

STAKEHOLDER COMMENTS TEMPLATE

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 (SB350) Study initiative posted on April 25, 2016.

Please submit comments to regionalintegration@caiso.com by close of business

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

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

Please use the following template to comment on the key topics addressed in the workshop.

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?

Comment:

See the attached document for TURN's preliminary comments on the preliminary study results.

2. Please organize comments on the study on the following topic areas:

- a. The 50% renewable portfolios in 2030**
- b. The assumed regional market footprint in 2020 and 2030**
- c. The electricity system (production simulation) modeling**
- d. The reliability benefits and integration of renewable energy resources**
- e. The economic analysis**
- f. The environmental and environmental justice analysis**

Comment:

See the attached document for TURN's preliminary comments on the preliminary study results.

3. Other

Comment:

See the attached document for TURN's preliminary comments on the preliminary study results.

TABLE OF CONTENTS

I. STUDY RESULTS THAT REQUIRE ADDITIONAL EXPLANATION AND DISCLOSURE	1
A. Excessive application of confidentiality by CAISO.....	1
B. CAISO responses to data requests are incomplete.....	2
C. Additional modeling is needed based on inputs proposed by stakeholders.....	2
II. 50% RENEWABLE PORTFOLIO ASSUMPTIONS FOR 2030.....	3
A. The study fails to acknowledge that even the most aggressive assumptions for reliance on out of state renewable resources can be met without regional expansion under the existing RPS program	3
B. Existing western renewable resources could substitute for new development.....	7
C. Curtailment assumptions are contradictory and implausible	8
D. Assumed costs of solar are significantly inflated and not consistent with current market offerings or projected industry trends	10
E. Transmission costs associated with Scenario 3 understate impacts for California customers.....	11
F. New transmission can be constructed to enable additional out-of-state renewable generation under current practice	12
III. SELECTION OF BASE SCENARIOS AND SENSITIVITIES	13
A. The SB 350 energy efficiency goals should be included as an input to all base cases	13
B. Assumption that regionalization will yield 5,000 MW of “Beyond RPS” Wyoming and New Mexico wind is critical to study’s estimates of benefits but is not plausible	14
1. Importance of “Beyond RPS Wind” Assumption.....	14
2. CAISO modeling shows that developing the 5,000 MW as merchant wind would be unprofitable under regional expansion.....	17
3. The costs of new transmission needed to integrate 5,000 MW of incremental wind power have not been acknowledged or modeled	18
4. It is not reasonable to assume that 0 MW of “beyond RPS” wind are developed absent regional expansion	20
5. Last-minute addition of “Beyond RPS Wind” input raises serious concerns about the integrity of the study process.....	22
IV. ASSUMED REGIONAL MARKET FOOTPRINT IN 2020/2030	23
A. SB 350 study fails to make a compelling case for PacifiCorp-CAISO integration in 2020 .	23
V. PRODUCTION SIMULATION MODELING	25
A. TEAM analysis of benefits to California ratepayers requires additional scrutiny.	25
1. Uncertain assumptions regarding units under California Ownership or Control.....	26
2. Congestion Costs Assumed Away.....	26
3. Differences in Market Prices among Scenarios Raises Questions.....	28
VI. ECONOMIC ANALYSIS	29
A. CAISO analysis showing “job” benefits are most pronounced under a status quo scenario with greater exports was not disclosed in the public release materials	29
B. Assumed economic impacts on communities are not reflective of the manner in which savings and costs would actually be distributed	30
VII. FAILURE TO MODEL TRANSMISSION ACCESS CHARGES IS A MAJOR OMISSION	31

COMMENTS OF THE UTILITY REFORM NETWORK ON THE PRELIMINARY SB 350 STUDY RESULTS

In the following sections, TURN offers the following preliminary comments on the SB 350 study results released by CAISO. Due to the many issues that are raised by the selected study parameters, preferred input assumptions, and partial results, TURN's observations and critiques are included in the following six sections that roughly (but do not exactly) correspond to the organization in the CAISO comment template.

I. STUDY RESULTS THAT REQUIRE ADDITIONAL EXPLANATION AND DISCLOSURE

A. Excessive application of confidentiality by CAISO

The CAISO made some of its consultants' data and workpapers available to interested stakeholders on June 3 and June 10. The CAISO chose to label many of these files as "confidential" and required stakeholders to sign a Non-Disclosure Agreement (NDA) to gain access. TURN signed the NDA, reviewed all of these "confidential" files, and does not believe that the contents of many of files – and possibly any of the files – merit confidential treatment. The overuse of confidentiality by CAISO in this process bodes poorly for the designation of similar material offered to stakeholders in a regional ISO.

The excessive application of confidentiality appears widespread. For example, one file contains only projected hourly "Locational Marginal Prices" (LMPs) in 2030, which represent forecasted wholesale electric energy prices at various locations on the transmission grid.¹ TURN cannot comprehend the rationale for designating such information as confidential, particularly in light of the fact that a chart containing hourly LMP data was included in the CAISO's public presentation of its results.² No information proprietary to power market participants – whether buyers or sellers – are included in this LMP file. Moreover, no information contained in this file

¹ This file is named "Brattle SB 350 Study_06-10-2016 data release (hourly LMPs and duration curves)_CONFIDENTIAL.xlsx". Contact the CAISO at regionalintegration@caiso.com for access to public and confidential data files.

² *Presentation, May 24, 2016 – Senate Bill 350 Study: Preliminary Results* (May 24 Presentation), p. 161, available at http://www.caiso.com/Documents/Presentation-May24_2016-SenateBill350Study-PreliminaryResults.pdf. TURN also provides some aggregated data from this file below.

appears to be reasonably considered as Critical Energy Infrastructure Information (CEII). TURN believes that the bulk of the data contained in other files – possibly all of it – should also be made fully available to the public.

B. CAISO responses to data requests are incomplete

TURN has submitted four separate data requests to CAISO and its consultants requesting specific workpapers and data along with additional questions seeking clarification of some assumptions that were not adequately described in the study materials. While TURN appreciates that the CAISO has responded to some of these requests quickly, the responses to some questions are incomplete or otherwise non-responsive. CAISO convened a call to discuss some additional materials relating to the TEAM analysis the day before comments were due from stakeholders and a response to questions submitted by TURN was provided the day comments were due. The primary reason for these inadequate and late responses appears to be the extremely compressed schedule adopted by CAISO (despite protests from a wide array of stakeholders) that limits the time available for consultants to review and respond to data requests. Despite this constraint, TURN is disappointed that some answers do not adequately respond to the questions posed.³

C. Additional modeling is needed based on inputs proposed by stakeholders

TURN believes that additional production simulation results and TEAM modeling are needed to analyze other scenario and sensitivity combinations in order to isolate the extent to which various inputs and constraints drive future economic and environmental outcomes. Additional model runs should include gas price sensitivities (low/base/high), consider alternative RPS portfolios without regional expansion, and incorporate other alternative input assumptions. Additional time and resources should be made available to perform such analysis in order to ensure that the study engages in a fair and realistic review of potential results.

³ For example, see CAISO response to Stakeholder Question #26 (In response to a direct question, CAISO refused to explain how the “high energy efficiency” sensitivity assumptions compare to the energy efficiency goals enacted as part of SB 350), CAISO response to Stakeholder Question #24 (When asked to explain a potential error in the computation of transmission costs for New Mexico wind, CAISO offered a non-responsive answer and did not address the concern.)

II. 50% RENEWABLE PORTFOLIO ASSUMPTIONS FOR 2030

- A. The study fails to acknowledge that even the most aggressive assumptions for reliance on out of state renewable resources can be met without regional expansion under the existing RPS program

The study builds several different renewable portfolios to satisfy the 50% RPS program targets in 2030. The composition of each portfolio is tied to the choice of whether regional expansion occurs, the maximum quantity of simultaneous exports, and whether RPS Product Content Category (PCC) requirements continue to apply. However, the study fails to consider the extent to which the existing RPS program could accommodate much greater reliance on out-of-state resources without any changes to program rules or any expansion of the CAISO balancing authority. The lack of any such analysis is surprising and reveals serious flaws in the study assumptions.

For purposes of developing the renewable energy portfolios in Scenarios 1a, 1b and 2, CAISO assumes that all out-of-state resources other than unbundled Renewable Energy Credits (RECs) must directly deliver all energy to California.⁴ The result is that out-of-state resources are capped at 5,000 MW in Scenarios 1a, 1b, and 2.⁵ This assumption is not reasonable. CAISO claims that this limit on out-of-state renewable generation is “based on an assumed policy preference” for reliance on in-state resources and those that deliver directly into California.⁶ However, the actual statutory provisions governing RPS procurement and compliance do not support this arbitrary limitation.

The California RPS program requires at least 75% of total multi-year compliance to be procured from products that result in direct delivery of renewable energy into the CAISO footprint without substitution (PCC 1). Up to 25% of total compliance may be procured via contracts with resources that do not directly deliver energy into the footprint of any California Balancing

⁴ CAISO response to Stakeholder Question 48.

⁵ CAISO response to Stakeholder Question 31.

⁶ CAISO response to Stakeholder Question 31.

Authority.⁷ No more than 10% may come from unbundled RECs (PCC 3) but the remaining allowance (up to the 25% limit) can be procured via firmed-and-shaped arrangements (PCC 2) that permit delivery of substitute energy from other resources at any point throughout the course of a single year. As a result, the assumption that all “out of state” resources must be directly delivered in order to be RPS eligible is fundamentally inconsistent with the express requirements of the program and the actual procurement conducted by California Load Serving Entities including Investor Owned Utilities, Community Choice Aggregators, Publicly Owned Utilities, and Electric Service Providers.⁸

Furthermore, because the study only classifies resources as “in state” or “out of state”, the resulting percentages shown in the E3 materials do not accurately reflect any limitations embedded into the RPS program. The study also mistakenly characterizes geothermal power produced in the Imperial Valley in the base 33% portfolio as “out-of-state” despite the fact that these resources are both within the state of California and, due to having their first point of interconnection with a California Balancing Authority, would be classified as PCC 1 (direct delivery) for purposes of RPS compliance.⁹

Many out-of-state resources have the ability to be treated as PCC 1, PCC 2 or PCC 3 depending upon the particular contracting arrangement. A significant quantity of out-of-state renewable resources should be able to directly deliver energy into a California Balancing Authority and qualify as PCC 1 resources. For example, SCE recently executed contracts for 622 MW of new windpower located in New Mexico that will be directly scheduled into the current CAISO footprint and eligible for RPS compliance as PCC 1.¹⁰ CAISO also acknowledges that solar projects located in Arizona and Nevada that dynamically transfer energy into the CAISO

⁷ California Balancing Authorities include CAISO, LADWP, BANC, IID, and TID.

⁸ Information about actual procurement of RPS resources by IOUs, ESPs and CCAs is publicly available in regular compliance filings submitted to the CPUC.

⁹ The E3 workpaper (RenewablePortfolioInput-Results.xls) calculation of “out of state share in total portfolio” in the “statewide results” worksheet incorrectly includes 3,933 GWh/year of Imperial Valley geothermal (Existing 33% Portfolio worksheet, Cell D15) in the calculation of “Out of State” resources.

¹⁰ Southern California Edison Advice Letters 3360-E and 3299-E; CAISO response to TURN data request #1, Question 18.

footprint consistent with the PCC 1 requirements are simply classified as “out of state” for purposes of the study.¹¹

Although the study assumes that the Los Angeles Department of Water and Power (LADWP) Balancing Area joins the new regional CAISO by 2030, there is no mention of the fact that LADWP is developing plans to import a large quantity of wind from Utah and Wyoming once the coal-fired Intermountain Power Plant is retired in the mid-2020s. LADWP maintains 2,400 MW of dedicated DC transmission with the ability to directly import intermittent renewable energy from the current PacifiCorp East footprint into California. Yet the study assumes that only 604 MW of incremental windpower can be developed in Utah and Wyoming under Scenarios 1a, 1b and 2 to serve LADWP and other California POU's.¹² This overly conservative assumption fails to consider the likelihood that additional windpower could be developed in Utah or Wyoming and still qualify as PCC 1 without regional expansion or any changes to RPS program rules. The arbitrary limitations enforced by the E3 portfolios are not realistic and appear designed primarily to reduce the economic benefits associated with Scenarios 1a and 1b.

TURN has analyzed the scenario data in the E3 workpapers to determine whether the aggressive reliance on out-of-state renewable energy identified in Scenario 3 could be achieved under existing RPS rules and without CAISO regional expansion. This analysis shows that the combined 33% base and incremental 50% portfolios for each Scenario would result in RPS procurement that exceeds with PCC 1 minimum quantities and is within the PCC 2/3 allowance. In other words, it appears that every one of the portfolios, including the high reliance on out-of-state wind in Scenario 3, could be achieved without regional expansion. This result highlights the fact that there are few, if any, meaningful limitations on RPS procurement from out-of-state resources under current RPS program rules and the existing CAISO balancing authority footprint. Table A on the following page summarizes the results of this analysis.

¹¹ CAISO response to TURN data request #1, Question 18.

¹² E3 workpaper (RenewablePortfolioInput-Results.xls), “Muni Results” worksheet.

TABLE A
Total resources in 2030 (33% base portfolio + incremental 50% resources)
CAISO entities

Total Resources (GWh)	PCC	Scenario 1a	Scenario 1b	Scenario 2	Scenario 3
California Solar	1	33,149	35,150	33,814	24,470
California Wind	1	24,339	24,339	21,455	21,455
California Geothermal	1	13,727	13,727	13,727	13,727
Imperial Geothermal	1	3,933	3,933	3,933	3,933
CAISO Small Hydro	1	3,754	3,754	3,754	3,754
CAISO Biomass	1	6,955	6,955	6,955	6,955
Northwest Wind, Existing Transmission	2/3	8,876	6,073	6,394	6,073
Northwest Wind RECs	2/3	2,803	-	2,803	-
Utah Wind, Existing Transmission	1	-	-	-	-
Wyoming Wind, Existing Transmission	2/3	1,708	1,708	1,708	1,708
Wyoming Wind, New Transmission	2/3	-	-	-	6,044
New Mexico Wind, Existing Transmission	1	3,416	3,416	3,416	3,416
New Mexico Wind, New Transmission	2/3	-	-	-	6,044
Northwest Biomass	1	280	280	280	280
Northwest Geothermal	1	6	6	6	6
Southwest Solar, Existing Transmission	1	380	1,189	1,869	1,869
Southwest Solar RECs	2/3	2,978	2,978	2,978	2,978
Total CA Resources		85,857	87,858	83,638	74,294
Total Out-of-State Resources		20,447	15,650	19,454	28,418
Total Renewable Resources		106,304	103,508	103,092	102,712
% from Out-of-State resources		19%	15%	19%	28%
% from PCC1		85%	90%	87%	84%
% from PCC2/3		15%	10%	13%	22%

B. Existing western renewable resources could substitute for new development

The E3 scenarios assume that incremental procurement for the identified RPS portfolios in each Scenario will come exclusively from newly developed resources either in California or the WECC.¹³ Scenario 3 additionally assumes that any resource delivering renewable energy to any point in the regional grid is automatically eligible as PCC 1 under the RPS. As it relates to resources located outside the current CAISO footprint, these assumptions were not tested against current renewable energy market conditions.

There may be significant quantities of existing surplus renewable generation in the WECC that will not be needed to satisfy any other state compliance obligation and can sell output to California LSEs. The extremely low price of PCC 3 RECs in the current market ($\leq \$1/\text{MWh}$) indicates significant surpluses of existing resources in the WECC. CAISO must consider the potential for such surpluses from resources located within the WECC, or a neighboring balancing authority, to substitute for new resource development in Scenario 3 through 2030.

According to the American Wind Energy Association, over 10,000 MW of wind is currently operating outside of California within the WECC footprint.¹⁴ Data provided by GTM Research shows almost 3,000 MW of solar currently operating outside of California but within the WECC footprint.¹⁵ In addition, there is approximately 1,500 MW of existing wind operating in Alberta, 500 MW in British Columbia, and almost 3,000 MW operating in Colorado that could deliver energy into the regional ISO and therefore qualify as PCC 1 renewable energy under Scenario 3. PacifiCorp currently manages almost 2,000 MW of existing PURPA contracts and has requests for contracts from another 3,700 MW of eligible QFs in Idaho, Utah, Wyoming and Oregon.¹⁶ Much of the output from these QFs could be easily resold to California LSEs as RPS-eligible output if the PCC 1 eligibility rules are modified consistent with the assumptions embedded in

¹³ CAISO response to TURN data request #1, Question 26.

¹⁴ AWEA First Quarter 2016 Market Report, page 5.

¹⁵ GTM Research Utility PV Market Tracker – Operating WECC projects.

¹⁶ *Direct testimony of Paul Clements of Rocky Mountain Power to Utah PSC*, May 11, 2015, pages 10-11

Scenario 3. In addition, significant quantities of existing windpower in the northwest may be available as PCC 1 under Scenario 3.

The SB 350 study assumes that none of these existing resources will supply even a single MWh to the incremental 50% renewable portfolios. But a review of existing data suggests significant potential for the “incremental” development assumptions of the SB 350 study to be eroded through some amount of substitution. Such substitution would presumably have an impact on overall production costs, gas and coal unit dispatch, and overall environmental impacts.

The study ignores the fact that Load-Serving Entities (LSEs) such as Community Choice Aggregators, Electric Service Providers and small Publicly Owned Utilities have disproportionately large renewable net short positions relative to the 50% requirement but are the least likely to execute significant quantities of long-term contracts with new facilities. For a variety of reasons, these LSEs are more likely to pursue short-term procurement arrangements with existing renewable resources. Because the SB 350 study assumes that all LSEs operate like large IOUs, there is a significant disconnect between the assumed procurement portfolios and the actual resources likely to be procured.

There is no recognition that this combination of existing surpluses of operating resources and a limited appetite for long-term contracts for new generation by a significant share of California LSE renewable net short positions could yield results that are completely different than those assumed in the modeling. Absent a comprehensive analysis of existing regional renewable energy supply not used to meet RPS or clean energy targets in other states, the SB 350 study may dramatically overestimate the potential for new generation under Scenario 3.

C. Curtailment assumptions are contradictory and implausible

The analysis of renewable generation curtailment in the preliminary study suffers from several significant defects that must be remedied. TURN offers three critiques in this section but also

believes that there may be other flaws with the assumptions that drive the curtailment estimates under each Scenario.

First, CAISO assumes that all out-of-state renewable generation would directly deliver energy into California under Scenarios 1a and 1b. This means that between 11,000 and 14,000 GWh of out-of-state generation is presumed to be first delivered to California and then subject to the Scenario 1a and 1b limits on being exported.¹⁷ As explained previously, there is no basis for assuming that all out-of-state resources would be procured under the RPS requirements for PCC 1 (direct delivery) given the opportunity to satisfy up to 25% of total RPS compliance via procurement satisfying PCC 2 (firmed and shaped) and PCC 3 (unbundled REC). The modeling forecasts between 2,022 GWh (Scenario 1b) and 4,818 GWh (Scenario 1a) of total curtailment.¹⁸ It appears that reducing the delivery of some out-of-state renewable generation, consistent with the 25% allowance for PCC 2 and PCC 3 procurement, could significantly reduce the amount of in-state curtailment. The study should be revised to consider how different types of RPS procurement from out-of-state resources would reduce expected curtailment.

Second, although the study results identify aggregate levels of curtailment (in GWh) under each scenario, total curtailment is arbitrarily allocated proportionately to in-state and out-of-state resources.¹⁹ This means that Wyoming wind and California solar are assumed to experience identical curtailment percentages despite the fact that system conditions (and market prices) would not be the same in each location. Moreover, the choice of Scenarios is not assumed to have any impact on the distribution of curtailments amongst locations or resources. This approach is overly simplistic and not reflective of any real-world conditions that would be expected to occur.

¹⁷ CAISO response to Stakeholder Question #6 (“Out-of-state renewables are assumed to be delivered to California in Scenario 1A and 1B, and are subject to the limit on re-export. In Scenario 2 and 3, there is no delivery requirement for out-of-state resources. Out-of-state RECs have no delivery requirement in any of the cases.”)

¹⁸ E3 workpaper (RenewablePortfolioInput-Results.xls), “CAISO results” worksheet.

¹⁹ CAISO response to Stakeholder Questions #27, 28.

Third, CAISO assumes that renewable project owners are paid for every MWh of curtailed generation by the utility contracting for the overall output.²⁰ This means that there is no unpaid curtailment assumed under the terms of the governing Purchased Power Agreements (PPAs). This assumption may prove inconsistent with the terms of executed PPAs. For example, Southern California Edison has included 50 hours/year of unpaid economic curtailment in some recent PPAs.²¹ This level of curtailment is equal to approximately 2% of the annual output of a solar facility and is on par with the overall percentage of hours when curtailment is assumed to occur in Scenario 1b. To the extent that such provisions are included in future PPAs, CAISO's assumptions regarding the costs of curtailment to California customers could be significantly overstated.

D. Assumed costs of solar are significantly inflated and not consistent with current market offerings or projected industry trends

One key assumption in the RESOLVE modeling is the cost of solar energy in 2030. E3 estimated that the Levelized Cost of Energy (LCOE) for photovoltaic (PV) resources in California would range from \$50 to \$59/MWh in 2020 and \$65 to \$78/MWh in 2030 *in real \$2015*.²² Yet the City of Palo Alto's retail electric utility just signed a 25-year contract for solar energy from a California-sited PV project for \$36.76/MWh,²³ about two-thirds of E3's projected 2020 cost and about one-half of E3's estimated 2030 cost. Recent confidential bid data suggests that the pricing of the Palo Alto PPA is not an outlier but instead represents a realistic proxy for new solar resources available to utility purchasers in the current market.

The notion that the pricing of solar PPAs will increase between 30-50% (in real terms) between 2015 and 2030 is not consistent with industry forecasts and defies credulity given the ongoing declines in solar pricing. While E3 assumes installed solar costs of over \$2/watt in 2015 and \$1.8/watt in 2030, solar market analysts claim that current utility-scale fixed-tilt ground-mount

²⁰ CAISO response to stakeholder question 40.

²¹ CPUC Decision 14-11-042.

²² May 24 Presentation, pages 77-78.

²³ See summary of contract at <https://www.cityofpaloalto.org/civicax/filebank/documents/50532>. See record of Palo Alto City Council approval at <http://www.cityofpaloalto.org/civicax/filebank/documents/51640>.

PV systems cost approximately \$1.25/watt and forecast declines to \$1/watt by 2020.²⁴ These current estimates and 2020 projections are far below E3's "Low cost solar" study sensitivity which assumes solar costs of \$1.35/watt in 2030 and PPA prices ranging from \$52 to \$63/MWh (in \$2015).²⁵ If solar costs reach \$1/watt in 2020 (consistent with industry projections) and decline further in the following decade, even the "low cost solar" sensitivity in the SB 350 study not even remotely resemble reality.

E. Transmission costs associated with Scenario 3 understate impacts for California customers

There are two additional concerns with the modeling of the Scenario 3 assumption that California load-serving entities would procure 3,000 MW of Wyoming and New Mexico wind requiring new transmission. First, the RESOLVE model E3 used to estimate the build-out of renewables essentially presumes a "perfect" allocation of the necessary transmission costs needed to enable new additions of Wyoming and New Mexico wind. Under this approach, California customers are assumed to pay only for the exact amount of transmission capacity needed to deliver the procured quantities of renewable energy.²⁶ Such an outcome is not likely or plausible since new transmission capacity is "lumpy" and will be added in large increments.²⁷ It is not credible that the capacity of any such new project would be perfectly matched to the exact amounts of renewable energy being developed.

Further, it is not yet clear how the costs of new regional transmission will be allocated. Based on proposals released in the stakeholder process, it is entirely possible that California

²⁴ <http://www.greentechmedia.com/articles/read/solar-pv-prices-to-fall-below-1.00-per-watt-by-2020>; See also <http://www.seia.org/research-resources/solar-industry-data>

²⁵ See the worksheet "Renewable Cost and Performance" of the spreadsheet "E3_Renewable Portfolios for CAISO SB 350 Study - Inputs and Results.xlsx". See footnote 1 above for instructions for gaining access to this spreadsheet.

²⁶ In response to Question 3.b of TURN's 2nd Informal Data Request, E3 stated "[t]he proxy transmission projects are converted into \$/kW-yr. transmission adders, which are applied linearly to all resources in each tranche".

²⁷ For example, E3's workpapers assumed "new transmission" projects connecting to Wyoming and New Mexico would be 1,500 MW or 3,000 MW in size. See the worksheet "Transmission Cost Inputs" of the spreadsheet "E3_Renewable Portfolios for CAISO SB 350 Study - Inputs and Results.xlsx". See footnote 1 above for instructions for gaining access to this spreadsheet.

ratepayers will be required to pay for excess transmission capacity included in the “lumpy” additions that will occur. These concerns speak to the importance of a cost allocation mechanism that ensures that California customers only pay for the transmission capacity that they use. Unless such a policy is adopted, California customers could be forced to pay for new transmission additions in excess of the amounts needed to enable deliveries of RPS contracted generation into the regional grid.

Second, there appears to be an error in E3’s computation of the costs of New Mexico wind in Scenario 3 that caused an understatement of the costs – and thus an overstatement of the benefits – of that scenario. E3’s documentation assumes that new transmission from New Mexico would cost \$50/kW-yr for the first 1,500 MW and \$129/kW-yr for the next 1,500 MW.²⁸ Yet the costs of the new transmission presumed built in Scenario 3 to make 1,962 MW of New Mexico wind deliverable are only \$98 million,²⁹ which equals 1,962 MW times \$50/kW-yr.³⁰ TURN believes the additional costs – that is, reduced benefits – of Scenario 3 are \$36 million, which equals (1,962 MW minus 1,500 MW) times (\$129/kW-yr minus \$50/kW-yr), or 462 MW times \$79/kW-yr.

F. New transmission can be constructed to enable additional out-of-state renewable generation under current practice

CAISO assumes that 3,000 MW of low-cost wind power additions in New Mexico and Wyoming will not be available to California buyers unless regional expansion occurs, the RPS PCC requirements are abolished, and CAISO is granted broad regional transmission planning authority.³¹ Each of these assumptions is incorrect and misleading. As explained in previous sections, the quantity of out of state renewable energy included in the Scenario 3 portfolio can

²⁸ See the worksheet “Transmission Cost Inputs” of the spreadsheet “E3_Renewable Portfolios for CAISO SB 350 Study - Inputs and Results.xlsx”. See footnote 1 above for instructions for gaining access to this spreadsheet.

²⁹ See cell N66 in the worksheet “Statewide CREZ Detail” of the spreadsheet “E3_Renewable Portfolios for CAISO SB 350 Study - Inputs and Results.xlsx”. See footnote 1 above for instructions for gaining access to this spreadsheet.

³⁰ E3 confirmed this computation in response to Question 3a of TURN’s 2nd Informal Data Request, but declined to state whether it thought this computation was an error.

³¹ May 24 Presentation, p. 38.

be used to meet RPS requirements even without regional expansion or changes to the RPS PCC requirements. The notion that new regional transmission cannot be approved absent regional expansion is perplexing. The CAISO currently participates in an interregional transmission planning process that is considering four new transmission lines, including two designed to facilitate access to Wyoming wind resources.³² Moreover, existing transmission capacity between other states and California was developed over the last several decades with even fewer formal planning processes than exist today. Given this history and the current processes that have attracted substantial interest from developers, it is not reasonable to conclude that new transmission would only be developed to integrate out-of-state wind if regional expansion occurs.

III. SELECTION OF BASE SCENARIOS AND SENSITIVITIES

A. The SB 350 energy efficiency goals should be included as an input to all base cases

SB 350 contains provisions relating to a variety of energy policy initiatives. One such initiative relates to the potential regional expansion of CAISO. Another provision commits the state to a doubling of energy efficiency savings in both electricity and natural gas end uses by 2030 and directs the Energy Commission to establish applicable targets.³³ Governor Brown laid out this ambitious goal in his January 2015 inaugural address and issued public statements noting that SB 350 codified the doubling of energy efficiency.³⁴

Despite this commitment, the SB 350 study does not include the energy efficiency target as an input for the 2030 scenarios. Instead, E3 modeled the impact of the “High EE” assumptions on renewable development as a “sensitivity” and concluded that it would reduce the estimated

³² See the CAISO’s “Interregional transmission coordination” page at <http://www.aiso.com/planning/Pages/InterregionalTransmissionCoordination/default.aspx>. The two projects that would appear to help link to wind resources in Wyoming and other Rocky Mountain states are the “Cross-Tie Transmission Project” and the “TransWest Express Project”. In addition, the “SWIP-North” project would originate in Idaho. It should also be noted that the Cross-Tie project is partially sponsored by Berkshire Hathaway Energy, a PacifiCorp affiliate, and would apparently connect to PacifiCorp’s Gateway transmission project.

³³ Cal. Pub. Resources Code §25310(c)(1).

³⁴ <https://www.gov.ca.gov/news.php?id=19153>

benefits of Scenario 3 by about \$100 million per year.³⁵ Brattle did not perform the additional modeling of this sensitivity needed to produce a complete assessment of its significance. TURN strongly recommends that CAISO include the SB 350 energy efficiency goals as an input for all base cases and incorporated into the ratepayer impact analysis.

B. Assumption that regionalization will yield 5,000 MW of “Beyond RPS” Wyoming and New Mexico wind is critical to study’s estimates of benefits but is not plausible

One of the CAISO’s key assumptions – that the creation of a “regional market” in Scenarios 2 and 3 would lead to the development of 5,000 MW of additional “beyond RPS” wind in Wyoming and New Mexico *at no cost to California customers* – is a critical driver of the economic and environmental benefits of regional expansion. The decision to arbitrarily include this assumption only in the regional expansion scenarios is puzzling and disappointing. It is puzzling because there is no compelling basis for this blatant ‘thumb on the scale’. It is disappointing because this significant assumption was never previously discussed with stakeholders and appears to have been added to the modeling exercise in a last minute effort to boost the claimed benefits of regional expansion. These issues are discussed in detail in the following sections.

1. Importance of “Beyond RPS Wind” Assumption

The CAISO prepared and conducted limited analysis on a “Scenario 3 without Beyond RPS Wind” sensitivity. The results demonstrate the critical importance of the “Beyond RPS” wind assumption both to the economic and environmental benefits assigned to Scenario 3. Specifically, approximately two-thirds of the lower production costs associated with Scenario 3 (compared to Scenario 1a) are due to the addition of 5,000 MW of incremental zero-cost wind

³⁵ May 24 Presentation, pp. 54 and 56. See also worksheet “Load and DG Inputs” of the spreadsheet “E3_Renewable Portfolios for CAISO SB 350 Study - Inputs and Results.xlsx”. See footnote 1 above for instructions for gaining access to this spreadsheet.

into the regional market. CAISO's reliance on \$645 million in annual production cost savings in the final results of the study are driven by this one input assumption.³⁶

The impact on environmental emissions and fossil generation dispatch impacts are even more pronounced.³⁷ The removal of the "Beyond RPS" wind severely diminishes, or in some cases reverses, the claimed benefits. While WECC GHG emissions are assumed to drop by 3.2% in Scenario 3 (compared to 1a), the removal of the "Beyond RPS" wind virtually eliminates the advantage of regionalization with GHGs reduced by only 0.1% - 0.4% compared to Scenarios 1a and 1b.³⁸ GHG emissions inside of California are assumed to drop by 6.3% under Scenario 3 but would actually increase by 0.6% without the "Beyond RPS" wind.³⁹

Similar results occur for NOx, SO2 and PM 2.5 emissions with assumed regional and in-state emissions flipping from reductions into increases if regional expansion occurs but the additional 5,000 MW of "Beyond RPS" wind does not materialize. Perhaps most importantly, regional expansion causes WECC coal generation to increase by 1.1% without the additional wind (but decrease by 0.8% if "Beyond RPS" wind is included). Key results for 2030 from Scenarios 1A, 1B, 3 and "3 without Beyond RPS Wind" are shown in the following tables.

³⁶ "Production costs" are a measure of the fuel and other operating costs generators incur in providing energy and ancillary services to meet load reliably. Production costs are not the same as the ratepayer benefits computed using the Transmission Economic Assessment Methodology (TEAM), which will be discussed below. The TEAM is used to assess the impacts of such production cost results on ratepayers' costs. Brattle provided a summary of its TEAM analysis of Scenario 3 "without Beyond RPS Wind" stating that the benefits to California ratepayers of this scenario would be almost as great as those of Scenario 3 "with Beyond RPS Wind". However, Brattle did not provide the supporting worksheets of this analysis. TURN has issued a data request seeking these additional supporting documents.

³⁷ The data on emissions and fossil generation comes from the May 24th CAISO presentation (slides 115, 150, 157, 158), the May 25th CAISO presentation (slides 123-130), and the Brattle worksheet (Brattle SB 350 Study_06-10-2016 data release (historical vs. simulated generation and CO2 emissions)_PUBLIC.xlsx).

³⁸ GHG reductions are relatively modest in the scenarios without "beyond RPS" wind due to the increased dispatch of coal in 2030 in a "regional market". See May 24 Presentation, p. 158.

³⁹ TURN only included in its count of "California" GHGs those related to in-state generation. TURN did not include the impact of imports and exports since they are already captured in the WECC-wide GHG emissions estimates.

TABLE B
CAISO-ESTIMATED EMISSIONS IMPACTS IN 2030 IN KEY REGIONALIZATION SCENARIOS

CAISO Model Output	Scenario #	1A	1B	3 "without"	3 "with"	Units
		Current Practice	Current Practice w/ 8GW Export Limit	Without 5 GW "Beyond RPS" Wind	With 5 GW "Beyond RPS" Wind	
<u>Emissions:</u>						
GHGs (CO2)	WECC	307.3	306.3	306.0	297.5	million metric tons
	California ⁴⁰	46.2	46.6	46.5	43.3	
NOx	WECC	1,166	not provided by CAISO	1,170	1,150	tons per day
	California	15.21		14.65	13.66	
SO2	WECC	1,113		1,126	1,110	tons per day
	California	0.72		0.73	0.67	
PM 2.5	WECC	not provided by CAISO				tons per day
	California	6.82		6.88	6.36	
<u>Generation:</u>						
Coal	WECC	150,748	149,246	152,401	149,608	gigawatt-hours
	California	0	0	0	0	
Gas	WECC	257,460	257,690	254,620	239,854	
	California	90,221	91,360	91,500	83,300	

These results raise many doubts about the environmental consequences of regional expansion absent the appearance of 5,000 MW of zero-cost, beyond RPS wind in New Mexico and Wyoming. It appears that, on its own, regional expansion would result in more coal generation in the WECC, more gas generation in California, and little meaningful overall impacts on GHG emissions. Based on these results, it is clear that CAISO found it important to add the 5,000 MW input assumption in order to claim that regional expansion is likely to produce some positive environmental benefits.

⁴⁰ These figures only count GHGs from in-state generation. Emissions from out-of-state generation are captured in the WECC aggregate figure.

2. CAISO modeling shows that developing the 5,000 MW as merchant wind would be unprofitable under regional expansion

CAISO claims that a key driver of 5,000 MW of incremental wind is the availability of regional power markets that will enable low-cost wind power in New Mexico and Wyoming to be financed and operated either as merchant units (with no dedicated off-takers) or under PPAs executed for hedging value.⁴¹ CAISO claims that the favorable economic value proposition for incremental wind can only be realized if regional expansion occurs. These claims and assumptions are not supported by the modeling inputs and results.

The E3 model estimates a levelized cost of energy from new Wyoming and New Mexico wind in 2030 ranging from \$46 to \$55/MWh in real \$2015.⁴² Under the rationales offered by CAISO, incremental wind development would occur if these units could realize positive margins by selling into the regional market where output is compensated based on the prevailing locational marginal price. Yet the CAISO's energy market modeling suggests that new wind would be somewhat unprofitable in Wyoming and *very* unprofitable in New Mexico under regional expansion in either Scenario 2 or 3.⁴³ Interestingly, the energy market modeling shows the highest market energy prices for New Mexico and Wyoming occurring under Scenario 1b where there is no regional expansion but increased exports from California to the rest of the WECC. This data suggests that the economic value of low-cost wind in Wyoming and New Mexico is more likely to be realized if regional expansion does not occur. Table C shows the estimated annual average prices forecasted in the CAISO, in Wyoming and in New Mexico in 2030.

⁴¹ CAISO response to stakeholder questions 19-21.

⁴² May 24 Presentation, p. 78; E3 workpaper (RenewablePortfolioInput-Results.xls), "Renewable Cost and Performance" worksheet.

⁴³ A more complete analysis of the financial viability of Wyoming and New Mexico wind would require multiplying hourly LMPs in each region by hourly wind profiles (which TURN has requested) to estimate annual revenues. Such an analysis should also consider the potential for wind curtailment in those hours with negative prices. Unfortunately, CAISO has classified these hourly LMPs as confidential.

TABLE C
CAISO-Estimated Annual Average Locational Marginal Prices at Select Nodes (\$/MWh)⁴⁴

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<u>Scenario</u>	<u>CAISO</u>	<u>PacifiCorp - Wyoming</u>	<u>Public Service of New Mexico</u>
1A	■	■	■
1B	■	■	■
2	■	■	■
3	■	■	■
Modeling Node:	CAISO	PAWY	PNM

TURN does not believe that the data in this chart should be deemed confidential and urges CAISO to determine that this material may be publicly released.

3. The costs of new transmission needed to integrate 5,000 MW of incremental wind power have not been acknowledged or modeled

The CAISO does not adequately address the need for, and costs of, new transmission to integrate 5,000 MW of incremental wind power. In effect, CAISO assumes that either no new transmission is needed or that no costs associated with this transmission would be allocated to the Transmission Access Charge assessed on California customers. Neither of these assumptions is plausible.

CAISO previously stated that development of out-of-state renewable energy beyond the incremental 5,000 MW included in each scenario’s RPS portfolio would require investments in new transmission.⁴⁵ E3’s workpapers also show the need for incremental transmission.⁴⁶ Specifically, E3’s documentation assumes that the costs of new transmission in New Mexico more than double after the first 1,500 MW of RPS wind is developed. The “beyond RPS” wind

⁴⁴ Source -- Brattle SB 350 Study_06-10-2016 data release (hourly LMPs and duration curves)_CONFIDENTIAL.xlsx.

⁴⁵ CAISO response to stakeholder comments on SB 350 study proposal, March 18, 2016, page 46.

⁴⁶ E3 workpaper (RenewablePortfolioInput-Results.xls), “Renewable Cost and Performance” and “Transmission Cost Inputs” worksheets.

assumed in Scenarios 2 and 3 should therefore be assumed to trigger transmission costs equal to \$129/kW-yr.⁴⁷

Consistent with CAISO's previous responses, additional transmission enhancements are necessary to enable the delivery of such large quantities of "beyond RPS" wind energy into an expanded grid. In response to questions raised by TURN, CAISO suggested that any new transmission investments needed to integrate the "beyond RPS" wind would be born entirely by developers and included in the price of a Power Purchase Agreement (PPA) with third party purchasers.⁴⁸ This explanation runs directly counter to the study assumption that California customers would pay for any new regional transmission needed to integrate renewable resources used to satisfy RPS requirements.⁴⁹

The failure to even account for the costs of significant transmission enhancements needed to enable delivery of 5,000 MW of incremental wind is puzzling since the transmission would presumably be approved through a regional transmission planning process. Consistent with the assumed treatment of new transmission associated with RPS procurement in the study, any costs of additional transmission could be primarily allocated to California customers through the Transmission Access Charge (TAC). Yet the study fails to attribute even a single dollar of additional costs relating to such upgrades to any subregion or identifiable customer. As a result, the analysis fails to apply consistent assumptions to the development of transmission for incremental RPS and "beyond RPS" Western wind.

In the unlikely event that all incremental transmission costs are born by the project developer and/or off-taker, the additional costs would raise the effective price of energy from these projects and make them even more unprofitable when compared to projected LMPs in New Mexico and Wyoming. These transmission costs should be included in further analysis to

⁴⁷ See the worksheet "Transmission Cost Inputs" of the spreadsheet "E3_Renewable Portfolios for CAISO SB 350 Study - Inputs and Results.xlsx".

⁴⁸ CAISO response to Stakeholder Question #25.

⁴⁹ CAISO response to Stakeholder Question #49.

determine whether “beyond RPS” wind would be financeable as merchant projects or attractive to utility buyers seeking to rely upon them as price hedges likely to yield positive value.

4. *It is not reasonable to assume that 0 MW of “beyond RPS” wind are developed absent regional expansion*

CAISO argues that “beyond RPS” wind will be developed due to demand from a variety of buyers including “large C/I customers” and retail suppliers making voluntary renewable energy purchases in excess of any applicable regulatory requirement.⁵⁰ This claim relies on two key assumptions. First, buyers would have no access to low-cost renewable resources absent regional expansion. Second, buyers would not be motivated (or able) to make any “beyond RPS” commitments unless regional expansion occurs. Neither assumption stands up to any scrutiny.

California buyers seeking to voluntarily exceed RPS requirements are already executing short and long-term contracts for renewable resources. Recently formed Community Choice Aggregators (CCAs) have committed to renewable portfolios far in excess of RPS requirements and offer 100% renewable products to customers on a voluntary basis.⁵¹ Investor-owned utilities recently launched voluntary programs enabling customers to subscribe to a portfolio of new solar resources located within their own service territory.⁵² Corporate buyers are also entering into voluntary contracts to provide price hedges, support corporate responsibility goals and achieve carbon neutrality. None of these resource commitments appear to be included in Scenarios 1a or 1b. Moreover, none of these entities has been deterred from entering into long-term contractual commitments due to the limited size of CAISO’s current balancing area.

⁵⁰ CAISO May 24th presentation, page 171.

⁵¹ Examples include Marin Clean Energy, Sonoma Clean Power, Lancaster Choice Energy, and Cleanpower SF.

⁵² The Green Tariff Shared Renewables programs authorized by SB 43 (Wolk) could result in up to 600 MW of incremental (“beyond RPS”) solar development within California to serve voluntary customer demand.

It is not obvious that these companies would embark on exponentially larger commitments simply because the CAISO footprint expands. There are no current barriers to in-state buyers entering into long-term commitments with new renewable energy projects anywhere in the WECC or in other regions of the country. Regardless of project location, the buyer would commit to payments under the PPA, receive revenues based on the value of the power sold into the market, and retain the Renewable Energy Credits either for resale or retirement. Many of these buyers are particularly interested in committing to in-state projects as a deliberate strategy to promote their reputation, boost the local economy, and improve relations with local customers. One document referenced by CAISO emphasizes the goal of procuring from renewable energy projects “near our operations” in order to “benefit local economies and communities”.⁵³ CAISO has not explained why these drivers, principles and motivations would no longer apply simply because CAISO expands to become a regional balancing authority.

Regional expansion would not alter the mechanics or impact of “beyond RPS” commitments. Today a California buyer can execute a long-term PPA with a wind project in New Mexico or Wyoming. The buyer would pay the wind project based on the PPA price and receive revenues from the wind project based on the prevailing price of energy at the market hub nearest to that project. Charges for the buyer’s own retail energy use would be based on local utility rates and local energy market prices. Under regional expansion, the structure of these arrangements would not change.

To the extent that buyers are motivated to secure a pure financial hedge, the projected value of energy at different market hubs throughout the WECC would be relevant to the decision to enter into a PPA. As pointed out in a prior section, the highest energy value in Wyoming and New Mexico appears to occur under a scenario where regional expansion does not occur but California instead focuses on increasing its own exports to the rest of the WECC (Scenario 1b). Moreover, a buyer motivated by a pure financial hedge could execute a PPA with a renewable

⁵³ See *Corporate Renewable Energy Buyers’ Principles: Increasing Access to Renewable Energy*, page 3 (http://www.wri.org/sites/default/files/Corporate_Renewable_Energy_Buyers_Principles.pdf)

energy project in other regions of the United States (including Texas) and achieve the exact same result.

Although there is good reason to believe that voluntary commitments to “beyond RPS” renewable energy are likely to accelerate between today and 2030, there is no basis for linking this trend to the single variable of whether the CAISO merges with other existing balancing authorities in the WECC. Yet the study makes the binary assumption that the rationales for “beyond RPS” procurement only apply if CAISO regional expansion is pursued. This restrictive view lacks credibility and appears to be driven by an outcome-oriented desire to demonstrate economic and environmental benefits that can be attributed exclusively to regional expansion.

5. Last-minute addition of “Beyond RPS Wind” input raises serious concerns about the integrity of the study process

The CAISO’s process for adding the “beyond RPS” wind to its base scenarios is highly questionable and raises concerns about the integrity of the study process. The notion of adding any “beyond RPS” renewables to the regional expansion scenario inputs was never disclosed or discussed with stakeholders during either the February 8 or April 14 review meetings.⁵⁴ Had CAISO shared this significant input assumption with stakeholders during those meetings, or in related presentation materials, TURN would have provided a comprehensive critique in earlier comments. No stakeholder publicly urged CAISO to include such an assumption through comments submitted in the study process. In response to data requests, CAISO admitted that this new input assumption was not even considered until the “second half of April” just before the preliminary study results were supposed to be released.⁵⁵

⁵⁴ Presentations from these meetings are available at <http://www.caiso.com/informed/Pages/RegionalEnergyMarket/BenefitsofaRegionalEnergyMarket.aspx>.

⁵⁵ CAISO response to stakeholder question #22.

On April 25th, CAISO announced a four-week delay in the release of the preliminary study results from April 27th to May 24th.⁵⁶ Based on the timeline of events and the lack of transparency relating to this change, it seems clear that the delay was tied to the last-minute decision to include this new assumption in the base regional expansion scenarios. The decision was likely driven by the realization that, absent “beyond RPS” wind, the regional expansion scenarios did not produce compelling economic or environmental outcomes that would justify the major changes in state law and policy needed to enable CAISO to become a regional ISO. With the inclusion of this new input assumption, which guaranteed that the results would be more favorable to the regionalization case, CAISO apparently felt sufficiently confident to release the preliminary study and proceed with the expedited schedule for meeting the remaining SB 350 requirements in time to present a package to the legislature before the end of the current session.

Both the substance of the “beyond RPS” wind assumption and the process for including this input into the study exacerbate misgivings about CAISO’s commitment to an unbiased review of the relevant facts. If CAISO wants California stakeholders to trust its ability to manage stakeholder processes, weigh evidence, and reach conclusions on factual matters, its handling of this issue has served to undermine overall confidence in the institution. To restore confidence, TURN urges CAISO to either remove the “beyond RPS” input from Scenarios 2/3 or add the “beyond RPS” input to Scenarios 1a and 1b so that there is no hidden ‘thumb on the scale’ that biases efforts to analyze the real-world incremental impacts of regional expansion.

IV. ASSUMED REGIONAL MARKET FOOTPRINT IN 2020/2030

A. SB 350 study fails to make a compelling case for PacifiCorp-CAISO integration in 2020

The SB 350 Study shows no benefit to California ratepayers in 2020 from PacifiCorp joining the CAISO as a Participating Transmission Owner (PTO). The Study purports to show that California

⁵⁶ The Market Notice announcing the delay of the April 27-28 meetings is available at http://www.aiso.com/Documents/PostponedCleanEnergyAndPollutionReductionActSenateBill350MeetingApril27-28_2016.htm.

ratepayers would receive a rate reduction in 2020 of \$55 million or 0.1 percent of revenue requirements.⁵⁷ However, 70 percent of the purported benefits – \$39 million – are due to a presumed reduction in customer payments of the CAISO Grid Management Charge (GMC).⁵⁸ This reduction is based on the assumptions that PacifiCorp customers will begin paying the GMC in equal amounts to current CAISO customers (based on proportionate load share) while total CAISO operating costs increase only modestly.⁵⁹

As a general rule, claims of benefits based on unresolved future cost allocations demand close scrutiny. In this case, there is reason to believe that the key assumption driving 70 percent of overall savings is flawed. CAISO management has admitted that PacifiCorp is seeking terms for entry that would allow its customers to avoid making GMC payments for some number of years. These terms could be included in a “transition agreement” currently being privately negotiated by CAISO management and PacifiCorp that may not be made public until after the Legislature is asked to change state law to enable regional expansion. If PacifiCorp successfully avoids paying its share of GMC revenues, CAISO customers could end up paying higher GMCs in 2020 thereby erasing practically all the estimated benefits of PacifiCorp joining the CAISO.

Furthermore, the preliminary study shows a 0.2 percent increase in carbon dioxide (CO₂) emissions occurring in 2020 with PacifiCorp membership in the CAISO.⁶⁰ Taking the study results at face value, California customers would receive a small (0.1%) economic benefit in exchange for a small (0.2%) increase in Greenhouse Gas (GHG) emissions. This outcome does not appear consistent with the state’s environmental goals. If these results are simply deemed within the margin of error, then it is hard to conclude that there will be any benefits to customers or any impact on GHGs from PacifiCorp membership in the CAISO.

⁵⁷ May 24 Presentation, p. 8.

⁵⁸ May 24 Presentation, p. 110.

⁵⁹ May 24 Presentation, pp. 106 and 204.

⁶⁰ May 24 Presentation, p. 12.

Finally, TURN notes that other studies of the impact of more efficient dispatch of electric generation in the Western Electricity Coordinating Council (WECC) – including the CAISO’s initial study of the benefits of creating the current Energy Imbalance Market (EIM) with PacifiCorp – have shown similar results as the CAISO’s 2020 modeling: a small reduction in energy production costs and small increases in CO2 emissions. This result is driven by cheaper coal resources replacing more expensive gas generation, which reduces total costs – but also increases GHG emissions.⁶¹ It is not clear that simply adding a carbon price to imports will address this effect given opportunities for resource shuffling within the larger regional footprint and leakage.

V. PRODUCTION SIMULATION MODELING

A. TEAM analysis of benefits to California ratepayers requires additional scrutiny.

CAISO estimates the benefits to California ratepayers of under some scenarios using the Transmission Economic Assessment Methodology (TEAM). The TEAM uses the results of the production cost modeling, combined with other assumptions, to estimate the actual net revenue requirement or rate impact on California customers.

As a preliminary matter, TURN found the workpapers the CAISO provided June 10 to document the TEAM computations helpful but incomplete. In particular, the spreadsheet workpapers included many cells that contained numbers, but not the formulae or data for computing such numbers, which are necessary to validate the computations.⁶²

Despite not being able to review the model itself, TURN has thus far identified two TEAM modeling issues that may affect the Study’s benefit estimates. TURN also raises another concern regarding the benefit estimates based on the assumed market price data.

⁶¹ CO2 and Generation data the CAISO’s initial EIM study are contained in the spreadsheet titled "PacifiCorp-ISO_CaseResults-Benchmark-EnergyImbalanceMarketBenefits.xlsx", available at <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=6A8B5B59-025D-4BE1-8B92-68E77A61E3E7>. Within this spreadsheet, these data are available from worksheets titled '5_CO2 by BA' and 'Q1_Energy by BA-TECH'.

⁶² TURN has a pending data request seeking the more complete model.

1. Uncertain assumptions regarding units under California Ownership or Control

One key TEAM assumption relates to which specific generators are “owned or controlled” by California utilities or other Load-Serving Entities (LSEs). This assumption is critical because, consistent with the TEAM, the CAISO assumes that California ratepayers will benefit by receiving power from California-owned-or-controlled generators at cost, rather than at higher market prices. However, the CAISO only provided TURN workpapers documenting these assumptions June 22. TURN has not had the opportunity to assess the California-ownership-and-control assumptions in any detail and, as discussed above, how such assumptions affect the CAISO’s estimation of California ratepayer benefits using the TEAM.

2. Congestion Costs Assumed Away

The CAISO appears to make another simplifying assumption that customers will receive payment at the same price for power from California-owned-or-controlled generators as it will pay to meet load. This is a convenient simplifying assumption but ignores the potential for large differences in prices paid to meet load and those received for California-owned-or-controlled generation. One key example could be the lower revenues a California LSE would receive from the CAISO for its Wyoming or New Mexico wind and the higher payments it would make to the CAISO to meet load in its service territory. Table C showed the CAISO’s estimated differences in these prices. The prices from Scenario 3 are shown again in Table D below along with additional data to illustrate this “congestion cost” risk.

Table D

Illustration of Congestion Cost Risk Facing California LSEs Purchasing Out-of-State Wind

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<u>Row ID:</u>		<u>Units</u>	<u>CAISO</u>	<u>PacifiCorp - Wyoming</u>	<u>Public Service of New Mexico</u>	<u>Source:</u>
A	Regional LMPs	\$/MWh	■	■	■	Table C
B	Sales to CA	gWh		8,037	7,905	1/
C	Purchases by CA	gWh	15,942			Sum of Row B 2/
D	Revenue / (Cost) to CA	\$million	■	■	■	A x (B or C)
E	Net Revenue / (Cost) to CA	\$million		■		Sum of Row D

Row A provides the annual average LMPs from three “nodes”: the CAISO, PacifiCorp-Wyoming and Public Service of New Mexico.⁶³ These prices are different from each other due to transmission congestion and losses between the regions and the differences are often labeled “congestion costs”.⁶⁴ Row B shows Scenario 3’s presumed sales of Wyoming and New Mexico wind energy to CAISO LSEs⁶⁵ and Row C shows CAISO LSEs presumed purchases of equivalent amounts of such energy at the CAISO “node.” Row D shows the costs CAISO LSEs incur for purchasing such quantities of load and the revenues the same LSEs receive for selling such quantities of energy into the regional market and Row E shows the net of these revenues and costs. This calculation suggests that ratepayers within CAISO would face an additional \$■ million in congestion costs.

⁶³ As noted previously, a more complete analysis of the congestion cost risk surrounding Wyoming and New Mexico wind would require multiplying hourly LMPs in each region by hourly wind profiles (which TURN has requested), with consideration for the potential for wind curtailment in hours with negative prices. The CAISO has classified these hourly LMPs as confidential.

⁶⁴ Losses are not considered in this example for the sake of simplicity.

⁶⁵ These payments from a regional ISO market are different from the payments LSEs will make under the PPAs presumed needed to develop such resources. E3 estimated PPA costs in its RESOLVE model. These additional computations are necessary to determine the additional impact on customers due to the operation of a regional market.

The TEAM presumes that all of these costs would not be borne by California customers but that such congestion costs would instead be credited fully to customers pursuant to a financial instrument known in the CAISO as Congestion Revenue Rights (CRRs). However, CAISO does not issue CRRs equal to the full amount of the transmission capacity of its grid but instead only issues CRRs in amounts that are less than the grid's full capacity.⁶⁶ To the extent CRRs are allocated for less than the grid's full capacity, customers are exposed to the congestion cost risk shown in Table D above.

Further, the above discussion references the need for CRRs to be *allocated* to California LSEs at no cost rather than merely being made available for purchase in CRR auctions. The allocation of CRRs would provide California LSEs with congestion cost mitigation at no additional cost, but requiring LSEs to purchase CRRs at auction would require them to spend additional money that is not accounted for in the TEAM. Some assessment of the fact that allocated CRRs will be less than 100 percent of the grid capacity, and that they may not be provided to LSEs for free, should be considered in using TEAM to assess the benefits of regional expansion.

3. Differences in Market Prices among Scenarios Raises Questions

The TEAM uses some additional assumptions (e.g., regarding unit ownership and control) to convert production cost modeling results to estimated rate impacts in California. Though unable to validate the CAISO's TEAM computations due to inadequate workpapers being provided, TURN notes that the impacts of the various scenarios on market prices raises questions about the potential impact of regionalization on CAISO customers.

Table C included average annual LMPs for selected hubs for each of the four scenarios for which the CAISO provided data. Expected market prices in California, Wyoming and New Mexico rose substantially between Scenario 1A and 1B, likely due to the assumption in Scenario 1B that California is able to export substantially more power. In Scenario 2, in which a regional energy market is assumed to operate, California prices rise a bit, but Wyoming prices fall and New

⁶⁶ More information regarding CRRs is available at <http://www.caiso.com/market/Pages/ProductsServices/CongestionRevenueRights/Default.aspx>.

Mexico prices fall substantially -- these latter two states' results are likely driven by the assumption of 5,000 MW of additional "beyond RPS" wind development between them. Finally, in Scenario 3, prices change modestly from Scenario 2, presumably due only to the change in renewable resource development.

TURN cannot explain all of these pricing changes, but suggests the impact on California ratepayers of higher CAISO market prices needs to be carefully considered as does, as discussed above, the impact of congestion costs on the benefits computed in TEAM.

VI. ECONOMIC ANALYSIS

- A. CAISO analysis showing "job" benefits are most pronounced under a status quo scenario with greater exports was not disclosed in the public release materials

SB 350 requires the study to analyze the impact of regionalization on employment in California. CAISO consultant (BEAR) concluded that the "[r]egional market creates 9,900 – 19,400 jobs" by comparing the jobs forecast among Scenarios 1a, 2 and 3.⁶⁷ However, this conclusion ignored key data regarding *Scenario 1b* that was only available in CAISO workpapers. Those workpapers showed that the highest job creation was in Scenario 1b where regional expansion does not occur and export capability is increased relative to current levels. These results are shown in Table E below. As a result, the conclusion that the "regional market creates jobs" is not supportable. In fact, according to the CAISO's modeling, regionalization will reduce the job increases resulting from the simple step of enabling greater exports from the CAISO

⁶⁷ May 25 Presentation, pp. 2 and 12.

Table E
CAISO Estimates of Job Impacts of Scenarios⁶⁸

<u>Scenario</u>	<u>1A</u>	<u>1B</u>	<u>2</u>	<u>3</u>
-	Current Practice	Current Practice w/ 8GW Export Limit	Regional expansion w/existing RPS rules	Regional expansion w/o RPS rules
Jobs Created by 2030	90,300	110,900	109,700	100,200
Change from Scenario 1A		20,600	19,400	9,900

The omission of the results for Scenario 1b in the primary study materials is problematic. CAISO may not like the results of this scenario, but it is inappropriate to exclude inconvenient data from the analysis presented to the public. Stakeholders should not be forced to mine the workpapers to discover that relevant information of this type has been withheld from the materials distributed at public meetings.

B. Assumed economic impacts on communities are not reflective of the manner in which savings and costs would actually be distributed

The economic impact analysis assumes that savings in utility procurement costs are distributed throughout the state to each customer based on their electricity usage.⁶⁹ Under this approach, every customer is presumed to receive the same level of monetary savings if they use the same quantity of electricity. While this simplifying assumption is convenient, it fails to reflect the fact that savings will not be realized equally by all load serving entities. Some utilities may realize larger savings while others receive no benefits (or experience net increases in costs). For example, many Publicly Owned Utilities appear concerned that they will suffer from higher TAC costs and could pay higher CAISO energy prices under regionalization without realizing significant offsetting benefits. This fact undermines the validity of any granular geographic analysis.

⁶⁸ Source - BEAR_Model_Results.xlsx, worksheet "BEAR_Results", cells A56:E79.

⁶⁹ CAISO response to Stakeholder Question #55.

Moreover, any savings will not be distributed evenly (on a consumption basis) throughout a given utility service territory. In particular, customers in disadvantaged communities are disproportionately served under low-income rate discounts (e.g. California Alternative Rates for Energy). Savings due to regional expansion may not be fully passed through to low-income customers who are already receiving 30-35% discounts relative to standard residential tariffs. As a result, the notion that benefits are passed through to customers equally on the basis of consumption is not well founded.

VII. FAILURE TO MODEL TRANSMISSION ACCESS CHARGES IS A MAJOR OMISSION

Another key concern about the CAISO's regionalization push is its impact on the TAC, the rate paid by loads and exports for the use of the CAISO grid, and the subject of an ongoing CAISO stakeholder process.⁷⁰ The first study of a CAISO and PacifiCorp "integration" conducted last fall assumed that \$202 million in additional transmission costs would be allocated to California customers, which would raise the TAC.⁷¹ The current study did not address the impact of regionalization on the TAC.⁷²

TURN is concerned that California customers could face significant increases in the TAC from the allocation of the costs of transmission assets elsewhere in the WECC that are somehow deemed to benefit California. The costs of transmission lines that enable the integration of Wyoming or New Mexico wind in Scenario 3 are an obvious candidate for such allocation.⁷³ The costs of any lines needed for "beyond RPS" Wyoming or New Mexico wind could be allocated to California.

⁷⁰ See <http://www.caiso.com/informed/Pages/StakeholderProcesses/TransmissionAccessChargeOptions.aspx>.

⁷¹ See *Regional Coordination in the West: Benefits of PacifiCorp and California ISO Integration, Technical Appendix*, October 2015, p. 28. Available at <http://www.caiso.com/Documents/Study-TechnicalAppendix-Benefits-PacifiCorp-ISOIntegration.PDF>. The study did find that benefits from Wyoming wind would exceed such costs.

⁷² May 24 Presentation, p. 93.

⁷³ The analysis E3 conducted for this study with its RESOLVE model implicitly assumes such an allocation and considers such added transmission costs in its choices of lowest cost renewables.

In order to comprehensively review the impact of regional expansion on California customers, CAISO should include an assessment of potential TAC outcomes (including changes to wheeling out revenues) under each of the Scenarios. These outcomes would assist stakeholders in identifying potential impacts of regionalization on an array of market participants. Providing a range of outcomes as part of the scenarios would ensure that all stakeholders and policymakers have sufficient information to assess the potential benefits and costs of regional expansion.