Senate Bill 350 Study

Volume II: The Stakeholder Process

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Senate Bill 350 Study

The Impacts of a Regional ISO-Operated Power Market on California

List of Report Volumes

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Volume II. The Stakeholder Process

A. Introduction

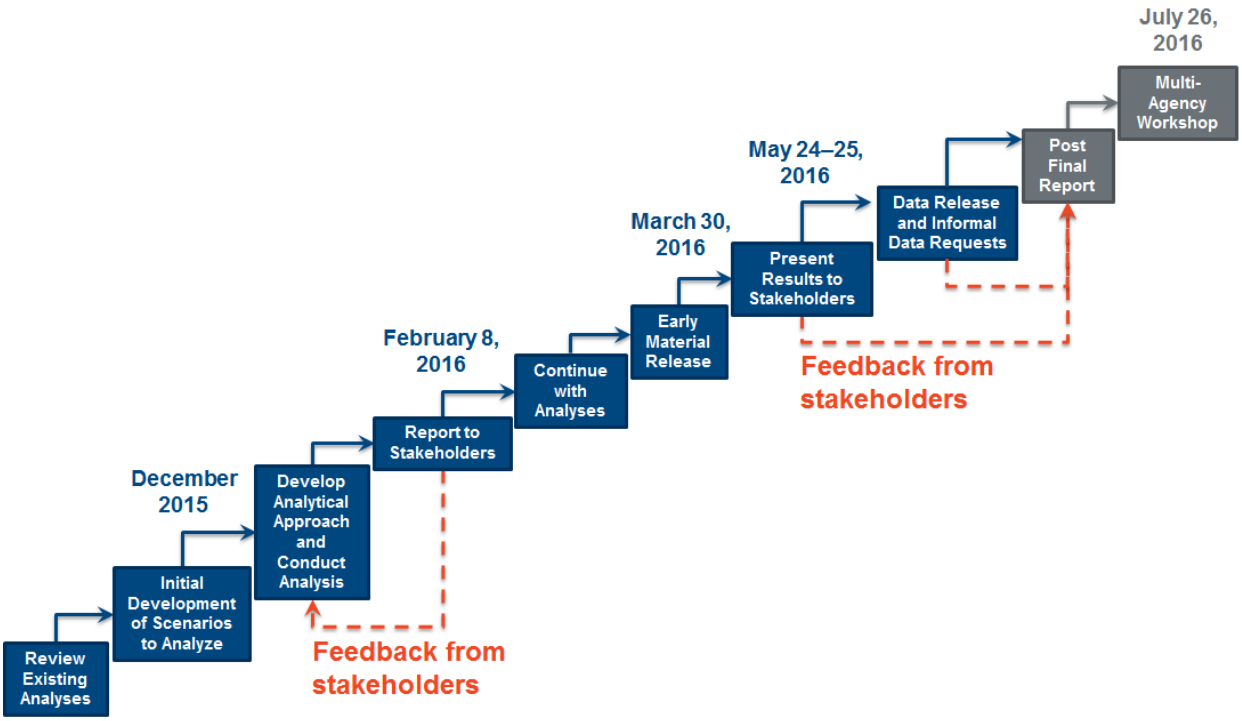
The SB 350 study efforts include a stakeholder process, by which the study team provides study assumptions, methodology, results, and detailed descriptions of all of the relevant metrics used in the analyses. The stakeholder process began with the study team presenting initial ideas about the approach and assumptions to be used in the analyses, modifying the approach based on stakeholder comments, continued through providing stakeholders interim updates associated with the approach and study assumptions, followed by providing detailed data and explanations of the preliminary results. This stakeholder process involved formal stakeholder workshops and comment periods, supplemental webinars, data releases and review of study data by stakeholders, and written correspondences that responded to specific stakeholder questions. All workshops and webinars were recorded as a service to stakeholders who couldn't join, or would like to review the proceedings.

In response to stakeholder comments the study team made several modifications to the SB 350 study's approach and methodology. We made adjustments to the scope of regionalization impacts to analyze, the footprint of regionalization to consider, the definition of the study's scenarios, sensitivities to consider, and a number of other specific inputs and assumptions to our analytical models.

B. Timeline of Stakeholder Feedback

The study team formally solicited feedback from stakeholders following two stakeholder workshops. After the first stakeholder workshop, we also responded to informal stakeholder questions, comments and requests through customized written responses to each comment received, early release material, supplemental webinars, data release and a number of webinars to walk-through the details of the analysis. Figure 1 shows the overall study timeline, from December 2015 through July 2016, and key times of stakeholder feedback.

Figure 1: SB 350 Study Timeline



Specifically, the stakeholder process consisted of:

- **February 8, 2016** stakeholder meeting to discuss proposed study framework, methodology, and assumptions. Stakeholders submitted to the ISO their comments and feedback, which the study team used to refine the study approach, study assumptions, and the scenarios and sensitivities analyzed.
- **March 18, 2016** the study team responded to stakeholder comments from the February 8 stakeholder meeting.
- **March 30, 2016** additional detail on study assumptions and methodologies ("early release material") were posted on the CAISO website in response to stakeholder requests.
- **April 14, 2016** the study team hosted a webinar to discuss the early release materials with stakeholders.
- **May 24–25, 2016** stakeholder meeting to discuss preliminary study results; stakeholder comments were due by June 22, 2016.
- **June 3 and 10, 2016** detailed analytical inputs, assumptions, calculations, and results were released for stakeholder review. Supplemental material, in response to ongoing stakeholder requests, was released on June 14, 17, 21, and 22, 2016 and on July 5, 2016.
- **June 21, 2016** the study team hosted a webinar to discuss the details of the ratepayer impact analysis, including TEAM methodology.
- **July 1, 2016** the study team provided initial responses to stakeholder comments from the May 24–25 stakeholder meeting.

Finally, SB 350 requires the ISO to hold at least one public workshop jointly with the California Public Utilities Commission, the California Energy Commission, and the California State Air Resource Board ("Joint Agency Workshop") to discuss the results of the study. The workshop is scheduled to be held in July 26, 2016 at the Secretary of State, Auditorium at 1500 11th Street, First Floor, Sacramento, CA 95814 (enter at 11th and O Streets).

C. Modifications to the Study in Response to Stakeholder Feedback

The study team made several refinements to the study approach and methodology in response to stakeholder feedback. Specific changes include:

- Refined renewable portfolio optimization:
  - Added a scenario (Regional 3) to reflect more of an out-of-state focus on California's procurement of new renewables to meet a 50% RPS by 2030;
  - Reduced battery storage costs: Reduced capital cost, added inverter replacement, increased balance-of-systems costs, reduced fixed O&M, adjusted lifetime;
  - Also reduced the cost of solar, wind, and geothermal resources;
  - Allowed hydroelectric and storage resources to provide frequency response services to the system;
- Revised the hypothetical regional footprint for 2020 to include only CAISO and PacifiCorp, rather than a larger footprint;
- Revised the hypothetical regional footprint for 2030 to include the U.S. portion of WECC without the Federal Power Marketing Agencies ("PMAs") (BPA and WAPA), rather than all of U.S. WECC; [1]
- Adjusted to a statewide focus, rather than just CAISO focus;
  - Assumed renewable procurement for non-ISO areas in California (LADWP, BANC, TID, IID) to meet 50% RPS by 2030; and
  - Estimated ratepayer impacts for the State of California as a whole, rather than just for CAISO;
- Did not attribute regionalization impacts to specific parties (other than disadvantaged communities);

[1] Specifically, the PMAs being excluded for the analysis are Bonneville Power Administration ("BPA") and Western Area Power Administration ("WAPA")—Colorado-Missouri Region, Lower Colorado Region and Upper Great Plains West. WAPA's Sierra Nevada Region is included in the Balancing Area of North California and, because it is not a separate balancing area, was included in the analysis.

- Measured WECC-wide impacts from a societal perspective as an additional metric, although not required by SB 350;
- Conducted various sensitivities as suggested by various stakeholders, including:
  - Sensitivities on renewables investment cost impacts: high energy efficiency under SB 350; high flexible load deployment, low portfolio diversity, high rooftop PV, high out-of-state resource availability, lower cost solar, 55% RPS;
  - Sensitivities on production cost impacts:
    - Sensitivities assuming a CO_2 price in the rest of U.S. WECC in 2030;
    - A sensitivity assuming a broader regionalization footprint in 2020, to better understand the impact of renewables intensity and market conditions on results;
    - A sensitivity on 2030 regionalization with no change in California's renewable portfolio, to better understand the impact of de-hurdling and reserve sharing on results;
    - A sensitivity on 2030 regionalization without additional renewables development beyond meeting RPS;
- Ensured compliance with RPS in the rest of U.S. WECC, including Oregon's new 50% by 2040 RPS;
- Incorporated additional announced coal retirements, and renewable and conventional plant additions from several utility integrated resource plans (IRPs);
- Evaluated California and the rest of U.S. WECC's ability to meet the EPA's Clean Power Plan mass-based targets;
- Updated demand, energy efficiency, and various demand-side resource inputs with the CEC's 2015 Integrated Energy Policy Report results.

D. Summary of Stakeholder Comments

Figure 2 summarizes the names and types of stakeholders active in the SB 350 study. These stakeholders submitted formal comments after the February 8, 2016 and May 24–25, 2016 stakeholder workshops. Several of these stakeholders also submitted informal questions and data requests, participated in supplemental webinars, and reviewed the study team's work papers containing input assumptions, methodology, and results. A glossary of stakeholder names is included at the end of this volume.

Figure 2: Summary of Stakeholders to the SB 350 Study

Type	Stakeholder
Transmission Owner	PacifiCorp, PG&E, SDG&E, Six Cities, SCE, TANC, TransCanyon, TransWest
Generator / Storage	AWEA, Calpine, CESA, Diamond, LSA, LS Power, MegaWatt Storage, NRG, SWPG, Stone Hill, WSP
Power Marketers	Powerex
Municipal Utility	BAMx, CMUA, , IID, LADWP, MID, SVP, SCL
State Agency	CDWR
Federal Power Marketing Agency	BPA
Public Power Agencies	NCPA , PGP, PPC
Environmental	CBE, Defenders, Greenlining/APEN, NRDC, NEC, Sierra Club, UCS, WRA, WGG, WCEA
Customers	CLECA, ICNU, ORA, TURN
Labor	Adams Broadwell
Regulator*	CARB, CPUC, CEC, Peak Reliability

*The CARB and the CEC did not submit formal written comments, but they provided feedback informally to the ISO.

Through the formal comment periods, the study team requested comments relating to 17 topics from the first stakeholder workshop on February 8th, and an additional 9 topics from the second workshop on May 24 -25. Those topics and a summary of stakeholder comments are as follows. This summary is highly condensed, and a more detailed account of stakeholder comments, along with the ISO's formal responses, can be found on the SB 350 website.[2] In addition to these formal comments we received over 75 informal clarifying questions and data requests prior to the production of our final report which can also be found on the CAISO's SB 350 study website.

The February 8, 2016 stakeholder workshop focused on study assumptions and methodology. After the workshop, the ISO requested comments on 17 topics. Below is a summary of the types of comments the study team received:

2 https://www.caiso.com/informed/Pages/RegionalEnergyMarket/BenefitsofaRegionalEnergyMarket.aspx

1. **Do you think the proposed study framework meets the intent of the studies required by SB 350? If no, what additional study areas do you believe need to be included and why?**

   Stakeholders made a number of requests to clarify specific assumptions and inputs to the study. There were some questions on how the SB 350 study aligns with a parallel study on CAISO-PacifiCorp Energy Imbalance Market ("EIM") integration. Several stakeholders commented that the study framework appears to meet SB 350's requirements. However, we received comments that assuming all of U.S. WECC forms a Regional ISO would be unrealistic, and that we should consider a case with only CAISO and PacifiCorp as a regional entity. We also received a number of comments on the renewable portfolio analysis and some requests to change the methodology of that analysis and specific assumptions. Stakeholders commented that our impacts should be measured statewide, instead of just for CAISO consistent with the legislation. Stakeholders made suggestions for additional benefits to consider, sensitivities to consider, and more detailed modeling inputs and analyses.

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?**

   Stakeholders made a number of comments on how we should treat in-state versus out-of-state procurement overall and in relation to regionalization, the composition of the renewable portfolios by technology (e.g., wind, solar, geothermal), new transmission relating to the renewable portfolios, and existing renewables outside of California to meet California's 50% RPS.

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?**

   Several stakeholders requested that the assumptions include data from the CEC's 2015 Integrated Energy Policy Report. Stakeholders also made suggestions for assumptions on energy efficiency, demand response, electric vehicle adoption and charging profiles, load, and load sensitivities. There were comments on assumptions for renewable technology costs, the extent of distributed solar development, renewable contract arrangements, and additional transmission. There were also some questions about assumptions on pumped storage, other storage, geothermal resources, and, again, in-state versus out-of-state procurement in relation to regionalization.

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?**

   We received several comments from stakeholders that our preliminary assumptions on the cost of solar development were too high. Stakeholders requested us to use the CPUC's RPS calculator for some assumptions on resource cost by technology and geography. There were a number of comments overlapping with the topics already discussed above, including why we included new geothermal and pumped storage resources in the renewable portfolios.

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?**

   Stakeholders had a number of comments and questions on how the RPS Product Content Categories (i.e., RPS "buckets") would work in the future under regionalization.

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?**

   Many stakeholders were focused on whether or not, and to what degree, CAISO's system would be physically limited in the future. Some commented that our assumed export limits were too high, and others commented that our assumed export limits were too low and overestimated California's ability to export oversupply of renewable energy. Several stakeholders supported modeling a range of export assumptions.

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?**

   Several stakeholders had questions about how benefits would be allocated, and some asked for more granular metrics to assess benefits for more specific stakeholders. A few stakeholders pointed out possible reliability benefits or other benefits the study team should consider. Some also pointed out the importance of estimating unit-specific effects. There were some requests to evaluate potential changes in transmission access charges.

8. **Are the methodology and assumptions to estimate the potential impact on California ratepayers reasonable? If not, please explain.**

   Responses were similar to those for question #7 above, including comments on benefits allocation, and treatment of transmission access charges. One stakeholder made suggestions for properly capturing savings in operating reserve costs.

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.**

   We received a wide range of comments, with stakeholders suggesting footprints from CAISO plus PacifiCorp only, to all of WECC including the non-U.S. portions of WECC. Most stakeholders expressed that assuming all of WECC or all of the U.S. portion of WECC would not be reasonable. One stakeholder pointed out in some detail the barriers to federally-owned and operated areas, such as BPA and WAPA, to joining a Regional ISO.

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.**

    Stakeholders generally supported the use of the CEC's greenhouse gas price forecast in the 2015 Integrated Energy Policy Report. Stakeholders also pointed out significant uncertainty in the timing and implementation of the EPA's Clean Power Plan. Some stakeholders requested our analysis to include emissions from non-CO_2 greenhouse gases, lifecycle emissions for power plants, and emissions from other sectors.

11. **BEAR will be using existing economic data, and generation and transmission data from E3, the ISO, and Brattle. These data are currently being developed. Are there specific topics that you want to be sure to be addressed regarding these data?**

    We received comments from only a few stakeholders on this topic. Individual comments included a request for an analysis of how investments in other states would affect California, suggestions on what types of entities would be affected economically, a request to develop and evaluate ISO performance metrics, and comments on storage and transmission costs.

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?**

    We received comments from only a few stakeholders on this topic. Individual comments included a request to consider more detailed employment effects of distributed solar resource development, requests to consider the entire value chain of economic activities, and a request to consider impacts on specific groups of people.

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 SB 350?**

    Again, we received comments from only a few stakeholders on this topic. Individual comments included a request to consider certain labor initiatives, and a request to look at health-related benefits more closely.

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?**

    We received comments from only a few stakeholders on this topic. Comments were repetitive to those received for question #13 above.

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?**

    Stakeholder comments on greenhouse gas emissions included a suggestion that regionalization could lead other states to increase their RPS, a request to look at the impacts on regionalizing only CAISO plus PacifiCorp, and a request to consider changes in greenhouse gas-related costs and to clarify some specific assumptions relevant to greenhouse gas emissions. Regarding land use impacts, several comments advised us to rely on a number of existing studies and regulations as a baseline. For our estimates of water impacts one stakeholder suggested an emphasis on water use, and provided data on previous studies of water use by technology. Another stakeholder made suggestions on additional environmental impacts to consider.

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?**

    Several stakeholder comments included suggestions to measure impacts at specific levels of geographic granularity (e.g., by air basin). One stakeholder suggested adding indicators on: federal solar Programmatic Environmental Impact Statement zones, state efforts to limit solar development to specific areas, monitoring and mitigation processes, and federal avian permitting criteria.

17. **Other comments.**

    Many stakeholders raised concerns about the compressed study timeline. We also received several requests to provide additional data and detail on our study assumptions and modeling efforts. A few stakeholders stressed the importance of sensitivity analysis

and/or supplemental or follow-up analyses that may be necessary. There were also a few comments on specific assumptions.

The May 24 – 25, 2016 stakeholder workshop focused on the preliminary results of the SB 350 study. After the workshop, the ISO requested comments on 9 topics. Below is a summary of the types of comments the study team received:

1. **Are any of the study results presented at the stakeholder workshop unclear, or in need of additional explanation in the study's final report?**

   Stakeholders requested clarification on the studies sensitivities and ranges of results, how the Energy Imbalance Market relates to study results, how Transmission Access Charges are treated, and how various assumed hurdles under the Current Practice scenarios are defined. Some stakeholders also re-visited assumptions to the renewables portfolio analysis

2. **Comments on the 50% renewable portfolios in 2030.**

   Many stakeholders commented on the cost and availability of future transmission, and its impact on future renewables integration. Stakeholders re-visited assumptions for wind and solar, and some presented viewpoints on the inclusion of "non-economic" geothermal and storage resources assumed. Stakeholders made a wide variety of requests for alternative assumptions for the cost and availability of renewable resources, the level of energy efficiency, and coal retirements.

3. **Comments on the assumed regional market footprint in 2020 and 2030.**

   Some stakeholders commented that additional combinations of different regional market footprint should be tested in the analysis. For instance, some discussed that since the benefits of the regional is dependent on the size and configuration of the footprint, both smaller (just CAISO plus PacifiCorp, and NV Energy) and larger footprint (one that includes all of U.S. portion of WECC) should be analyzed.

4. **Comments on the electricity system (production simulation) modeling.**

   We received a wide variety of comments, including comments on market inefficiencies, wind development, natural gas-fired generation, carbon pricing across WECC, the grid management charge savings assumptions, export limits and renewable resource curtailments, and TEAM and ratepayer calculations. Many comments included requests for clarifications and/or comments on the limitations in the modeling and further elaborations about how the modeling approach used drive conservatively low benefits, even though the real benefits would be much larger than those estimated by the study

team. Some stakeholders requested additional sensitivity analyses and the use of a variety of alternative assumptions in either the baseline analyses or in additional sensitivity analyses. Stakeholders also provided comments about the resulting GHG emissions, particularly comments about how to interpret the *de minimus* amount of GHG emission increase estimate for 2020 even though the estimated longer term effects of the regional market would be a material reduction of GHG emissions from the power sector.

5. **Comments on the reliability benefits and integration of renewable energy resources.**

   There were many clarifying questions and suggestions for estimating reliability impacts. Stakeholders asked about assumptions to the load diversity analysis and offered alternative assumptions. Some stakeholders requested further information about the amount of renewable resource development that is beyond those needed to meet the region's collective RPS requirements. Some asked for the analytical results without the "Beyond-RPS" renewable development.

6. **Comments on economic analysis.**

   There were several comments and questions on the more granular sub-state results and some clarifying questions.

7. **Comments on environmental analysis.**

   We received relatively few comments on this topic; many of them requested clarifications or additional detail on our results.

8. **Disadvantaged Communities Analysis**

   We did not receive any comments on the analysis for disadvantaged communities, but many of the comments on economic and environmental analyses apply to the disadvantaged communities as well.

9. **Do stakeholders have any additional comments?**

   Many stakeholders expressed concern over the study timeline and requested more time to conduct the study. Some stakeholders requested more study of how other states outside of California would benefit from the regional market and suggested that since the data is available, the study should include a description of other states' benefits.

F. GLOSSARY OF STAKEHOLDER NAMES

Adams Broadwell	Adams Broadwell Joseph & Cardozo
AWEA	American Wind Energy Association and Interwest Energy Alliance
BAMx	Bay Area Municipal Transmission Group
BPA	Bonneville Power Administration
Calpine	Calpine Corporation
CARB	California Air Resources Board
CBE	Communities for a Better Environment
CDWR	California Department of Water Resources
CEC	California Energy Commission
CESA	California Energy Storage Alliance
CLECA	California Large Energy Consumers Association
CMUA	California Municipal Utilities Association
CPUC	California Public Utilities Commission
Defenders	Defenders of Wildlife
Diamond	Diamond Generating Corporation
Greenling/APEN	The Greenlining Institute and Asian Pacific Environmental Network
ICNU	The Industrial Customers of Northwest Utilities
IID	Imperial Irrigation District
LADWP	Los Angeles Department of Water & Power
LSA	Large-Scale Solar Association
LS Power	LS Power Development, LLC
MegaWatt Storage	MegaWatt Storage Farms, Inc.
MID	Modesto Irrigation District
NCPA	Northern California Power Agency
NEC	Northwest Energy Coalition
NRDC	Natural Resources Defense Council, Western Grid Group, Western Resource Advocates, Utah Clean Energy, Northwest Energy Coalition, Islands Energy Coalition and Vote Solar
NRG	NRG Energy, Inc.
ORA	The Office of Ratepayer Advocates
PacifiCorp	PacifiCorp
Peak Reliability	Peak Reliability
PG&E	Pacific Gas and Electric Company

PGP	Public Generating Pool
Powerex	Powerex Corp.
PPC	Public Power Council
SCE	Southern California Edison
SCL	Seattle City Light
SDG&E	San Diego Gas & Electric
Sierra Club	Sierra Club
Six Cities	Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California
Stone Hill	Stone Hill CP, LLC
SVP	Silicon Valley Power
SWPG	SouthWestern Power Group
TANC	Transmission Agency of Northern California
TransCanyon	TransCanyon, LLC
TransWest	TransWest Express LLC
TURN	The Utility Reform Network
UCS	Union of Concerned Scientists on behalf of the Environmental Defense Fund ("EDF") and the Center for Energy Efficiency and Renewable Technologies ("CEERT")
WCEA	Western Clean Energy Advocates
WGG	Western Grid Group
WRA	Western Resource Advocates
WSP	Westlands Solar Park

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