZ	LTPP 2010	LTPP 2012-2014	WECC EDTF
Timeframe when it was developed	2008 (1B) and 2010 (2B)	2009	2010	2012	2012
Numerical scoring	Yes		Yes	Yes	
Mapping of environmental screens	Yes	Yes			Yes
Stakeholder vetted	Yes	Yes	Yes	Limited, after development	Yes
Data sources	Federal, State or Province, NGO, Vendors	Federal, State or Province, NGO, Vendors	Same as RETI, with updates	Largely DRECP data	Federal, State or Province, NGO, Vendors, Other Studies, Tribal, some earlier RETI and WREZ sources
Ease of application	Time consuming ranking of each CREZ. Not for individaul projects; many are outside CREZs.	Easy - GIS based for resource assessment only	Based on RETI with updates	Relatively easy, but requires project specific location data	Easy - GIS based for transmission routing
Generation or transmission focus	Generation & needed transmission for CREZ	Generation	Generation	Generation	Transmission
Geography	California	WECC	California	California	WECC
Applications	Resource assessment, CREZ ranking	Resource assessment	Environmental scoring in 2010 LTPP	Environmental scoring in 2012-2014 LTPP	Transmission planning