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Large-scale Solar Association Comments - Draft Staff Report - Land Use Screens

Additional submitted attachment is included below.



November 1, 2022

California Energy Commission Docket Unit, MS-4 715 P Street Sacramento, California 95814-5512

Subject: Land Use Screens - Docket Number 22-IEPR-02

Dear Commission Members,

The Large-scale Solar Association ("LSA") appreciates the opportunity to provide comments on the California Energy Commission ("CEC') draft staff report titled *Land-Use Screens for Electric System Planning:* Using Geographic Information Systems to Model Opportunities and Constraints for Renewable Resource Technical Potential in California (CEC 2022) ("Draft Report").

LSA is a non-partisan association of solar and battery storage developers that advocates appropriate policies to enable market penetration of utility-scale solar technologies in California and the Western United States. LSA members are leaders in the utility-scale solar industry with deep experience in all disciplines necessary to site develop, engineer, construct, finance and operate utility scale solar and battery storage systems. LSA member companies are principally responsible for developing most of the operational and planned solar and storage capacity in California today. In addition to a deep appreciation of what it takes to bring solar and storage capacity online, LSA members are also profoundly aware of the many challenges that must be addressed with urgency to achieve the state's aggressive goals for incremental solar capacity between now and 2035.

Summary

LSA supports targeted transmission planning to facilitate decarbonizing California's economy. Today's injection capacity cannot accommodate the substantial increase in supply side solar generation needed to meet the state's goals. Transmission planning must fully anticipate the newly accelerated renewable energy goals under SB 1020 and prior legislation. In concept, LSA fully supports policies and market design that steer future solar generating capacity to areas that are both technically and economically suitable for development and which also present the lowest conflict with other values, such as conservation, biodiversity and agriculture. This is also the stated objective of the authors of the Draft Report.

Unfortunately, the Draft Report fails to achieve its objective. In these comments, LSA addresses three fundamental concerns with the Draft Report:

 Analytical Concern. The land use screening methodology is overly reductive, resulting in low conflict land that has high techno-economic value for development being screened out. Conversely, the CEC's screening methodology identifies lands as suitable for development that cannot be developed in practice due to existing site conditions, land use policy and/or industry standards. These flaws create false signals for transmission planners and will lead to poor transmission planning outcomes. It makes no sense to direct transmission planners to areas that cannot be developed economically or technically. It makes no sense to direct transmission planners away from high value solar development lands (such as Central Valley farmland that has been or will likely be fallowed under SGMA). Yet the Draft Report makes both of these mistakes; it is overly aggressive in excluding lands suitable for solar development, and overly inclusive of lands which are not. As a result, the Draft Report paints an optimistic and highly misleading picture for transmission planners, the ill-effects of which will be felt for years to come unless they are fully addressed now.

- Scope Concern. Up to 40 GW of new solar capacity must be online by 2035 and more than 70GW by 2045 to meet current policy goals, which will necessarily precede new transmission infrastructure planned as a part of this process; the CEC must ensure that these projects are not penalized or made more difficult by publication of the Draft or final Staff Report.
- 3. **Process Concern**. CEC staff failed to seek out solar industry expertise and comment in developing the land screening methodology. Engaging the industry which is ultimately charged with implementing a significant portion of the state's policy goals on the ground as part of the planning process, rather than relegating the industry to the status of *ex post facto* commentor, would have ensured actionable land use and transmission planning outcomes. Moreover, even in the greatly diminished role of commentor, LSA and its members have been given less than a month to review and comment on the Draft Report. GIS layers for the CEC's modeling effort were provided less than a week before comments were due, resulting in almost all the analytic work supporting these comments being stuffed into a single weekend.

LSA addresses each of these concerns in greater detail below.

In light of the significant methodological and procedural concerns raised in these comments, LSA urges the CEC to establish a schedule of expedited workshops and/or charettes to address the foundational and analytic flaws associated with the Draft Report. In addition, we request that the CEC include a Development Feasibility layer to the mapping portfolio – the contours of which we provide in these comments.

LSA fully understands the schedule demands of the IEPR and the TPP; however, the negative downstream consequences of adopting flawed approaches to land use screening and transmission planning will be far more significant than a brief delay up front to ensure that planning objectives are enabled rather than thwarted by the CEC's proposed methodology and outputs.

Technical Concerns

LSA has numerous technical concerns about the land use screens as developed. These include concerns about the overall methodology used, the iterative and siloed process used to share data across agencies, data update process, the lack of inclusion of real-world electric planning elements, new GIS model inputs, and specific issues with the screen outputs and identified development areas. We urge the CEC to address these multiple technical concerns before finalizing the screens.

Overall methodology. CEC staff described this report as providing "updates to the land-use screens for electric system planning" but the updates are so reductive and simplified that they do not achieve the CEC's broader objectives of planning for solar. By collecting data from other agencies like the Department of Water Resources, Department of Conservation (DOC), and California Department of Fish and Wildlife (CDFW) – without industry input – CEC has created layers showing where solar should not be sited from a non-industry expert standpoint, leaving many areas identified for solar failing to meet basic feasibility criteria used by the industry in project siting decisions. While the land use screens allegedly identify eligible areas for solar, many of the areas identified are not feasible or practicable or will result in severe increases in costs of wholesale power for California ratepayers.

Overall, we are concerned that:

- 1. The methodology identified fewer acres of developable lands than previous land screens, despite large increases in the state's clean energy goals since 2018.
- 2. The siloed nature of agency-provided inputs results in protectionism and overly prescriptive layers. For example, California Department of Fish and Wildlife (CDFW) is incentivized to include as much land as possible in the biodiversity screen, without evaluating species needs and habitat usage. Similarly, the Department of Conservation (DOC) is incentivized to protect all agricultural land, without evaluating the realities of agricultural production, what is currently in production, varying types of soils, and the reality of water availability.

Iterative and siloed planning process. The process of CEC developing screens, handing off the screens to the California Public Utilities Commission (CPUC) to run RESOLVE and busbar mapping, then CPUC handing off the results to the California Independent System Operator (CAISO) could be problematic. It will be important for the CEC and its state energy counterparts to build in a process for incorporating feedback from the land use planning exercises into the iterative transmission mapping processes. We are pleased to hear that the CEC plans to revisit and revise the land use screens every two years.

Data update process. It is common for land use screens like these to become rigid and inflexible once put into place. The Desert Renewable Energy Conservation Plan (DRECP) is a prime example. Adopted in 2016, solar development in the DRECP area has not occurred as rapidly as envisioned due to both layered constraints within the DRECP and constraints applied after the DRECP was approved. The DRECP mapping data has not been updated to include these constraints and continues to exclude land in areas with limited resources that may be suitable and included in a future land use plan amendment (i.e., slopes with southfacing aspect up to 15%). As noted above, we are encouraged that the CEC is proposing a regular two-year update schedule, which will help state energy planners adjust the screens to account for local land use changes, changing environmental regulations, and real-time change of input data. Building in flexibility will help to overcome the shortcomings of the more rigid datasets of the past and provide nimbleness to the broader planning effort.

Lack of real-world electricity planning elements. CEC's land use screens appear to be solely focused on environmental and agriculture issues, with little to no consideration of electricity planning and accurate technology and development factors. Given that the easiest solar development sites have been taken, more attention should be given to non-biological site selection pressures such as parcelization, parcel size, and willing sellers. Developers consider many other variables such as zoning, feasibility of a path to an interconnection point with planned capacity, environmental constraints (biology and hydrology), mineral interests, subsidence, fault zones, easements, and others.

Parcelization & Fractured Subsurface Ownership. California's competitive wholesale electricity
rates are driven by a combination of the decline in price and increase in efficiency of solar modules,
innovation in construction methods, and – importantly – economies of scale. The average size of
solar projects in the CAISO interconnection queue have increased from an average of 87 MW for
projects that reached commercial operations by 2021 compared with an average of 244 MW for
projects awaiting commercial operation.

The most important factor influencing the industry's ability to develop large projects with their attendant economies of scale is parcelization of land. Aggregation of hundreds of small parcels with thousands of landowners makes development of large projects on highly parcelized land with disparate ownership infeasible. Surface ownership is not the only consideration: many areas throughout the State have fractured subsurface mineral ownership with multiple owners even on large parcels. Projects cannot be financed without a title insurance policy that typically requires at least 95% of mineral interests to be acquired or waived. In short, forcing development on highly

parcelized, highly fractured properties will drive project sizes down, reducing economies of scale, and driving up wholesale electricity prices.

- Land Use Efficiency. The Draft Report's imputed heuristic for the number of acres required per solar megawatt developed appears to be roughly 7. On a perfectly square site, with no setbacks, easements, or layout constraints, achieving maximum production for a tracking solar PV facility is achievable at 7 acres/MW. However, in reality, perfect sites do not exist. While solar projects can be developed at a higher ground coverage ratio, achieving roughly 5 acres/MW, this results in high levels of early morning, late afternoon, and seasonal shading of each row of panels by adjacent rows of panels. A better rule of thumb is to plan for 10 acres/MW of solar PV.
- Solar Insolation. The Draft Report claims to have considered capacity factor impacts from insolation, yet there are numerous lands identified in the northern half of the state where few if any solar developers are proposing projects due to low production values. Low production translates directly into higher electricity costs, with each percentage drop in capacity factor resulting in a 5-15% increase in wholesale prices.
- **Geotechnical, Hydrologic, and other Natural Risks.** Numerous other primary considerations for solar development potential were omitted from the analysis in the Draft Report, including for areas where desktop data are readily available. Economic projects cannot tolerate high levels of geotechnical, hydrologic, subsidence, and fault risks.

Willing Landowners. The Draft Report identifies more than 3 million acres of solar development potential, which is somewhere between 3 and 6 times as much land as will be needed to support California's policy goals. However, as demonstrated in these comments, many otherwise suitable lands will be determined to be unsuitable (or at a minimum, uneconomic) when viewed through a developer's lens. In addition, even when suitable lands are identified by a solar developer, a project cannot come to fruition without the presence of many willing landowners. The CEC should also be aware that not all landowners with suitable land are willing to use their land for solar development. When prospecting for new opportunities, solar developers find that there are often have only a 10-20% success rate with landowners.

• Given these realities, industry will require closer to 10-15 million acres of potentially suitable land with viable future interconnection capacity to funnel through the development process and ultimately meet the State's decarbonatization goals.

Given the complexities of solar development in an era of decreasing land availability and accelerated climate targets, we recommend the CEC work with industry to create a Development Feasibility Index. This screen could include:

- Parcelization and fragmentation of parcels
- Distance to planned interconnection and transmission facilities
- Feasibility of gentie ROWs (e.g., across parcelized land, across multiple jurisdictions, across otherwise protected or legally excluded areas)
- Relationship between length of gentie, MW and acres needed to support economics of gentie and interconnect (e.g., small projects need fewer acres and support short interconnections and large projects need more acres and support longer interconnections)
- Interconnection nuances (i.e., voltage levels, potential undergrounding or overcrossing requirements, and availability and cost of acquiring a route) affecting the economics of project siting and sizing
- Local zoning restrictions

Other variables such as federal Inflation Reduction Act (IRA) highly incentivizes siting in "Energy Communities." This too could be a variable considered in the CEC's land use screens as it will influence

where developers build. This information should be accounted for in future transmission and busbar planning, and it will provide a high-level view of what lands are economically feasible today. It will also more accurately identify areas of greatest interest and potential.

To illustrate the importance of this recommendation, LSA conducted an expedited GIS analysis of just one variable - parcelization - in Fresno County. Parcelization was evaluated as a measure of how many different parcels are within 0.5 mile of a given parcel. This was calculated for all areas within a parcel and then an average was taken for each parcel. The 10th percentile of parcelization was used as a cutoff for development feasibility; this cutoff was based on an average of 14 parcels within 0.5 mile.

Applying the parcelization analysis, LSA determined that there is a 31% reduction in developable area within Fresno County when compared to the CEC's land use screen 1 (from 341,000 acres to 237,000 acres). See the figure below for a visual illustration of which areas were retained and which areas were eliminated based on parcelization.



Use of GIS model inputs. We are concerned that the CEC's use of model inputs relating to the base exclusions dataset, biodiversity, landscape intactness, proximity to protected areas, cropland index, and climate resilience overly narrows otherwise viable development areas and promotes areas that are not viable. Collectively, these inputs substantially (and artificially) restrict solar development areas and we would like to work with CEC to refine the use of these inputs. Detailed comments include the following:

Base Exclusions Datasets. These assumptions should be revisited and updated.

- Slope screen is overly prescriptive. Solar can be developed on slopes up to 10% today and technical potential is anticipated to increase over time. The model should allow up to 15% slope to account for technology and racking developments currently under development.
 - Slope screens should be treated carefully due to quality of slope mapping tools. We would like to have further discussion with CPUC and CEC staff about slope characterizations and how slope exclusions should be best be applied.
- Capacity factor screen may be overly prescriptive. We should have additional discussions regarding what is feasible. It is unclear what capacity factor was used for solar development and how this aligns with current technology.
- Solar exclusion screen fails to exclude lands already occupied by solar projects. This is most apparent in the DRECP area. We recommend the CEC to integrate existing projects into this and

future land use screens, so that areas already populated with projects are not considered available by the maps.

- Solar exclusion screen incorrectly includes all of DRECP DFAs, where:
 - \circ a) large portions of DFAs have no-surface occupancy restrictions,
 - b) vast areas are currently excluded from compliance due to Conservation Management Actions (CMA), and
 - c) areas are excluded for DoD use that were not considered during the DRECP process but which are now in place.

The illustration below demonstrates this for the DRECP's East Imperial Development Focus Area.



• CEC should account for local zoning restrictions and community opposition. Is the buffer from residential/inhabited areas sufficient to account for community opposition and local protectionism? Local opposition is a major and growing concern, as evidenced by San Bernardino County's Rural Living solar prohibition on nearly one million acres.

Biodiversity Index. The index is a representation of areas with a weighted index of biodiversity at a given location. However, areas with a high biodiversity index can support solar development while retaining ecological values. As such, the Biodiversity Index areas should not be considered blanket exclusion areas for transmission and renewable energy development, particularly in areas that are *not* protected and *do not* contain listed or special-status species as developers can still work to permit and entitle projects in these areas.

Additional refinements CEC should consider for this Index, beyond not using the Index as a blanket exclusion, include:

- o Further down sampling of ecoregion weights to smaller areas
- Update underlying data set to use smaller mapping units (30-meter units rather than 1 km units)
- Including additional connectivity information that accounts for major impediments to species movement such as canals and major highways
- Increasing the threshold to the median value.
- LSA recommends that CEC also work with CDFW to create a listed species index that focuses specifically on habitat for threatened, endangered, and candidate species, to provide a screen that can more accurately identify areas with the highest risk to listed species.

Landscape Intactness and Proximity to Protected Areas. If designed correctly, solar can be developed in or adjacent to intact areas of protected lands. The screens place an additional no-development buffer around

protected areas that unnecessarily restricts the amount of usable land. CEC's rationale for a 1-km buffer around all protected lands is not explained in the Report.

- A 1-km buffer would be appropriate for national parks or similar but is inappropriate for other areas designated as 'protected', such as conservation easements and agricultural conservation easements as the state has no authority in those areas. As illustrated in Figure C-7 (below), the majority of the state is very close to protected areas.
- CEC's 1-km buffer from all protected areas should be removed; if it is not removed, we recommend it be reduced to 100-meters as a more reasonable setback from protected areas.



Figure C-7: Distance to Legally Protected Areas

Cropland Index. Solar can be developed to be compatible with agricultural land uses, yet the screens exclude a remarkable amount of cropland area from use for solar development. Many areas that the CEC has identified as inappropriate for solar development are perfectly suited for solar given their lack of sensitive biological resources and given that they may be retired from agricultural production in the future.

- We recommend this screen be removed as the use of cropland should be based on willing -sellers and a solar developer's ability to obtain entitlements (i.e., local land use decisions).
- Most notably, should the CEC choose to use the Cropland Index, staff should factor in Sustainable Groundwater Management Act (SGMA) planning efforts undertaken by many local agencies as this information will shape regional agricultural production.

It is now widely understood and even anticipated that solar projects can be built on fallowed farmland and provide important economic benefits to farmers who would otherwise lose revenue from fallowing their land due to water scarcity and other pressures. According to 2020 *Blueprint* document, upwards of 900,000 acres will be fallowed in Fresno, Kings, Kern and Tulare Counties. Solar may be the highest and best use of this land. These lands are of low environmental value for sensitive species. CEC and other state agencies should prioritize these lands for solar siting over rehabilitation of these lands for conservation.

During the October 10 CEC workshop, DWR's representative referred to DWR's collaboration with other agencies to map croplands idled due to drought. Although the capability clearly exists to determine with significant granularity what lands are being idled, no effort was undertaken as part of land screen exercise to incorporate this capability and information.



The statewide maps above and the closeup map below are based on data from the Landsat series of satellites (L5, L7, and L8) and from the MODIS instruments on NASA's Terra and Aqua satellites. They show changes in crop cultivation and idle agricultural lands in California in August 2011 and August 2014. Brown pixels depict farms and orchards that have been left fallow, or "idled," since January 1 in each year. Green pixels show plots where at least one crop was grown during the calendar year. This is the most recent information regarding this exercise that LSA was able to obtain. More current information may well exist. *More importantly, however, these maps demonstrate that the capability exists to ascertain land fallowing in the central valley.*¹

¹ https://earthobservatory.nasa.gov/images/85199/satellites-spot-fields-idled-by-drought



The data used to produce these maps were assembled and analyzed by a team led by Forrest Melton, California State University, Monterey Bay, and James Verdin of the U.S. Geological Survey (USGS). Melton and colleagues processed the satellite data from the NASA Earth Exchange, while also making monthly ground surveys of the Central Valley to verify the satellite observations. The team essentially observes crop development every week on more than 200,000 fields in California's Central Valley in order to provide partners at the California Department of Water Resources (DWR) with near-real time assessments of increases in land idling during the drought.²

Using this existing technology and ground-truthing to inform the CEC's land-screen experiment would greatly enhance the identification of solar-ready, low conflict lands, which in turn would facilitate an actionable transmission planning exercise. It would also neatly stitch together the related policy objectives of reducing groundwater consumption and increasing supply-side solar generating capacity in the most economic and lowest conflict sites. Unfortunately, the CEC Draft Report fails to even mention these tools, much less take advantage of them.

Our recommendations for refinement of the Cropland Index are:

- Include information that reflects SGMA, perhaps by creating an index of anticipated acres to be retired by county or subsidence information,
- Include information on current and recent cropping patterns (as many crops have been removed from production due to drought and water supply availability)
- Revise the variables and weights for the cropland model inputs (the weights assigned to model variable inputs should be adjusted with the Storie index variable reduced to 12.5 and the California important farmland variable being increased to 50%, with statewide important and unique variables further reduced to ensure that the highest emphasis is placed on prime farmland.

• Finally, the Jenks classification index binning should be adjusted to be less sensitive – a higher threshold value than 7.4 should be used allowing for more land to be included).

Climate Resilience. This index further unnecessarily restricts development areas. CEC is effectively indicating that solar cannot be developed either where species are now or where they *might be* in the future. This layer is also overly restrictive as solar can be designed to be compatible with multiple species' needs, and in many cases can improve habitat relative to degraded conditions under an intensive agriculture regime.

- Overall, we recommend this screen be removed given how speculative and imprecise this screen is. In the event it is not removed, we recommend only cells with a rank of 5 or more be retained.
- Further, areas that are expected to be degraded by climate change should be added back into the model as allowing for future solar development.

Other issues with solar development areas:

CEC's land use screen maps show lands as available for solar development that are not feasible. For example, there are some coastal areas in northern California that are not feasible for solar development. Further, there are forested lands, in northern California that are also unsuitable for solar development.

Process Concerns

At this stage in the state's climate planning, where so many are doing so much to do the unprecedented, we must all work together. We are thus concerned by the appearance that the CEC's interest may lie more in preserving the screens as developed, than it does in ensuring the accuracy of the screens for use in energy planning. California is faced with nearly doubling the size of its grid in 12 years. Surely, the planning for the siting of that energy (which will also inform the location of its attendant transmission infrastructure) deserves more than mere cursory public and industry engagement.

Recognizing both the magnitude of solar expected and the complexity involved with land use planning in California, the CEC would have benefitted from including the solar industry in the initial phases of its land screening exercise. By failing to consult industry, staff adopted a methodology, inputs and outputs that fall short of an actionable development assessment. This oversight is compounded by a rush to judgment.

Inadequate comment period and insufficient workshop. Three weeks to respond to the draft report and three business days before the comment deadline to review the data layers is insufficient. The truncated comment period and lack of access to the data left little opportunity for truly constructive feedback. Further, CEC's October 10 public workshop on the land use screens did not provide for meaningful discussion or engagement among staff and parties.

• LSA requests that the October 10 workshop be considered only a preliminary workshop; and we request the CEC to schedule at least one and preferably two more "working session" workshops or design-charettes following the submission and review of stakeholder comments to make necessary adjustments prior to final approval.

Context and Application for Land Use Screens. Previous versions of the land use screens were devised in a pre-SB 100 environment, where a 50% RPS target was the state's primary clean energy target. California now has multiple decarbonization strategies across several sectors of the economy requiring an unprecedented energy buildout. With evolved clean energy and climate policies should come an evolved approach to and criteria for land use screens. The Draft Staff Report is not there yet, nor does it reflect collaborative engagement with industry parties.

• As discussed above, the screens should include a multi-pronged Development Feasibility layer, which will help to ensure that the energy modeling and planning is built on the proper foundation.

Additionally, preliminary or unapproved screens should not be used by other state agencies, such as the CPUC, in modeling for the Integrated Resource Plan ("IRP"). The CPUC is currently updating its IRP RESOLVE modeling inputs, with the goal of finalizing before the end of this year. We urge the CEC and CPUC to *not* incorporate the new land use screens until revisions are made to better factor in energy planning elements.

Recommendations and Conclusions

We are concerned that the CEC's land use screens are overly prescriptive, fail to include critical energy planning criteria, and fail to yield the amount and proper location of utility-scale solar development areas needed to achieve state climate targets.

LSA respectfully makes the following requests and recommendations:

- 1. We ask that CEC delay approval of the land use screens to a) allow time for staff to correct and refine the screens, b) provide for development of Development Feasibility screens, and c) to have one or two additional design-charettes or workshops to provide genuine discussion between staff and parties about the land use screens. Additional time and analysis are needed to ensure that the land use screens include the correct information and result in the desired outcomes. Stakeholder engagement, particularly industry engagement, is needed to ensure the state can achieve its goals.
- 2. The land use screen thresholds should be revised to ensure that more area and the appropriate areas are shown as suitable for solar. As these comments detail, the screens will need to identify much more acreage to account for factors that are only discoverable in the project siting process. At a minimum 1,000,000 acres of technically feasible acreage should be identified under all scenarios, and even with that, large areas within that 1M would still be undevelopable. Significantly more acreage will be needed as we reach the 2045 goals.
- 3. Rather than showing development/no development areas, the criteria should be used to show areas on a scale of priority, where projects in high priority areas would be easier to permit and projects in low priority areas would be harder to permit, understanding that the more sensitive the land, the higher the cost and the more challenging the permitting.
- 4. We ask the CEC and the CPUC to not incorporate these land use screens into the current IRP modeling until they are revised and formally approved by the CEC. In the interim, the CPUC can use existing screens in its current IRP modeling.
- **5.** We ask the CEC to engage solar industry partners more actively in this process. With 86GW of new renewable energy generation needed by 2035, 40GW of which expected to be solar, the CEC, CPUC, CAISO, and CDFW need to be working closely with industry and other parties. The state will not achieve its climate targets if the agencies and parties are balkanized and not coordinating efforts.

Thank you for the opportunity to provide these comments. We sincerely hope the CEC will work with us to improve these land use screens.

Sincerely,

Shannen 594

Shannon Eddy Executive Director, Large-scale Solar Association