

Large-scale Solar Association Comments

Submitted by	Company	Date Submitted
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Please use this template to provide written comments on the Clean Energy and Pollution Reduction Act Senate Bill 350 Study initiative posted on February 4, 2016.

Please submit comments to regionalintegration@caiso.com by close of business
February 19, 2016

Materials related to this study are available on the ISO website at:

<http://www.caiso.com/informed/Pages/RegionalEnergyMarket/BenefitsofaRegionalEnergyMarket.aspx>

This is an important and ambitious undertaking and the Large-scale Solar Association (LSA) appreciates the opportunity to comment on the scope, assumptions and methodologies for the SB 350 studies and offers the comments and recommendations below:

1. Do you think the proposed study framework meets the intent of the studies required by SB350? If no, what additional study areas do you believe need to be included and why?

LSA recommends resetting the scope of the environmental analysis in order to streamline an already complex analysis and given the limitations of the level of analysis possible with the proposed scenarios and assumptions (see specific recommendations below).

LSA also recommends that the study, in its business as usual assumptions (BAU), retain the current boundaries of CAISO for determining RPS bucket classification. This may well be the planned approach but It was unclear to LSA whether this is in fact how the BAU assumptions are structured. Establishing the baseline, as it exists today is important to both understanding and exploring the benefits from CAISO expansion.

2. Five separate 50% renewable portfolios are being proposed for 2030 as plausible scenarios for the purpose of assessing the potential benefits of a regional market. Are these portfolios reasonable for that purpose, and if no, why?

LSA's understanding is that the RESOLVE model looks at a selection of typical days across a number of years. LSA recommends that at least one scenario include high stress assumptions as this could lead to different renewable portfolios. In addition, LSA finds portfolio 3 undervalues the potential for solar development outside of California. This may be due to high-cost assumptions for the resource (see recommendations below on cost assumptions) and may also be related to how much transmission will in fact be needed for the out-of-state wind. Because there is significant disagreement over how much transmission may be needed for WECC-wide procurement portfolios, LSA suggests that the study include a sensitivity around this assumption.

3. To develop the five renewable portfolios the RESOLVE model makes a number of assumptions resulting in a mix of renewable and integration resources for the scenario analysis (rooftop solar, storage, retirements, out of state resources etc.) Do you think the assumptions associated with developing the renewable portfolios are plausible? If no, why not?

One important outstanding question is the assumptions about which resources can provide ancillary services and meet any local generation requirements in both the RESOLVE model and the production cost runs. We know from recent production cost studies that these assumptions materially change the production cost results and recommend that these assumptions be clarified in this study.

In addition, LSA recommends the study use the most updated IEPR demand forecast.

4. The renewable portfolio analysis assumes certain costs and locations for the various renewable technologies. Do you think the assumptions are reasonable? If no, why not?

LSA recommends that E3 incorporate into its base assumptions more realistic forward-looking costs for solar resources. This may well impact the overall portfolios that emerge from the RESOLVE model and the rate analysis. Specifically, the assumptions around future cost declines should reflect recent pricing trends. Solar PV costs have declined 80% since 2009, including another 15-18% in 2015 alone. In fact, prices in solar PV Power Purchase Agreements announced in the west in 2015 ranged from \$50/MWh to under \$40/MWh – 25-50% lower than 2015 installed costs. A more aggressive future cost reduction assumption, based at least on what we're seeing in the market today, is needed in the study to at a minimum reflect these current pricing trends.

<p>See: SEIA/GTM Solar Market Insight Q3 2015, Lazards Levelized Cost of Energy Analysis 9.0 and LBNL’s Utility Scale Solar 2014 Report.</p>
<p>5. The renewable portfolio analysis makes assumptions about the availability and quantity of out-of-state renewable energy credits (“RECs”) to California. Do you think the assumptions are plausible? If no, why not?</p>
<p>LSA strongly recommends that any assumptions around RECs be aligned with the statutory requirements of SB 350 and the portfolio content requirements. It was not clear from the presentations whether that is the current assumption.</p>
<p>6. The renewable portfolio analysis makes assumptions about the ability to export surplus generation out of California (i.e., net-export assumptions). Do you think these assumptions are reasonable? If no, why not?</p>
<p>LSA supports having a range of export assumptions in the study and recommends that the study include support for the particular levels chosen. This support should include research into: (1) the ability of adjacent/nearby BAAs to absorb the additional energy at the times when it is likely to be available; (2) the extent to which those areas might be willing to forego the economic and other benefits of developing generation in their own areas in favor of accepting California’s surplus generation.</p>
<p>7. Does Brattle’s approach for analysis of potential impact on California ratepayers omit any category of potential impact that should be included? If so, what else should be included?</p>
<p>No comment at this time.</p>
<p>8. Are the methodology and assumptions to estimate the potential impact on California ratepayers reasonable? If not, please explain.</p>
<p>See above recommendation related to solar cost assumptions.</p>
<p>9. The regional market benefits will be assessed based assuming a regional market footprint comprised of the U.S. portion of the Western Interconnection. Do you believe this is a reasonable assumption for the purpose of this study? If not, please explain.</p>

<p>This assumption, while reasonable in the context of the overall expansion, may make it difficult to understand the particular benefits of the expansion to include PacifiCorp. LSA encourages the CAISO to consider whether the study or the presentation of the results can be structured to enable an understanding of the potential for more immediate benefits (PacifiCorp as a new PTO) vs. later (broader but more speculative) west-wide benefits (e.g., with NVE, APS, etc.).</p>
<p>10. For the purpose of the production cost simulations, Brattle proposes to use CEC carbon price forecasts for California and TEPPC policy cases to reflect carbon policy implementation in rest of WECC. Is this a reasonable approach? If not, please explain.</p>
<p>No comment at this time.</p>
<p>11. BEAR will be using existing economic data, and generation and transmission data from E3, the CAISO, and Brattle. These data are currently being developed. Are there specific topics that you want to be sure to be addressed regarding these data?</p>
<p>We recommend that BEAR take a look at the most recent Solar Foundation jobs report that can be found here: http://www.thesolarfoundation.org/solar-jobs-census/states/.</p>
<p>12. The economic analysis will focus on the electricity, transportation, and technology sectors to develop the economic estimates of employment, gross state product, personal income, enterprise income, and state tax revenue. These results will be further disaggregated by sector, occupation, and household income decile. Do you think these sectors are the appropriate ones on which to focus the job and economic impact analysis? If no, why?</p>
<p>No comment at this time.</p>
<p>13. Under the proposed study framework, both economic and environmental impacts of disadvantaged communities will be studied. Based on the study overview do you think this satisfies the requirements of SB350?</p>
<p>See below.</p>
<p>14. The BEAR model will evaluate direct, indirect, and induced impacts to income and jobs, including those in disadvantaged communities. Do you think additional economic analysis is required? If yes, what additional analysis is needed and why?</p>

No comment at this time.

15. The environmental analysis will evaluate impacts to California and the west in five areas – air quality, GHG, land, biological, and water supply. Do you think additional environmental analysis is required? If yes, what additional analysis is needed and why?

LSA understands that Aspen intends to study the environmental impacts (using the topics of air quality, GHG emissions, land use and visual resources, biological resources, water supply, and disadvantaged communities) across scenarios and that, for each of the topics, it will look closely at ‘sensitive areas.’

This is an ambitious undertaking. LSA encourages the consultants to consider the appropriate level of granularity, given the timeframe and level of uncertainty in the timeframe of the studies (2030). Our primary concern is ensuring that the study is able to fairly and reasonably compare potential differences across scenarios and portfolios.

LSA strongly recommends that data inputs to this exercise be based on existing and final regulatory decisions, particularly given the high level of the scenario assumptions from the RESOLVE model, which are at the Super CREZ level. At this high level, it would be unreasonable to presume what types of potential land-use conflicts or considerations projects may occur.

The purpose of this exercise is not to identify zones for specific land use development, but to provide a snapshot comparing business-as-usual to a more regional market development. SB350 gives the CAISO significant latitude in designing the study. However, in the interest of timeliness and accuracy, LSA recommends that the approaches not be overcomplicated with incomplete or uncertain inputs; for this reason, we encourage CAISO to keep the environmental analysis at a high level.

Specifically, the collaborative San Joaquin effort has not yet yielded a clear picture of future development in the area. So, while there is likely to be development in that area, and in Westlands in particular, LSA cautions against inferring completion of and accuracy from that process.

It is clear that there are current projects, and future opportunities for solar development to locate on marginal farmland, and thus support needed agricultural water reduction. To this end, metrics that infer negative impacts due to potential locations of generic solar projects on or near farmland are not likely useful or relevant to the question at

hand.

Furthermore, it remains unclear why specific renewable energy development locations are necessary for an assessment of impacts to air quality. Generally, renewable energy generation within a Balancing Area will displace fossil generation from within that same Balancing Area, and the location fossil generation being displaced is much more important for an assessment of impacts on public health or air quality than the location of the renewable energy generation displacing it.

LSA also understands that the study would compare sector-wide modeling results to determine the likelihood of 'conflict,' with the hypothesis that certain scenarios will increase intensification (potential conflict) and others will decrease conflict. LSA is unclear about how 'conflict' will be defined and encourages Aspen and the CAISO to focus these efforts on *objective* criteria rather than perceived conflicts.

Finally, the Aspen presentation includes suggested metrics around water use and water supply as it relates to solar PV development. LSA wants to emphasize the water-reduction *benefits* of the conversion from fossil generation to solar PV, and encourages Aspen to incorporate these benefits into the model.

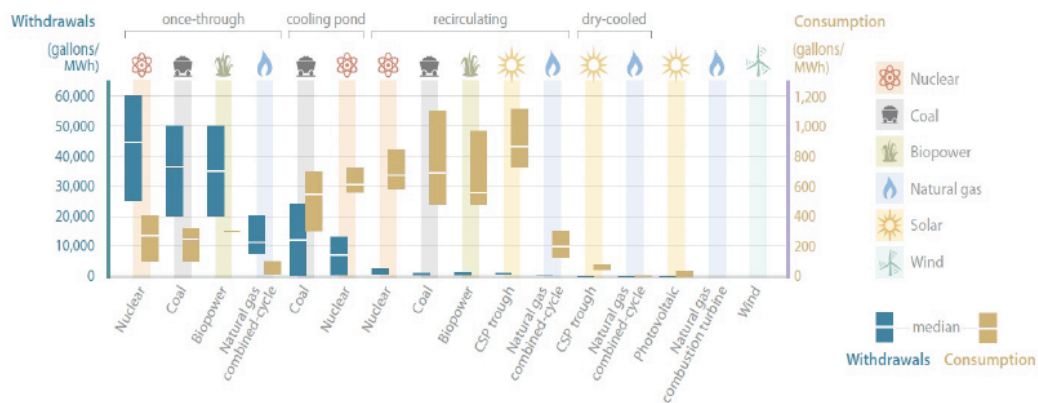
Recent project data speaks to the minimal water use of solar PV, particularly during construction. LSA would be happy to provide additional detail to Aspen to demonstrate the water efficiencies realized by solar PV. A few specific figures are listed below:

- A 20 MW PV facility requires 30 acre feet of water for construction and 2 acre feet per year in operations (panel washing).
- A 40 MW PV facility requires 30 acre feet of construction and uses 0.5 acre foot of water per year for panel washing
- A 100 MW PV facility used 60 acre feet of water for construction and uses less than 1 acre foot per year for washing.
- At least one PV company does not require any water for operations, as it does not wash its panels.

Furthermore, a recent LBNL study on the benefits of RPS standards found significant water savings in its analysis of the switch to renewables. This study found that, "Each MWh of electricity generated for RPS compliance obligations in 2013 represents an average savings of 8,420 gallons of water withdrawal and 270 gallons of water consumption" (See Wiser et al, *A retrospective analysis of benefits and impacts of US*

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renewable portfolio standards, January 2016). The chart below gives a good general comparison of relative water use for various technologies. Aspen and the CAISO should consider taking a similar approach to its study to that used in this LBNL analysis. It is important to note, however, that this study relies on 2011 data and that the SB 350 environmental studies should seek more up-to-date figures in order to capture recent water efficiency innovations.



16. The environmental analysis presentation identified a number of potential indicators for the various impacts. Are the indicators sufficient? If no, what additional indicators would you suggest?

See above.

17. Other

No further comments at this time.