

California Wind Energy Association Informal Comments on Proposed Updates to the Busbar Mapping Methodology

September 5, 2025

CalWEA appreciates this opportunity to comment on the Proposed Updates to the Busbar Mapping Methodology for the 2024-26 cycle of the Integrated Resource Planning (IRP) process as discussed in the Modeling Advisory Group (MAG) Webinar on August 19, 2025, and in the September 2024 “Methodology for Resource-to-Busbar Mapping for the Annual TPP” (“Methodology Paper”). These comments are organized according to the webinar presentation.

In summary, CalWEA urges staff to:

- Use the CEC discretionary land-use layers to pare down, not eliminate, wind resources. These screens are overbroad, as demonstrated by a CalWEA analysis showing that these screens would have screened out 42 percent of operating projects.
- Rebalance wind resource study areas to place greater emphasis on Northern California and avoid Southern California areas with greater conflicts.
- Re-evaluate fire-risk scoring given substantial existing wind developments that have safely coexisted with fire risk for decades, and given additional resource potential in these areas
- Ensure that interconnection scoring will not constrain consideration of major upgrades that could strengthen the grid overall while opening up new wind resource areas, and
- Heavily weight indications of commercial interest in wind resources where possible and, where such indications are not available, give serious consideration to the wind industry’s experienced assessments of the most promising wind resource areas.

To enable a balanced, least-cost portfolio that will require a substantial amount of in-state wind, this process must not arbitrarily screen out resources that may prove to be developable.

Resource Potential Upgrades Impacting Busbar Mapping (Slides 19-23)

CalWEA applauds staff’s decision to incorporate Global Wind Atlas (GWA) wind speed data with a cut-off annual average wind speed of 6.5 m/s to characterize wind resource potential in California, as CalWEA recommended in its March 7, 2025, informal comments on staff’s Inputs and Assumptions (I&A) document. GWA data is a reasonable facsimile of UL data, which is used commercially to support prospecting and development of wind projects. Use of the GWA data resulted in excluding non-commercially viable wind resource areas, most notably 2,200 MW that the staff analysis previously identified in the PG&E Fresno study area as shown on Slide 23.

Using GWA data partially corrects for the underestimation of the wind capacity that can be supported on available land. However, continued use of a 40 acre/MW density factor for wind projects is still contributing to that underestimation and a 25 acre/MW density factor should be used instead. As explained in our August 4, 2023, informal comments, and our March 7, 2025, informal comments, a 25 acre/MW density factor is appropriate for estimating resource potential, given the 4.5-7 MW ratings of the wind turbine generators available for the rest of this decade and recent experience with California ridgeline projects, which focus turbine rows into groups denser than would be used in flat land regions.

In addition, GWA data more accurately identifies these ridge-based resources that require smaller setback areas.

Criteria 2: Substation Level Interconnection Viability (Slides 33-39)

The Substation-level Interconnection Criteria (slide 34) disfavors resources that can support >200-MW projects if they are more than 20 miles from a CAISO substation or are <400 MW interconnecting to a 100-200 kV substation. Wind resources are often too remote to be captured within 20 miles of a large substation; they should not be assigned a low score given that immutable characteristic. The criteria should be at least neutral (Level 3) for >200-MW wind resources that are within 30 miles of a 250-kV CAISO substation.

The criteria also disfavor (or do not seem to contemplate) large wind resource areas that require major transmission upgrades, as will be needed in Northern California. As was the case with the Tehachapi Resource Transmission Plan, which provided access to many gigawatts of wind, solar, and battery capacity while strengthening the Southern California grid, these areas should be viewed as opportunities to strengthen the grid overall in conjunction with accessing renewable resources. Moreover, last year, the Commission requested that the CAISO study upgrades to Northeastern California in the current TPP cycle where the grid is weak, with a possible interconnection to neighboring Balancing Areas that could further strengthen California's grid.

Lastly, resource areas should not be constrained by substations, but by transmission lines, as projects can tap lines with new switching stations.

All these options obviously entail network upgrade costs; however, remote wind resources should not be overlooked in this analysis, nor should they be penalized beyond the estimated costs of interconnection.

Criteria 3: Land-Use Implications and Feasibility - Fire Threats (Slides 40-44)

The Methodology Paper states (p. 24) that, when mapping resources, staff will seek to limit mapping resources in "extreme" and "elevated" fire threat districts using the CPUC's High Fire-Threat District Map, most recently updated in 2021. On the MAG Webinar slide 42, staff indicated that they are investigating alternatives to the HFTD map and welcome stakeholder recommendations. Possible alternatives are listed on slide 43, including CalFIRE's Fire Hazard Severity Zone (FHSZ) maps and the USFS Wildfire Hazard Potential (a.k.a. Wildfire Risk to Communities). For the reasons below, CalWEA strongly urges staff not to screen out high-quality wind resource areas based on any fire threat maps for the following reasons.

Fire risk is elevated across wide swaths of California. CalFIRE's fire hazard zones cover 31 percent of non-federal California land (17 percent when "moderate" areas are excluded), but these maps do not include federal lands. The federal Wildfire Risk to Communities assessment¹ shows most of California land at moderate to high risk. These maps cover too much area to serve as a meaningful screening tool because they will screen out or de-prioritize most wind resource areas.

Wind projects cannot be permitted without fully mitigating any elevated fire risk. Wind projects will be required to mitigate any significantly elevated fire risk that they cause and will likely improve fire

¹ See U.S. Department of Agriculture, Forest Service. (n.d.). *Wildfire Risk to Communities: California*. Retrieved May 23, 2024, from <https://wildfirerisk.org/state/california/>.

safety by building roads that provide fire-fighting access, supporting local fire-fighting capabilities, and potentially by adding on-site water supplies.² The most critical time for fighting wildfires is in the first several hours. Ground access is usually the most limiting factor, and project roads provide timely access. In addition, wind project areas are closely monitored and staffed with a full-time crew, which promotes early wildfire detection. They also restrict public access, which is the most significant cause of wildfire.³

There is no evidence of increased fire risk in existing wind project areas. Many, if not the large majority, of existing wind projects in California (including all or most in the Tehachapi and Altamont Pass wind resource areas, and parts of the San Geronio Pass) are in Very High or High CalFIRE risk zones but second and third generation turbines have operated without significant incident for decades.

California has recently permitted a wind project in a high fire zone. The Gonzaga Ridge Wind Project, located within Pacheco State Park and approved in 2023, is within High and Very High fire severity zones.⁴⁵ In their CEQA assessment, the lead agencies for the project's review, California State Parks and the California Department of Fish and Wildlife, did not consider the project's wildfire risk to be "potentially significant."⁶ Additionally, the Office of the State Fire Marshal was the lead agency for the local permits required for the project. Clearly, wind projects in high fire zones can be permitted.

Areas with commercial-grade wind resources are very limited. To enable a balanced, least-cost portfolio that includes a substantial amount of in-state wind, it will be essential not to screen out resources that may prove to be developable arbitrarily.

For all these reasons, wind projects in areas with elevated fire risk should not be indiscriminately screened out.

² See, e.g., the fire-risk analysis conducted by veteran fire service professionals at PyroAnalysis LLC regarding the proposed Fountain Wind project in Shasta County. The report concludes that the project "is not detrimental or even neutral but is actually a net benefit to fire protection and mitigation efforts in Shasta County" and cites the Shasta County's 2021 EIR for the Fountain Wind Project and the 2008 EIR for the Hatchet Ridge Wind Project that determined that the risk of these projects triggering a wildfire was less than significant with mitigation. See:

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=255883&DocumentContentId=91735>

³ See: <https://spectrumnews1.com/ca/la-west/weather/2021/09/20/how-do-wildfires-start-in-california--most-of-the-time--it-s-us->

⁴ Search for Pacheco State Park in CalFire's interactive fire severity zone map:

<https://www.arcgis.com/apps/Style/index.html?appid=5e96315793d445419b6c96f89ce5d153>

⁵ In the CPUC's High Fire-Threat District Map, the Gonzaga project is just outside an "Elevated" risk area, which stops exactly at the nearby border of the adjacent county. The county line is highly unlikely to represent a true demarcation of fire risk, supporting the suggestion that the CPUC map is unsuitable for use in any case.

⁶ Draft Environmental Impact Report for the Gonzaga Ridge Wind Repowering Project SCH no. 2018101047, at PDF-p. 316. Available at: https://www.parks.ca.gov/pages/980/files/CVD_10.10.19_DraftEIR_508.pdf. ("The proposed Project is located within a State Responsibility area and is designated as being within a high fire risk area. However, the Project does not include any permanent residences and does not include any uses or activities that would exacerbate wildfire risks ... Although the Project does include construction of overhead power lines, these lines would be routinely maintained by employees of the Project and it is not anticipated the risk of wildfire would be exacerbated. The impact is considered less than significant.")

Criteria 4: Environmental (Conservation and Biological) Impact (Slides 45-46 and CEC Slide Deck)

The CEC's Core Land-use Screen includes screens centered on CDFW's Areas of Conservation Emphasis (ACE) datasets, specifically, "Terrestrial Connectivity," "Biodiversity," and "Irreplaceability," and the Conservation Biology Institute's "Terrestrial Landscape Intactness" screen.

CalWEA strongly objects to the broad application of these screens, which go far beyond the CEC's Protected Areas Layer (PAL) where, generally, wind projects cannot legally be permitted (see below for concerns with the PAL). The additional screens remove lands where wind can be permitted without benefit of any on-site studies that are necessary to determine compatibility with wind projects, which disturb only about three percent of the project lease area.

CalWEA analyzed the additional Core Land-use Screens in relation to permitted and operating wind project areas. As shown in the Appendix, this analysis found that these screens would have screened out almost 42 percent of existing projects, including 39 percent of projects in Kern County, 86.5 percent of projects in Riverside County, 70 percent of projects in East San Diego County, and the relatively recently permitted Strauss Wind Project in Santa Barbara County. Moreover, the screens would eliminate only 7 percent of capacity in the Altamont, which has historically been the most environmentally controversial.

Clearly, these screens are overly broad and not informed by actual on-the-ground conditions. They must not be used to eliminate wind resource areas if wind is to play a significant role in a least-cost resource portfolio. At most, they should be used to pare down the available wind resource in these areas.

Concerning the PAL layers, staff should ensure that (1) SRMA exclusions apply only to federal land, and not to unaffected private lands in these areas, and (2) California Rangeland Trust lands that allow for renewable energy development (which is shown to be a permissible use in the trust template and at least some known trusts) – should not be excluded.

Criteria 6: Commercial Development Interest

CalWEA noted in its July 15, 2025, comments on the Reliable and Clean Power Procurement Program (RCPPP) Staff Proposal that there is almost no development or procurement of in-state wind projects occurring in California today.^{7,8} To rekindle wind development activity, CalWEA urged the Commission

⁷ CalWEA's review of the CAISO queue, after it recently culled projects in the reformed 2025 TPD allocation process, found that, of the 22 interconnection requests currently in the queue that specify "wind," only two (totaling 205 MW) appear to be in-state greenfield wind projects clearly moving forward. Ten are repowers that have been built or are under construction, one is stalled indefinitely, one has converted to batteries, and five are in Baja or Nevada. Three projects are multi-technology that may ultimately not include wind. CalWEA is aware of only three wind projects under late-stage development in California: Fountain Wind in Shasta County is currently in the permitting process at the CEC; Kern County has approved the 100-MW Keyhole Wind Energy Project; and the 147.5-MW Gonzaga Ridge project is in construction. Each of these projects has been under development for nearly a decade or more. No other wind projects are in the permitting process, and little early-stage development is occurring.

⁸ In March, the Commission released data showing that procurement of wind energy has lagged far behind that of solar and batteries since 2020 (CPUC Resource Tracking Data, Data current as of March 2025). This data shows that only 5% of new online resources since 2020 are wind energy (1,145 MW), most of which are out-of-state or in-state repowers, as confirmed by CalWEA with Energy Division staff. The data also show

to ensure that the adopted RCPMP framework send clear signals to investors that there will be strong demand for in-state, as well as out-of-state, wind energy in the California market.

Given this situation, staff cannot rely on recent expressions of commercial development interest to sufficiently inform the busbar mapping process. Instead, staff should place heavy emphasis on CalWEA's analysis of the most (and least) promising wind resource areas in California. In addition, staff could evaluate the CAISO interconnection queues over the past decade and, if possible, investigate the Federal Aviation Administration's OEAAA database,⁹ which will indicate where wind turbines have been planned in the past and where met towers have been located.

The results of CalWEA's analysis are shown in the table on the next page in comparison to staff's "Wind Potential Totals By Study Area" table on Slide 23. CalWEA's analysis reflects commercial prospecting and development experience over the past 20 years, as well as theoretical capacity estimates based on 25 acres/MW and net capacity factors informed by industry judgment. In addition, CalWEA has substantially reduced (sometimes to zero) the theoretical capacity potential to account for environmental, visual, and other siting challenges. Further explanations are reflected in the Notes column.

CalWEA very much appreciates the opportunity to provide our perspective on the busbar mapping process and would welcome any further opportunity to provide input as staff conducts the process in the coming weeks and months.

that only 9% of resources expected by 2028 (1,756 MW) are wind energy, most of which, again, are out-of-state or in-state repowers. The same is true looking back to 2012. See California Energy Commission, Energy Almanac, Download data for [Electric Generation Capacity Energy - Excel](#).

⁹ See <https://oeaaa.faa.gov/oeaaa/oe3a/main/#/home>.

CalWEA Recommended Wind Resource Planning Areas & Capacity

Study Area (and busbars)	CPUC Proposed 2026-27 TPP	CalWEA (with busbar detail)***	Difference (CalWEA - CPUC)	Notes
Northeast CA	584	3801	3,217	CalWEA applied 55-85% discount factors to the resource potential in this area to account for potential environmental and visual sensitivities and constructibility. The region is relatively sparsely populated, with limited military conflicts. Recognizing its potential, at least five development companies have invested prospecting resources in the area over the past decade, including two recently, but many gave up based on the lack of transmission capacity.
Canby		573		
Madeleine		3228		
PG&E NGBA	1,894	7399	5,505	CalWEA applied 50-90% discount factors to resource potential to account for potential environmental, military, and visual sensitivities, constructibility, and known project opposition.
Grand Island		1224		
Hilltop		0		
Hopland		647		
Pit 1		306		
Peabody		471		
Putah Creek		1161		
Birds Landing		1180		
Cortina		1198		
Glenn		1212		
PG&E GBA	245	1322	1,077	CalWEA applied various discount factors to resource potential to account for potential environmental, military, and visual sensitivities and constructibility.
Tesla		220		
Soledad		713		
Coburn		389		
PG&E Fresno	-	200	200	
Los Banos		0		This area has FCDS available
Wilson		200		A 200-MW project was in C14*, demonstrating commercial interest
PG&E Kern	245	0	(245)	
SCE Northern	2,447	2734	287	
Whirlwind		63		
Windhub		752		CalWEA consolidated Tehachapi potential around Windhub (consistent with the previous PSP). Military conflicts (height restrictions), California Condor concerns, and potential county resistance to additional rezoning for wind energy limit development above ~750 MW.
Highwind		0		
Antelope		1919		This resource area was one of the few that were identified for development in the DRECP process for non-federal lands
SCE Metro	-	-	-	
SCE NOL	1,243	0	(1,243)	Permitting efforts failed in the Biden Administration. Developing in USFS and desert areas is difficult, overlaid with pervasive military and county permitting concerns/restrictions.
SCE Eastern	819	478	(341)	Difficult development area due to military conflicts and existing wind developments.
Mirage		261		
Devers		217		
SCE EOP	241	2037	1,796	CalWEA figure reflects Arizona potential only
Mohave		2037		NV permitting failed under Biden Admin. Desert lands next to impossible due to DRECP restrictions and preserved lands. Only realistic opportunity is in Arizona where there is at least some commercial interest in the form of an application into QC15.
SDG&E Imperial / Baja	2320	2651	331	
East County (ECO)		2174		Most potential at both substations is from Baja due to environmental restrictions on the US side as well as known difficulties/denials to development on Native American and USFS land in this area.
Boulevard		477		
TOTAL**	10,038	20,622	10,584	

* See 2024-25 TPP Figure 3.5-7 (May 14, 2025) Greater Fresno

**Note that CPUC table doesn't sum correctly in CPUC slide deck.

***Note that CalWEA uses 25 acre/MW vs. CPUC's 40 acre/MW

CalWEA Comments on Busbar Mapping
September 5, 2025 – **APPENDIX**

CEC's Discretionary Land-Use Screens Would Have Eliminated Significant Existing Project Areas

