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American Clean Power-California Comments

Additional submitted attachment is included below.



March 5, 2026

California Energy Commission
Docket No. 23-SB-100
715 P Street
Sacramento, California 95814

RE: Workshop on 2025 SB 100 Joint Agency Report Draft Results

American Clean Power – California (“ACP-California”) appreciates this opportunity to provide the following comments and responses to the California Energy Commission (“CEC”), California Public Utilities Commission (“CPUC”) and California Air Resources Board (“CARB”) (collectively the “Joint Agencies”) February 19, 2026 SB 100 Draft Results Workshop. The SB 100 process is essential for the thoughtful consideration of the challenges and alternatives to achieving the state’s SB 100 goals. As such, we appreciate the presentation of the updated draft results and the panel on implementation challenges and opportunities, both of which illustrated potential tradeoffs, barriers, and solutions as California continues to transition its electric system to meet the SB 100 targets.

Our comments focus on key observations from the draft results presentation and offer recommendations for future policy and planning. We would further appreciate the opportunity to review and comment on a full set of draft results as well as a draft report before either are finalized by the Commission.

I. Modeling Approach, Inputs and Assumptions

ACP-CA provided comments on the February 16, 2024 Inputs & Assumptions Workshop.¹ In those comments, we requested review of the raw data and draft capacity expansion results with enough time to provide feedback and enable adjustments or alternative model runs. We continue to recommend the CEC share its raw data and scenario results with sufficient

¹ See ACP-CA comments in SB 100 Docket No. 23-SB-100 dated 3/1/24

granularity that stakeholders can understand key drivers in results and compare results to other major planning processes (e.g., IRP, Scoping Plan, etc.).

Based on the workshop presentation and Q&A we note a few modeling assumptions which may negatively impact the utility of this report. First, the modeling assumed continuation of federal investment and production tax credits rather than incorporating the more rapid phase out imposed by H.R.1 (2025). The CPUC's IRP 2025 Inputs and Assumptions provide analysis on the impacts of tax credit changes to LCOE.² These should be incorporated into the final report.

Second, we note that geothermal inputs are out-of-date based on best available information regarding the costs and availability of enhanced geothermal systems (EGS). The CPUC IRP team has incorporated new information on EGS potential, profiles and costs over the last two IRP cycles, utilizing NREL 2024 ATB data for Hydrothermal–Binary, EGS–NF–Binary, and EGS–Deep–Binary in the most recent cycle.³ The SB 100 team should review these updates as well as the latest research⁴ to update its analysis from the draft results.

Third, the SB 100 model applied a liberal 12,450 MW import limit based on historic patterns. Although the Plexos modeling dispatches supply and demand across the greater WECC, demand in the greater WECC is modeled as relatively static based on recent EIA data and would therefore miss the effects of evolving load shapes and patterns in the greater west. As ACP-CA has commented in the IRP proceeding, we believe that dependable import supply is likely to change from past patterns. Winter peaking needs in the Pacific North West is likely to grow and import availability in both winter and summer and is likely to shrink significantly within the planning horizon.⁵ As a result, we suspect this assumption is too generous and may mask the true new build requirements for SB 100.

Fourth, the SB 100 report is solving for a 25 MMT target by 2035 and a 6.9 MMT target by 2045. The CPUC's latest IRP modeling, which focuses solely on the non-POU load in CAISO, plans for 25 MMT by 2035 and an 8 MMT target by 2045 GHG emissions limit. The

² See IRP slides 162-167 https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_inputs_and_assumptions_slides-20260210.pdf

³ See Final IRP Inputs and Assumptions, https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_inputs_and_assumptions_report_20260210.pdf; See NLR 2024 ATB (Hydrothermal–Binary, EGS–NF–Binary, EGS–Deep–Binary)

⁴ See, Akindipe, Dayo and Erik Witter, “2025 Geothermal Drilling Cost Curves Update,” available at <https://pangea.stanford.edu/ERE/db/GeoConf/papers/SGW/2025/Akindipe.pdf>

⁵ See R.2506019, Comments of American Clean Power California on ALJ Ruling (October 22, 2025), available at: <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M584/K704/584704073.PDF>

2022 Scoping Plan included very different assumptions about load and generally found a need for much greater electrification than the CPUC’s IRP or the Joint Agencies’ SB 100 planning. We recommend the Joint Agencies clarify in the final report how the SB 100 scoping plan sector emissions targets will be coordinated with other state agency planning efforts to create consistency in how each of these processes plans for electricity sector emissions. Creating alignment will better ensure that the Joint Agencies are sending the appropriate signals for resource development and transmission planning necessary to meet both future load and GHG reduction needs.

Despite these inputs and assumptions issues, we continue to view the SB 100 report update as directionally useful in informing the scale of new resource requirements and the strategic and policy options along the way toward achieving SB 100 goals.

II. Draft Results

ACP-California’s comments on the draft results are limited to our interpretation of charts presented in the workshop. We would appreciate the opportunity to review and comment on the full set of data and draft narrative sections on these results as part of a comment opportunity on the draft SB 100 report.

A. Scenarios

ACP-CA finds the scenarios studied provide a helpful range of alternatives for California’s path to achieving SB 100 requirements. Combined with the land-use assessments and system reliability standards, they demonstrate that there are multiple approaches to achieving these requirements. We support the Joint Agencies planning across scenarios that reflect different policy options and goals. Doing so will enable a better understanding of policy impacts and tradeoffs as well as preserve options amid uncertainties regarding costs, technologies, load growth and ongoing barriers to generation and transmission development. While we recommend continued investigation into certain assumptions and future constraints, including availability of imports, sufficiency of transmission, and local siting and permitting, we remain confident in the state’s implementation of SB 100 while furthering the state’s reliability and affordability objectives.

ACP-CA also appreciates the scenario comparison between “SB 100 only” in which the electric system achieves the SB 100 requirement that 100% of retail sales come from clean or zero emissions resources without applying a GHG emissions constraint, and the other “state mandates” scenarios. The results, which show 6 times the emissions as compared to the reference scenario built toward a 6 MMT GHG constraint, should inform electric system program design as we transition from an RPS framework toward a GHG framework.

In particular, this result suggests an emissions-based approach will be superior to a REC/ZEC approach in cost effectively achieving our climate goals. A GHG framework will better drive a supply portfolio that tailors resources' production profiles to demand profiles.

B. Portfolio Results

We observe a few key differences in the portfolios built for the SB 100 report scenarios as compared to those built in IRP, specifically the base case portfolio for the 2026-2027 TPP. Compared to the TPP portfolio, the SB 100 comparison portfolio has significantly less geothermal and offshore wind (by 5 and 4.5 GW, respectively), much more in-state wind (+7.5 GW), much more LDES (+14 GW) and proportionally about the same quantities of solar and Li-Ion batteries.⁶ We expect that differences in capacity expansion modeling, inputs and assumptions are driving these differences.

We further suspect the IRP process is driving a portfolio with greater resource diversity given the declining capacity value (Marginal ELCC) of solar and batteries as the system becomes more saturated with these resources. This effect is likely absent in SB 100 analysis. Consequently, the CPUC IRP process may drive procurement orders and LSE procurement decisions toward greater resource diversity than is currently projected in the SB 100 modeling. We further suspect the generous import assumptions in SB 100 are likely masking energy sufficiency gaps in the SB 100 modeling. As a result, the IRP modeling may show reduced value of storage as compared to generation, which in turn, would understate the need for generation resources in the SB 100 portfolios.

Regarding results for specific resources, we recommend that the Joint Agencies update the SB100 modeling to incorporate up-to-date cost and availability information on geothermal, as well as state policy direction on clean-firm procurement.⁷ If these inputs cannot be updated, we recommend forcing in *at least* 5 GW of geothermal in the capacity expansion scenarios.

Regarding wind development, we are generally supportive of in-state wind development, however we question the quantity of in-state wind selected in the comparison portfolio given the relatively small quantity of in-state wind brought online and in the development pipeline in recent years. In state wind resources face declining resource value in remaining developable locations and suffer ongoing permitting and siting challenges. The Joint Agency presentation on Slide 23 notes that much of the wind selected in the model has a

⁶ Based on interpretation of quantities in draft results bar charts. Quantities are imprecise.

⁷ See Proposed Decision Revision 2/24/26 available

<https://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=600398976>

capacity factor (“CF”) less than 20% which is “below what is currently considered commercially viable.” ACP-CA agrees with this caution. While the model may select in-state wind at low CFs, it would be challenging to finance and develop many wind projects whose production is expected to be so low (meaning a much lower return vs. capital cost ratio). Due to these factors, much of the commercial wind development activity continues to focus on regions with higher wind speeds (e.g., New Mexico, Wyoming and Idaho as well as OSW). This trend is also reflected in the ELCC analyses. There are considerably higher capacity factors and ELCC values for both Offshore-wind (“OSW”) and Out-of-State (“OOS”) wind resources, as shown in recent IRP analysis.⁸ Recent reports from PNNL also suggest high ELCC values for offshore wind (~41% in 2035 and 35% in 2050)⁹. Production of sufficient energy overnight (from OOS wind, OSW, and geothermal) will be essential for achieving SB 100 goals given expected winter-day load profiles and reduced availability of future imports, as discussed below.

Given the portfolio results selecting a large quantity of LDES, ACP-CA would like to note the potential for batter storage to provide energy at multiple durations (i.e., 4, 6, 8, 10, 12 and 24 hr.) and with asynchronous charging and discharging, in which charging takes place on a shorter timescale (e.g., four hours) than discharging.¹⁹

System Performance Results

We appreciate the draft results presented on both summer and winter peak days. As CEC staff pointed out at the workshop, the state electric system is expected to experience greater strain in winter as compared to summer as we approach 2045. Winter peak days are expected to rely heavily on fossil production (up to ~15 GW of the gas fleet outside midday hours). Both winter and summer peak days also rely heavily on imports, with winter days appearing to max out the modeled import availability for all hours of the day. We recommend the CEC work with the CAISO and CPUC to refine state expectations about the availability of unspecified or short-term contracted import resources in the 2030s and 2040s as we believe the assumptions utilized in both IRP and SB100 are too high. We also recommend further exploration of asynchronous charging available in advanced battery technologies given the implications regarding energy sufficiency for charging in winter days.

C. Land-use impacts

⁸ See https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/reliability-filing-requirements_lses-2024-26_irp-plans_20260210.pdf slide 31

⁹ See <https://www.osti.gov/servlets/purl/2500279/>, p 69

ACP-CA commented on the Land-use assumptions workshop presented February 1, 2024 generally supporting the land-use assessment goals for this report. These goals included:

- Expand and update understanding of the land area and sea space required to achieve SB 100 (i.e., how many acres could be needed for future electricity infrastructure to achieve SB 100?)
- Assess high-level environmental and land use constraints of each scenario to understand uncertainties and potential challenges

The draft results presented at the workshop indicate there is “enough space” for the quantity of renewables in the scenario portfolios, broadly, but overestimates the land-use implications of certain resources and fails to accurately present the land-use trade-offs across resource types, as discussed below.

i. Offshore Wind

The draft results suggest 25 GW of offshore wind would require 2.1 Million acres of sea space. This implies a capacity density of 2.9 MW/km². This assumption is outdated and materially over-estimates the sea space required for OSW resources. ACP-CA provided recent industry estimates and more standard assumptions in comments following the land-use workshop in February 2024.¹⁰ The wind turbine manufacturing industry has made tremendous strides over the last decade increasing the size and productivity of wind turbines in both onshore and offshore applications. China is currently testing a 26 MW floating OSW turbine.¹¹ We expect these trends to continue. Based on discussions with leaseholders on how they are planning projects, as well as most recent industry analysis, we believe a higher density factor of 7 MW/km² is achievable. The CPUC updated the assumptions in its current IRP proceeding to 5MW/km².¹² Thus the estimated total acreage of 25 GW of OSW would very likely be less than 1 million, less than half of what is reported in the SB 100 draft results.

The Joint Agencies should also consider a report from Energy Innovation which concluded that the overall sea-space and land-use requirements for a renewable transition will be lower if OSW is a significant component of a clean energy portfolio. The report further highlights the relatively small footprint of OSW as compared to total sea-space occupied.¹³

¹⁰ See Docketed 3/1/2024 ACP Comments at p 7

¹¹ See: <https://www.scientificamerican.com/article/the-worlds-largest-wind-turbine-will-smash-previous-records/>

¹² See p 75: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_inputs_and_assumptions_report_20260210.pdf

¹³ See <https://energyinnovation.org/publication/2035-offshore-wind-technical-report/> , p. 35.

In order to “update and expand” understanding of land-use and sea-space per the report goals, we request the Commission update its analysis on OSW and the discussion of corresponding land use needs of other technologies in a portfolio that includes OSW resources.

ii. Land-Use Constraints and Uncertainties

The CEC’s goal of evaluating land-use constraints and uncertainties is only partially accomplished in the draft results. While it is helpful to consider theoretical total resource potential, the analysis does not consider the challenges and costs of successfully siting and permitting solar, wind and storage projects in California which can face a myriad of local opposition, species protection, or land-use conversion constraints. The charts presenting the quantity of “total resource potential near grid” compared to the quantities of land needed for wind and solar development suggest it will be relatively easy to develop tens of gigawatts of new resources in the state over the next twenty years, ignoring the siting and permitting challenges that are creating delays, increasing costs, and in some cases leading to project denials and cancellations.¹⁴

iii. Transmission Planning

We further appreciate that the land-use analysis considered proximity to points of interconnection. To be sure, access to transmission is a top factor for clean energy developers’ assessments of site suitability. However, we note that land that is “near grid” (or within 15 miles of existing or planned infrastructure) is not necessarily developable. The CAISO “heat map” shows that many of the substations in otherwise prime clean energy development zones have “less than zero” available capacity for interconnection.¹⁵ This is especially true for the central valley and Southern California desert regions where considerable solar and battery storage resources are expected to be sited.

As ACP-CA has articulated in the past, timely transmission development is one of the main barriers to SB 100 implementation. Put simply, if California wants clean energy development to happen on-time and in the right places that maximize resource value and minimize environmental impacts, it needs to dramatically and proactively increase the pace of transmission development to those locations and in areas where transmission resources don’t already exist.

ACP-CA applauds the work of the CPUC and CAISO over the last several IRP-TPP cycles to transmit and assess increasingly larger resource portfolios over longer timeframes toward

¹⁴ See Fountain Wind Denial at <https://www.energy.ca.gov/filebrowser/download/8856?fid=8856>; See Compass docket <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02>

¹⁵ See <https://www.caiso.com/poi-heatmap/>

2045 goals. We also welcomed the CAISO's 20-year outlook initiatives which identified major transmission upgrades necessary to access clean energy resources in major, essential geographic zones. Based on ACP-CA's analysis presented in Attachment 1, of the 41 upgrades identified in the 2022 and 2024 outlook analyses, only 4 have been fully approved in subsequent TPPs, 2 have moved forward as approved subscriber PTO projects, and 5 have had components approved, but not the entirety of the identified upgrade. That leaves 29 projects that have seen no progress in TPPs over the last four years.

III. Recommendations

A. Operationalize a 20-Year Plan for Transmission Build Out

As noted above, ACP-CA recommends the Joint Agencies work with the CAISO to track progress in the approval of the major transmission upgrades necessary to access diverse clean energy resources. The 20-Year outlook is likely a useful basis for judging whether the pace and scale of build out is sufficient.

While we understand that the IRP-TPP process select projects for approval based on different portfolios, different timeframes, and according to different standards, we nevertheless recommend that the Commission work with the CAISO and CPUC to integrate SB 100 results and 20 year outlook findings into the IRP/TPP process such that each TPP cycle drives major network upgrades at the pace necessary to achieve long-term goals. Given the time it takes to permit major transmission projects (up to 10 or more years), supply chain constraints which are extending the delivery period for transformers and circuit-breakers, and the human and engineering resources necessary to construct 30+ transmission projects, the CAISO will need to begin approving the majority of these major upgrades between the 2026-2027 and the 2033-2034 transmission cycles to ensure they're online by 2045. That's equivalent to ~5 major project approvals in each TPP cycle over the next decade beginning with the 2026-2027 cycle.

We further suggest an SB 100 workshop on developer priorities for access to diverse resources, status and interest from private developers, and potential timeline to completion.

B. Investigate Import Assumptions and Supply and Demand Dynamics of the Greater WECC

ACP-CA recommends the Energy Commission further examine its assumptions about imports in light of anticipated capacity shortfalls across the broader Western Interconnection and implementation of the Western Resource Adequacy Program

(“WRAP”) in Summer 2028 which will significantly limit the availability of WRAP participant resources for CAISO during high-risk periods in the WECC. We believe the 12,450 MW import limit imposed in this modeling is far too high and will significantly undermine long-term planning, especially given how SB 100 modeling shows all-day dependence on this level of imports for reliability during peak winter days.

We recommend the Energy Commission work with the greater WECC, through forums such as the Western Interstate Energy Board (WIEB), and with both the Regional Organization for Western Energy (ROWE) and WRAP, to compare approaches and assumptions regarding energy flows between WECC regions.

C. Advance an Emissions-Based Framework in Integrated Resource Planning

ACP-California has supported the shift to a long-term emissions-based framework in IRP, and in particular in the proposed Reliable Clean Power Procurement Program (RCPPP), as superior for achieving GHG-based goals, matching supply production with hourly demand, and more equitably distributing obligations across LSEs. While the RPS program has been tremendously effective at driving clean energy deployment, an RPS or Clean-energy-standard approach (RECs + ZECs) is only indirectly related to portfolio emissions. This conclusion bears out in the SB 100 results that show a dramatic difference between resource needs and emissions results between “all mandates” scenarios and an “SB 100-only” scenario that solves for annual retail sales but not daily production and demand. The Joint Agencies should recommend that the State as a whole move towards an emissions-based planning regime.

D. Coordinate GHG Planning and Load Assumptions with the CPUC IRP and Scoping Plan Processes.

As discussed above, there is considerable variability in the GHG targets and load assumptions used in the SB 100 report, CPUC IRP process and the Scoping Plan. We recommend coordinating these assumptions more closely to ensure consistency across state planning efforts. Ultimately, the Scoping Plan should be used to set the electricity sector’s GHG target and inform long term load assumptions in light of the role of electrification in meeting broader state wide goals.

Conclusion

The SB 100 Report fulfills an important role in furthering statewide planning for long-term affordability, reliability and GHG reductions. The SB 100 Report should be used to frame the scale and pace of transmission and generation capacity that must be planned. We

encourage the Joint Agencies to coordinate their processes and ensure that the state is on track to meet its affordability, reliability and GHG reduction goals.

Respectfully Submitted,

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Senior Policy Director
American Clean Power -
California

Appendix 1: Status of CAISO 20 Year Outlook Upgrades

Recommended Transmission Development from 2022/24 CAISO 20-Year Outlook	Description of Project from Outlook	Included in 2022 Outlook?	Included in 2024 Outlook?	In Approved in Transmission Plan (or some variation/part of project approved in a TPP)
Eldorado – Lugo 500kV line	- 180 mi of 500 kV line - Series compensation in number of locations	Y	No - But there is a Trout Canyon - Lugo 500kV line	No
Colorado River – Devers 500kV line	- New Devers – Red Bluff 500 kV line - New Red Bluff – Colorado River 500 kV line	Y		Smaller upgrades to existing lines in the area (Colorado River - Red Bluff 500kV 1 line upgrade & Devers-Red Bluff 500kV 1 and 2 line upgrade) were approved in the 2022-2023 TPP
North Gila – Imperial Valley 500kV line	- 85 mi of 500 kV line - Series compensation	Y		North Gila - Imperial Valley 500kV line was approved in the 2022-2023 TPP
Westland 500/230kV station	- 50 mi of 500 kV line - New 500/230 kV substation with two transformers (\$200M)	Y		No
Second Los Banos – Tracy 500kV line	- 67 mi of 500 kV line	Y		No
Third Collinsville – Pittsburg 230kV cable	- 230 kV cable	Y		No
Dever – La Fresa HVDC	- 100 mi of DC cables - Two VSC HVDC converter	Y		No
Lugo – LA Basin HVDC	- 80 mi of DC cables - Two VSC HVDC converter	Y		No
Sycamore – Alberhill HVDC	- 82 mi of DC cables - Two VSC HVDC converter	Y		No
Diablo – South HVDC	- Four VSC converter stations - 250 miles HVDC cables	Y		No
Diablo – North HVDC	- Four VSC converter stations - 200 miles HVDC cables	Y		No
Round Mountain 500/230kV transformer	- Add one 500/230 kV transformer	Y		No
Lugo 500/230kV Transformers	- Add one 500/230 kV transformer	Y		The Lugo-Victor-Kramer 230kV upgrade approved in the 2022-2023 TPP included adding a 3rd Lugo 500/230 kV transformer as part of its scope
SWIP-North	275 mile 500 kV line from Midpoint to Robinson substation with upgrades to On Line from Robinson to Harry Allen to access Idaho wind resources	Y		SWIP-North was approved as an addendum to the 2022-2023 TPP
Cross-Tie	214 mile 500 kV line from Robinson to Mona/Clover to access Wyoming wind resources	Y		No
Robinson-Eldorado	500 kV transmission line from Robinson to Harry Allen/Eldorado	Y		CAISO hasn't approved a standalone Robinson-Eldorado line, but the SWIP-North arrangement includes scheduling rights on the One Nevada (ON) Line from Robinson to Harry Allen, which is similar
Trout Canyon – Lugo 500 kV line	- 180 mi of 500 kV line - Series compensation in number of locations		Y	No
Manning – Tracy 500 kV line	107 mi of 500 kV line		Y	No - However a Manning - Metcalf 500kV line was approved in the 2024-2025 TPP
Manning – Moss Landing 500 kV line	- 78 mi of 500 kV line - New 500/230 kV substation with two transformers (\$100M)	Y	Y	No - However a Manning - Metcalf 500kV line was approved in the 2024-2025 TPP
Two Fern Road – Tesla 500 kV Lines	2 x 250 mi of 500 kV line		Y	A new Humboldt to Fern Road 500kV line was approved in the 2023-2024 TPF

Appendix 1: Status of CAISO 20 Year Outlook Upgrades

Palo Verde/Hassayampa – Imperial Valley 500 kV line	~200 mi of 500 kV line		Y	No
Reconductor Vaca Dixon – Collinsville – Tesla – Metcalf 500 kV line	~ 36 miles of 500 kV line		Y	No
Upgrade 500/230 kV transformers at Vaca Dixon, Tesla, Metcalf, Moss Landing, Tracy	A total of eleven 500/230 kV transformers need to be upgraded. The assumption is that there space limitation to add new transformers.		Y	2024-2025 TPP includes Metcalf Substation 500/230kV Transformer Bank Addition (so part of the scope in the Outlook)
Add series compensation to Gates – Los Banos #3, Loop in Midway – Manning 500 kV line into Gates substation			Y	No
Reconductor24 Vaca – Lakeville 230 kV lines (2 x 42 mi)			Y	No
Reconductor Vaca – Bahia 230 kV line (33 mi)			Y	No
Reconductor Vaca – Parkway 230 kV line (26 mi)			Y	No
Reconductor Birds Landing – Contra Costa 230 kV lines (2 x 10 mi)			Y	No
Reconductor Round Mountain - Cottonwood 230 kV line (34 mi)			Y	No
Reconductor Table Mountain - Palermo 230 kV line (15 mi)			Y	No
Reconductor Tesla - Sand Hill – Delta 230 kV line (10 mi)			Y	No
Reconductor Tesla - Eight Mile 230 kV line (27 mi)			Y	No
Reconductor Embarcadero - Potrero 230 kV cable (2.5 mi)			Y	No
Reconductor East Shore - San Mateo 230 kV line (9 mi)			Y	No
Reconductor Metcalf – Los Esteros 230 kV line (26 mi)			Y	No
Humboldt Bay Offshore wind area	Total of 14,600 MW offshore wind connected through 500 kV AC lines, overhead HVDC, and subsea HVDC lines to Fern Road, Collinsville, and Bay Hub substations. (Figure 4-7)	Y	Y	The 2023-2024 TPP included approval of several upgrades in the Humboldt area (which are part of the full scope of projects in the Outlook), including: <ul style="list-style-type: none"> • New Humboldt 500 kV substation, with a 500/115 kV transformer; and building approximately 260 mile HVDC line, initially operated as 500 kV AC line to interconnect Humboldt 500 kV to the Collinsville substation; • Building approximately 140 mile, 500 kV AC line to interconnect Humboldt 500 kV to the Fern Road substation; • A 115 kV/115 kV phase shifting transformer (PST) and a 115 kV line from Humboldt 500 kV to existing Humboldt 115 kV substation.
Diablo – Morro Bay Offshore wind area	- Total of 5,400 MW offshore wind. Connected to Diablo 500 kV and the new Morro Bay 500 kV substation. - The cost estimate for a 500 kV switching station and looping in the existing Diablo – Gates 500 kV line into it is 0.15 B – 0.22 B. If more than ~2,400 MW generation is connected the new Morro Bay 500 kV substation, a second Morro Bay – Diablo 500 kV line with \$100 M to \$140 M will be required.	Y	Y	No

Appendix 1: Status of CAISO 20 Year Outlook Upgrades

TransWest Express	732 Mile transmission system consisting of HVDC and 500 kV facilities to access Wyoming wind. Project is designed to potentially provide 1500 MW to LADWP at the IPP facilities in Utah and 1500 MW to the ISO at Harry Allen/Eldorado	Y	Y	TWE is an approved Subscriber PTO project
SunZia	530 mile HVDC line and 35 mile 500 kV AC line plus scheduling rights on existing lines from Pinal Central to Palo Verde connecting to the ISO system to access New Mexico wind resources	Y	Y	SunZia is an approved Subscriber PTO project
Additional transmission for additional wind resources from Wyoming/Idaho area	HVDC transmission line from the wind resource area to northern California (Eldorado/Tesla area)	Y	Y	No
Additional transmission for additional wind resources from New Mexico area	HVDC transmission line from the wind resource area to southern California (Lugo area)	Y	Y	No