Senate Bill 350 Study

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

Executive Summary

PREPARED FOR

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Executive Summary

California's Senate Bill No. 350—the Clean Energy and Pollution Reduction Act of 2015—("SB 350") requires the California Independent System Operator ("CAISO," "Existing ISO," or "ISO") to conduct one or more studies of the impacts of a regional market enabled by governance modifications that would transform the ISO into a multistate, regional entity ("Regional ISO" or "regional market"). This report, comprising Volumes I through XII, responds to this legislative requirement.

The ISO retained The Brattle Group ("Brattle"), Energy and Environmental Economics, Inc. ("E3"), Aspen Environmental Group ("Aspen"), and Berkeley Economic Advising and Research, LLC ("BEAR") (together with the ISO, the "study team") to evaluate the following impacts of a Regional ISO as outlined by SB 350:

- Overall benefits to California ratepayers;
- Emissions of greenhouse gases and other air pollutants;
- The creation or retention of jobs and other benefits to the California economy;
- Environmental impacts in California and elsewhere;
- Impacts in disadvantaged communities in California; and
- Reliability and integration of renewable energy resources.

In addition, SB 350 requires that the modeling and all assumptions underlying the modeling are made available for public review.[1]

The SB 350 study efforts include a stakeholder process, by which the study team has been providing 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 the initial framework of the approach and assumptions to be used in the analyses, continued with providing stakeholders interim updates associated with the approach and study assumptions, followed by providing detailed data and explanations of the preliminary results.

[1] California Senate Bill 350, Clean Energy and Pollution Reduction Act of 2015, Article 5.5, Section 359.5.(e)(1).

This stakeholder process involved several days of formal stakeholder workshops, supplemental webinars, data release, a review of study data by stakeholders, and written responses to numerous stakeholder questions.

While this study is conducted in direct response to the California legislative requirement to assess impacts on California and California electricity ratepayers, the study team hopes the information and analyses provided herein and during the stakeholder process can be used by stakeholders in California and in other states to perform their own analyses as they evaluate the potential impacts of regional market participation.

More 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") was posted on the CAISO website, in response to stakeholder requests.[2]
- **April 14, 2016:** the study team hosted a webinar to discuss the early release materials with stakeholders.
- **May 24–25, 2016:** stakeholder meeting to present and discuss the preliminary study results; stakeholder comments on preliminary study results were due by June 22, 2016.

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[2] Stakeholder materials are posted on the ISO's website at: https://www.caiso.com/informed/Pages/RegionalEnergyMarket/BenefitsofaRegionalEnergyMarket.aspx.

Certain analytical inputs contain detailed system information considered Critical Energy Infrastructure Information under FERC law and must be accessed through a non-disclosure agreement with the ISO. The instructions and NDA template can be found at: http://www.caiso.com/informed/Pages/RegionalEnergyMarket/BenefitsofaRegionalEnergyMarket.aspx under SB 350 Study Data. If you have any further questions, please contact regionalintegration@caiso.com.

- **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 10, 15, 21, 22 and July 1 and 6 2016:** released responses to stakeholder questions on the analytical material released.
- **June 21, 2016:** the study team hosted a webinar to discuss the details of the ratepayer impact analysis, including TEAM calculations.
- **July 7, 2016:** in response to stakeholder comments, the ISO reassessed the classification of data files underlying the Senate Bill 350 preliminary study results. During that assessment, the ISO determined that certain confidential files, including those containing output calculations, could be reclassified as public information and are now available on the ISO website.
- **July 12, 2016:** the study team provided responses to stakeholder comments related to the May 24–25 stakeholder meeting.

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

The primary purpose of this report is to inform California policymakers and the California legislature on the impacts to California of transforming the existing CAISO into a regional organization that manages wholesale electricity markets and operations across a broader western region. To undertake this analysis, the study team needed to make several foundational assumptions:

- The study team is not analyzing impacts associated with the ISO's Energy Imbalance Market ("EIM").[3] This study assumes the EIM may expand to the regional market

[3] The Energy Imbalance Market is a real-time market and it does not incorporate day-ahead unit commitment, day-ahead market dispatch, intra-day adjustments, or coordinated transmission planning and generator interconnections.

footprint with or without implementation of the ISO-operated regional market. The benefits estimated in this study are incremental to those achievable by a regional EIM.[4]

- A number of *plausible* future renewables portfolios can help to meet California's 50% Renewable Portfolio Standard ("RPS") by 2030 ("50% RPS portfolios"). The 50% RPS portfolios used in the study illustrate how regional market impacts may influence renewable generation development and vary across different renewable generation portfolios. We analyze portfolios with California-focused procurement (2030 Current Practice 1 scenario and 2030 Regional 2 scenario), a portfolio with more regionally-focused procurement (2030 Regional 3 scenario), and a number of sensitivities. Each of the sensitivity analyses of California renewables buildout results in a (at least slightly) different 50% RPS portfolio. This study is focused on plausible portfolios for achieving the 50% target under alternative assumptions for the ***sole*** purpose of assessing the benefits of a regional market over a range of plausible renewable procurement scenarios. *This study does not endorse or provide any recommendations about the procurement approach or the future composition of California's 50% RPS portfolios.*
- The study uses a number of assumptions that reflect California policies associated with reducing greenhouse gas ("GHG") emissions from California's electric sector. The policies that are assumed to be in place and are reflected in the analytical assumptions include the deployment of new energy efficiency, new (dispatchable) renewables, energy storage, growth of electric vehicles, time-of-use rates, improved ancillary services, and some fossil-fired generator retirements that reflect expected future policy decisions. In addition, GHG emission allowance prices in California are assumed for each future scenario analyzed. These assumptions do not take the place of policymakers' decisions. Instead, we expect that the California policymaking agencies and load-serving entities will make a determination of how to meet the 50% RPS, how to expand energy efficiency measures for the future, and how to reduce future GHG emissions as required by Assembly Bill 32.
- Assumptions reflect a *range* of the scope and conditions of a regional market. We analyze bookends for the scope of a regional market: at one end, we analyze a regional market that consists only of CAISO and PacifiCorp in 2020; and at the other end, we analyze an

[4] Given that an expanded ISO-operated regional market also enhances real-time operations beyond those that could be achieved through a regional EIM, our estimates will represent a conservative estimate of actual benefits because these additional real-time impacts are not quantified in our study.

expanded Regional ISO that includes most of the U.S. portion of the Western Electricity Coordinating Council ("WECC").[5] The rest of the assumptions about market conditions reflect both near-term year conditions (2020) with electric supply, demand, and fuel prices similar to today's, and longer-term conditions (2030) with significant changes in electric supply, including more renewable generation and significantly less coal-fired generating capacity in the entire Western Interconnection.

- This study's baseline scenarios do not include simulated GHG policies outside of California, other than states' existing RPS in the rest of WECC region. A sensitivity analysis considers the impact of a modest price on GHG emissions on electricity sector emissions in the rest of the U.S. WECC as a proxy for compliance with future environmental regulations, such as the U.S. Environmental Protection Agency's Clean Power Plan.

Our five baseline study scenarios consist of the following two 2020 scenarios and three 2030 scenarios:

- **2020 Current Practice:** reflects near-term market conditions. California has developed the necessary resources to meet its 33% RPS. CAISO operates as-is, with no regional expansion.
- **2020 CAISO+PAC:** reflects near-term market conditions. California has developed enough renewables to meet its 33% RPS. CAISO and PacifiCorp form a Regional ISO. Up to 776 MW of energy transfers from CAISO to PacifiCorp and 982 MW of transfers from PacifiCorp to CAISO (the amount of existing transmission capability between the two areas) are free of economic and operational hurdles. CAISO and PacifiCorp resources are committed and dispatched in a coordinated fashion to meet combined energy and operating reserves requirements in advance of real-time operations. For any imports into the CAISO region, all of PacifiCorp's generators, including coal plants, are assumed to face the same emissions cost as a generic natural gas combined-cycle generator (a simplification because the simulations cannot identify unit-specific imports and assign unit-specific allowance costs for imports into California). This scenario is compared to the 2020 Current Practice scenario to evaluate the impacts of a very limited initial market expansion.

[5] The WECC region is also referred to as the "Western Interconnection."

- **2030 Current Practice ("Current Practice 1"):**[6] reflects longer-term market conditions. California has developed enough renewables to meet its 50% RPS, with a current practice (in-state) procurement focus. CAISO operates only its current footprint, without regional expansion. Bilateral markets and trading frictions continue and limit the sales and net exports of excess generation from the RPS portfolios of CAISO entities to 2,000 MW. This means it is assumed that bilateral markets would accommodate the re-export of all prevailing existing imports (averaging 3,000–4,000 MW) plus export/sell an additional 2,000 MW of (mostly intermittent) renewable resources.

- **2030 Expanded Regional ISO 2 ("Regional 2"):** reflects longer-term market conditions. California has developed enough renewables to meet its 50% RPS, with a ***continued (but not exclusive) in-state renewables procurement focus***. All of the U.S. WECC except for the federal Power Marketing Agencies ("PMAs") (BPA and WAPA) ("WECC without PMAs") is part of an expanded Regional ISO.[7] All energy transfers among the Regional ISO members are free of economic and operational hurdles. Regional ISO resources are committed and dispatched in a coordinated fashion to meet combined energy and operating reserves requirements. Oversupply from California's renewables portfolio is more readily absorbed by the regional marketplace, as reflected in a more relaxed physical CAISO export limit (8,000 MW) in contrast to the more constrained bilateral limit in Current Practice 1 (2,000 MW). This scenario is compared to the 2030 Current Practice 1 scenario to evaluate the impacts of the broader regional market. The regional market is assumed to have facilitated the development of additional low-cost renewable generation resources beyond the western states' RPS mandates.

- **2030 Expanded Regional ISO 3 ("Regional 3"):** reflects longer-term market conditions. California has developed enough renewables to meet its 50% RPS, with a ***more region-***

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6 This "Current Practice 1" scenario was previously referred to as "Case 1A".

7 Specifically, the PMAs excluded for the purpose of this 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. The PMAs were excluded solely for providing a smaller than WECC-wide geographic footprint. This choice does not reflect any suggestion that the PMAs would not be interested in participating in a regional market. In fact, in the eastern interconnection, WAPA's Upper Great Plains Region has already joined the Southwest Power Pool.

wide procurement focus than in Regional 2. All of the U.S. WECC without PMAs participates in a Regional ISO. All energy transfers among the Regional ISO members are free of economic and operational hurdles. Regional ISO resources are committed and dispatched in a coordinated fashion to meet combined energy and operating reserves requirements. Oversupply from California's renewables portfolio is more readily absorbed by the regional marketplace, as reflected in a more relaxed physical CAISO export limit (8,000 MW) compared to the less flexible (2,000 MW) bilateral limit in Current Practice 1. This scenario is compared to the 2030 Current Practice 1 scenario to evaluate the impacts of the broader (but still not WECC-wide) regional market with more WECC-wide procurement to meet California's RPS. The regional market is assumed to have facilitated the development of additional low-cost renewable generation resources beyond the western states' RPS mandate.

Numerous sensitivity analyses were also studied as summarized in Volume III. The sensitivity analyses were used to test the impact of a variety of factors and alternative assumptions on the study results. The sensitivities address high bilateral trading flexibility, the market's geographic scope, renewable generation costs, alternative RPS and energy efficiency targets, and the extent to which a regional market would facilitate additional renewable generation development in the rest of the U.S. WECC region. We have not analyzed sensitivities focused on alternative assumptions for fuel prices, conventional plant retirements and additions, different weather and load conditions, or different hydro conditions.

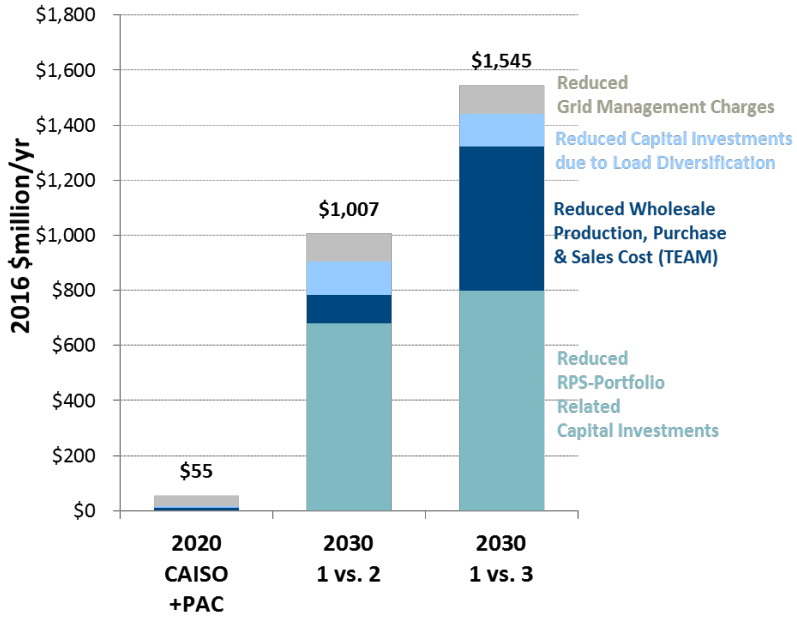
The key findings of the SB 350 analysis with respect to California ratepayer impact, greenhouse gas and other emissions, economic and environmental impacts, and impacts on disadvantaged communities are as follows:

Overall Benefits to California Ratepayers: We estimate an annual net benefit to California ratepayers of $55 million a year in 2020 (assuming the regional market would only include CAISO and PacifiCorp). That benefit grows to a baseline net benefit range of $1 billion to $1.5 billion a year by 2030 (assuming a large regional footprint that includes all of U.S. WECC without PMAs).[8] The 2030 results, which would continue and likely grow in subsequent years,

[8] When including the results of various sensitivity analyses (including higher bilateral flexibility and no additional renewable development), annual 2030 California ratepayer savings range from $767 million/year to $1.75 billion/year.

reflect ratepayer savings in a renewables scenario that achieves California's 50% RPS and meets all existing RPS standards in the rest of the West. Figure ES-1 below summarizes these results and shows that these net benefits to California's ratepayer are composed of: (1) savings from reduced capital investments for RPS-related procurement; (2) reduced production, purchase, and sales costs for wholesale electricity; (3) reduced capital investments from regional load diversification; and (4) reduced grid management charges for system and market operations.[9] The reductions in RPS-related procurement costs stems from reduced renewable generation capacity needs due to reduced curtailments and the ability to develop lower cost renewable resources. Savings associated with wholesale productions, purchase and sales costs are driven primarily by lower-cost imports (during periods when California is importing power) and higher export sales revenues during oversupply conditions (when California would otherwise have to curtail renewable generation or export power at a zero market price). The increased diversity of peak loads in a larger market region reduces generation-related capital investments and the larger geographic footprint reduces the average charge needed to recover the grid management costs of the ISO operating the regional market.

Figure ES-1: Estimated Annual California Ratepayer Net Benefits



* The grid management charge is the ISO's charge for recovering its annual operating costs. Note that the "Current Practice 1" scenario has previously been referred to as "Case 1A"

[9] A separate sensitivity analysis shows that 2020 California ratepayer benefits would be $258 million/year in a market covering the larger regional footprint.

The ratepayer benefits are annual net benefits, estimated for the years 2020 and 2030. If the regional market grows as assumed in this study, the $55 million/year savings in 2020 is expected to grow to $1.5 billion/year in 2030. Since these ratepayer benefits are associated with true cost reductions, they are expected to be sustained over the long-term, beyond 2030.

Emissions of Greenhouse Gases and Other Air Pollutants: The market simulations undertaken for this effort show that California's energy policy initiatives will substantially reduce the emissions of GHGs associated with serving California electricity loads. Our analysis of GHGs focuses on carbon dioxide, which accounts for 99 percent of all GHG emissions from electric sector operations. Our estimate of electric-sector CO_2 emissions[10,11] includes emissions from all simulated generation sources on the high-voltage grid, including biomass, geothermal, and other sources that may not necessarily be included in the California Air Resources Board's GHG accounting under AB 32. Figure ES-2 shows that the estimated CO_2 emissions associated with serving California retail electricity loads (including CO_2 emissions from imported power) will be approximately 63.6 million metric tons by 2020 (well below recent historical levels of about 90 million metric tons per year in 2010–2013 and 107.5 million metric tons in 1990). These emissions are projected to decrease further to 49.2 million metric tons by 2030, even under the Current Practice 1 scenario, without implementing a regional market.[12] Furthering California's GHG emissions reduction goals by implementing a regional market is estimated to decrease 2030 CO_2 emissions associated with serving California loads from 49.2 million to 44.6–45.5 million metric tons. These projected 2030 CO_2 emissions levels are about 58% below California's 1990 electric-sector CO_2 emissions. They are also well below the CO_2 emissions limits set by the U.S. Environmental Protection Agency's Clean Power Plan ("CPP") for California's power sector. We have interpreted SB 350 as requiring a study of GHG and other air pollutant emissions from the power sector. This study does not make any assumptions or analyze emissions from other categories of sources in California, and it does not analyze the potential reactions from other sectors of the economy when emissions from the power sector change.

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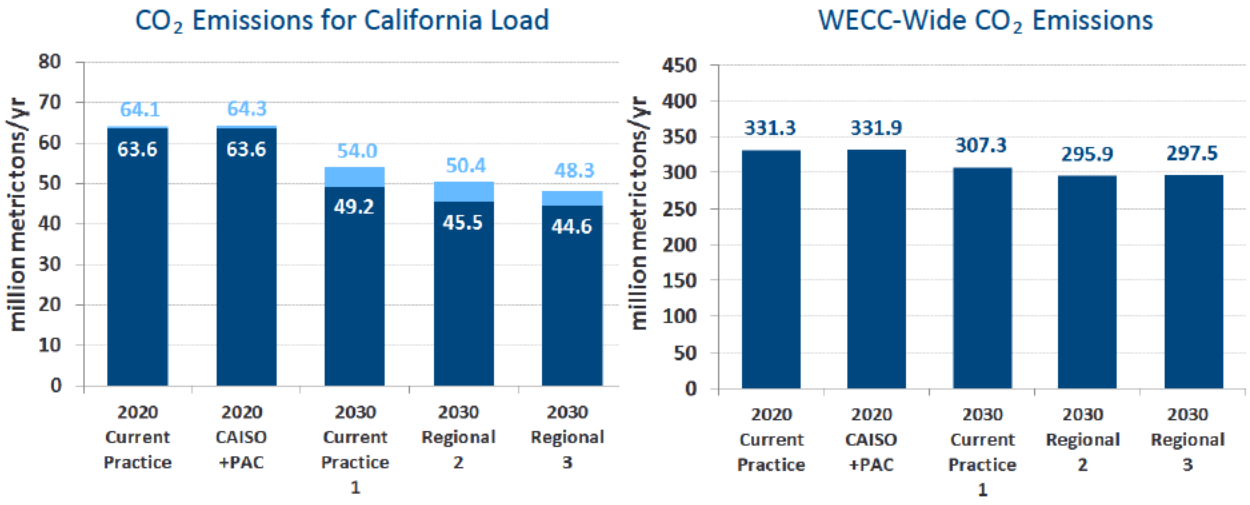
[10] Note that the emissions results presented in this final report differ slightly from preliminary results presented on May 24, 2016; all cases were updated to: (1) include CO_2 emissions during plant starts and (2) exclude wheeling-through transactions in California emissions accounting.

[11] Our estimates of future CO_2 emissions are for all modeled electric generating sources on the high-voltage grid, including biomass and geothermal.

[12] The term "tonne" is meant to mean "metric ton" and two terms are used interchangeably.

The SB 350 analysis includes a simulation of the power sector across the entire WECC, including the western Canada (British Columbia and Alberta) and northern Mexico portions of WECC. On a WECC-wide basis, and despite continued projected load growth in the rest of WECC, the CO_2 emissions are estimated to decrease from 331.3 million metric tons in 2020 to 307.3 million metric tons in 2030, even without a regional market. On top of this reduction, the regional market is estimated to further reduce 2030 emissions, to below 300 million metric tons. These reductions are estimated to materialize prior to implementing any additional measures that the western states would use to comply with the CO_2 emissions limits set under the CPP. Aside from the emissions reductions facilitated by a regional market, the main drivers of the estimated CO_2 emissions reductions include: the announced retirements of coal-fired generators throughout WECC through 2030; the relative economics of different fuels and generating technologies; the design and implementation of specific environmental regulations in California and the rest of WECC; and the magnitude of renewable energy resource development throughout the West. The simulation assumptions associated with these factors made for the purpose of this study are explained in more detail in Volume V.

Figure ES-2: Annual Electricity-Sector CO_2 Emissions in California and WECC-Wide



Notes:

[1] On the left chart, the higher value reflects the CARB's GHG accounting for GHG imports. The lower value includes an adjustment to "credit" California for GHG exports, which is not currently part of the CARB's accounting.

[2] The emissions results presented in this final report differ slightly from preliminary results presented on May 24, 2016, reflecting updates to: (a) include CO_2 emissions during plant starts and (b) exclude wheeling-through transactions in California emissions accounting.

In addition, in a sensitivity analysis conducted to simulate a future under which states in the rest of the U.S. WECC would implement policies to further reduce GHG emissions akin to those

mandated under the CPP, we assess the potential impact of implementing a regional market assuming a $15/metric ton carbon price is imposed on electric sector emissions across the western states outside of California. That sensitivity analysis does not include any assumptions about how each state might implement their emission reduction plans to comply with specific environmental regulations, such as the CPP.[13]

The expanded regional market will also decrease electric-sector emissions of nitrogen oxides (in part by reducing the need for extensive cycling of California natural gas plants), sulfur dioxide, and particulate matter emissions within California and WECC-wide.[14]

The Creation or Retention of Jobs and Other Benefits to the California Economy: The impacts of a Regional ISO-operated market are expected to create numerous and diverse jobs and economic benefits to California households and enterprises. We estimate that a regional market, growing from a CAISO plus PacifiCorp footprint in 2020 to the larger regional market by 2030, will create 9,900–19,300 additional jobs in California, compared to Current Practice, primarily due to reduced cost of electricity. We estimate that, by 2030, the regional market will increase statewide household real income, across all income brackets. We estimate statewide household real disposable income to increase by between 0.1% and 0.2%, an increase in community incomes equal to $290–550 per household annually by 2030. Moreover, the study results show that a regional market would lead to higher California Gross State Product, real economic output, real wages, and state revenue. A regional market with more California-focused renewables procurement to meet the state's RPS (instead of more out-of-state procurement) can yield even greater economic benefits to the state, but there are potential tradeoffs among ratepayer benefits, local employment, economic impact benefits, and environmental impacts as discussed next.

Environmental Impacts in California and Elsewhere: Our analysis for 2030 shows that implementing a regional market increases the efficiency of investments in low-cost renewable energy generation, including investments in new wind and solar resources to meet California's RPS. With a more efficient renewable resource expansion to meet the state's RPS, implementing a regional market also reduces impacts on land use, biological resources, and water use. The land-use impact associated with building new wind and solar developments in California is

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[13] For the purpose of providing context to our results we do, however, compare our CO_2 emissions results to hypothetical mass-based state CO_2 standard under the Clean Power Plan as discussed below.

[14] Our analyses are subject to important limitations for the purpose of analyzing specific air quality impacts as discussed further in footnote 23 of Volume I of this report.

reduced by 42,600 acres in Regional 2 and by 73,100 acres in Regional 3. The land use for deploying new wind and solar outside of California to meet the state's 50% RPS is reduced by about 31,900 acres relative to the Regional 3 scenario, if California continues to focus on in-state development for RPS as is assumed in the Regional 2 scenario.[15] The environmental study inherently reflects tradeoffs between in-state versus out-of-state development. With more of an out-of-state renewables-procurement focus to meet California's RPS, land use and impacts on biological resources are shifted from California to out-of-state. New transmission builds to support renewable resource development outside of California are likely to further increase out-of-state land use. Due to a regional market's more efficient dispatch of generating units across the West, water use for thermal generators is reduced, specifically for natural gas-fired combined-cycle units in California, and for natural gas-fired and coal-fired units in the rest of WECC.

Impacts on Disadvantaged Communities: Our analysis shows that the regional market would confer economic benefits on disadvantaged communities. We estimate that implementing a regional market with CAISO plus PacifiCorp in 2020, and expanding to a larger Regional ISO by 2030, would stimulate real income and jobs growth in most of California's disadvantaged communities, particularly in the Inland Valley, Greater Los Angeles, and Central Valley Competitive Renewable Energy Zones ("CREZs"). Real disadvantaged community incomes would increase by an amount corresponding to $170 to $340 of existing real annual household incomes, and total full-time employment would rise by 1,300 to 4,600 jobs between 2020 and 2030. A regional market mitigates construction-related adverse environmental impacts by reducing renewable resource development needs to meet California's RPS, particularly in the Westlands area where solar resource development is reduced due to more efficient renewable integration of a regional market (see the next finding and Volumes IV and XI). Reduced generation from natural gas-fired generators in California decreases the amount of water used during power production and provides benefits to disadvantaged communities by decreasing power plant emissions in the San Joaquin Valley and South Coast air basins.

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[15] The higher land-use impact of the Regional 3 scenario (compared to Regional 2) relates to the scenario's higher share of wind resources and the fact that wind generation requires more land per MWh of renewable energy than solar generation. Note, however, usually less than 10% of the acreage within a typical wind site may be disturbed, while the remainder of the land remains undisturbed and available for other uses (e.g., for range land and farming).

Reliability and Integration of Renewable Energy Resources: A regional market reduces the cost of maintaining reliability by reducing the need for load-following resources, operating reserves, and planning reserves. A regional market improves integration of renewables to achieve California's 50% RPS by reducing curtailments of renewable resources in a regional market (relative to current practices based on bilateral trading) and therefore would allow California to build less renewable generating capacity (megawatts) to meet the same goals. Regional pooling of resources to meet flexibility reserves allows the region to balance the intermittent output of wind and solar generation much more efficiently than operating individual balancing areas independently. These aspects of reliability benefits are quantified in the load diversity analysis (meeting the same resource adequacy level with less generating capacity) and nodal energy market simulations (more optimized power flows, reduced curtailments, reduced need for load-following and operating reserves) of our study. In addition, a regional market increases operational reliability through a variety of factors, such as better real-time visibility of system conditions in the larger regional footprint and improved management of unscheduled regional power flows. Improved management of the existing grid and better regional transmission planning will additionally reduce the transmission-related renewables integration and generator interconnection costs. The liquidity and transparency of a regional market will attract renewable generation investments beyond those needed to meet the RPS requirements of western states. This means the quantified benefits are a conservatively low estimate in that they do not include the monetary value of a variety of benefits related to system operations, planning, enhancing reliability, and more efficiently integrating or interconnecting renewable energy resources in the rest of the region. These additional operational reliability benefits are described and documented in detail in Volume IX of this study.

A Regional ISO: Why Now? The analyses show that regional market benefits (1) significantly depend on the size of the regional market; and (2) increase quickly with California renewable generation mandate. Experience with the Energy Imbalance Market and other regional markets show that it takes several years to set up a regional market. Additionally, it takes new participants several years to obtain the regulatory approvals and undertake the necessary preparations before they are able to achieve market participation. As a result, it will take a number of years to achieve a regional market of sufficient size to provide the available regional market benefits. Thus, the sooner a regional market of sufficient size can be developed, the sooner California customers will be able to benefit from the investment and operating cost savings a regional market can provide—particularly as RPS mandates increase over time.

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