California Air Resources Board

Staff Report: Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets

July 2018

CALIFORNIA
AIR RESOURCES BOARD

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Section 1: Introduction

The evidence that the climate is changing is undeniable. The changing climate escalates serious problems, including wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution. As evidence mounts, the scientific record only becomes more definitive, and further action is imperative to avoid the most catastrophic impacts of climate change. The Paris Agreement—which calls for limiting global warming to well below two degrees Celsius and pursuing efforts to limit it to 1.5 degrees Celsius—frames California's path forward.

California has a long and successful record of climate policies and programs that demonstrate that we are doing our part in the global effort to address climate change and limit greenhouse gas (GHG) emissions. Recent data indicates California is on track to achieve its 2020 GHG reduction target of 1990 levels early. California also has a statutory mandate to reduce GHG emissions by 40 percent below 1990 levels by 2030[1] and a goal to further reduce GHG emissions 80 percent below 1990 levels by 2050.[2]

The 2017 California Climate Change Scoping Plan (2017 Scoping Plan Update),[3] adopted by the California Air Resources Board (CARB or Board) in December 2017, identifies an achievable and cost-effective path to achieve the 2030 GHG emissions reductions target through a mix of regulatory, incentive based, and market-based policies. The 2017 Scoping Plan Update also establishes 260 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) as the mass-based GHG target for 2030.

The electricity sector will play a critical role in achieving the State's GHG emissions reductions target. Transitioning to a low-carbon economy as described in the 2017 Scoping Plan Update will be implemented, in part, by the electrification of several sectors, while decarbonizing the grid. The State's electricity demand and GHG emissions will be affected by transitions already underway, including adoption of energy efficiency measures, the penetration of customer-owned solar, greater renewable energy generation, and electrification of transport, among others.

Building on the State's climate leadership, Senate Bill 350 (SB 350) (De Leon, Chapter 547, Statutes of 2015), the Clean Energy and Pollution Reduction Act of 2015, directs the electricity sector decision-makers to undertake comprehensive integrated resource planning that incorporates multiple goals and mandates. For the first time, Integrated Resource Plans (IRPs) will be required to incorporate what actions may be taken to

[1] Senate Bill 32 (SB 32) (Pavley, Chapter 249, Statutes of 2016), California Global Warming Solutions Act of 2016
[2] Executive Order S-03-05 (2005)
[3] California's 2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target (December 2017). Retrieved from: https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf

achieve California's long-term GHG reduction goals, while considering cost effectiveness, reliability, impacts on disadvantaged communities, as well as statutory mandates such as the fifty percent Renewables Portfolio Standard (RPS).[4] The integrated resource planning process provides an opportunity to plan for the future electricity sector. The IRP process establishes a new level of coordination and collaboration throughout the electricity sector. Holistic consideration of these requirements enables planning at both the individual utility and the sector level to achieve the State's GHG emissions reductions goals.

In order to facilitate this planning and achievement of GHG reductions, SB 350 requires CARB, in coordination with the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC), to set GHG reduction planning targets for the electricity sector and for individual load-serving entities (LSEs) and publicly owned utilities (POUs). This Staff Report describes the proposed methodology for establishing the GHG planning target ranges and the specific proposed GHG planning target ranges for the electricity sector, LSEs, and POUs, for use in IRPs.

Section 2: Electricity Sector Background and GHG Trends

GHG emissions from the electricity sector are a function of the demand for electricity and the carbon intensity of the fuel used to generate electricity. Historically, power plants generated electricity largely by combusting fossil fuels. In the 1970s and early 1980s, a significant portion of California's power supply came from coal and petroleum resources. To reduce air pollution and promote fuel diversity, the State shifted away from these resources to natural gas, renewable energy, and energy efficiency programs, resulting in significant GHG emissions reductions. Indeed, coal generation to serve California electricity demand declined by more than half from 2008 levels.[5]

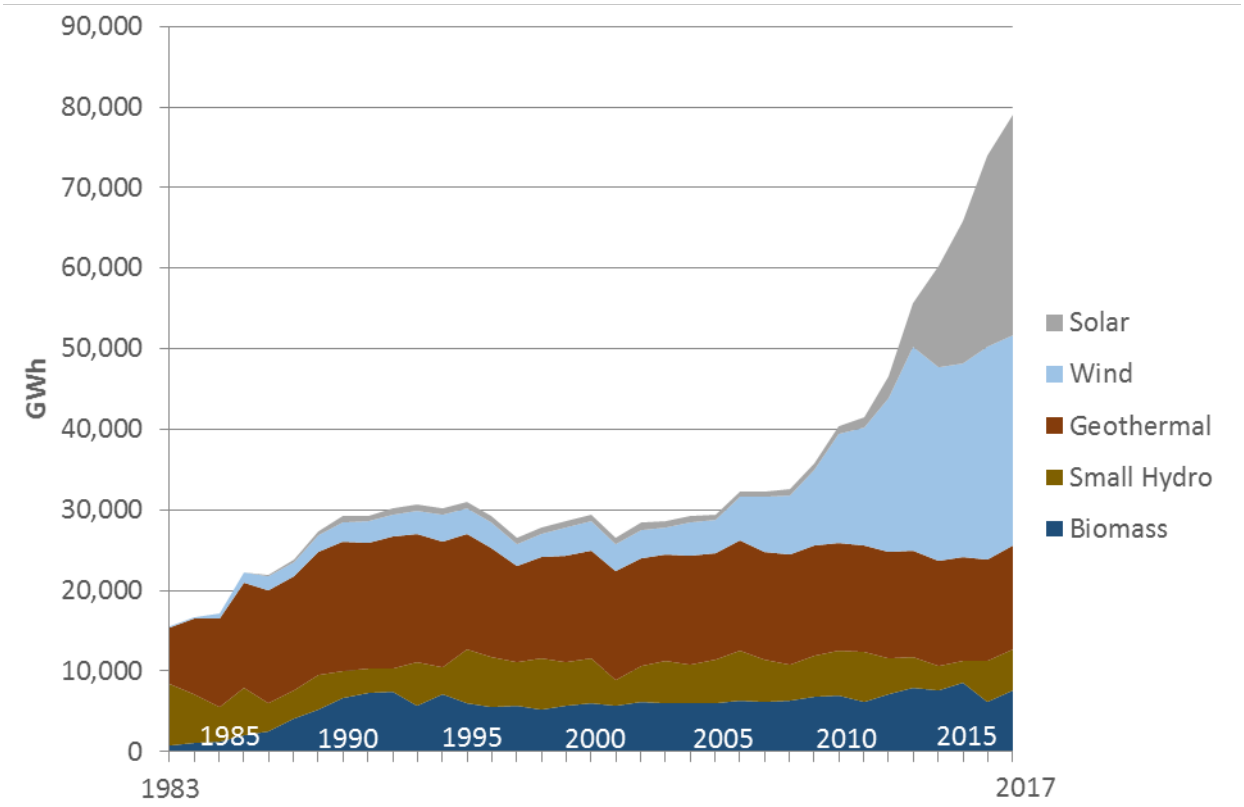
Renewable Energy

Renewable energy has shown tremendous growth, with capacity from solar, wind, geothermal, small hydropower, and biomass power plants growing from 6,600 megawatts (MW) in 2010 to 27,800 MW as of October 2017.[6] Likewise, electricity generation from renewable energy has grown over the past 30 plus years—more than doubling since 2008.[6] The RPS, established in 2002, has driven greater renewable energy generation, and the RPS target was ratcheted upwards in 2006, 2011, and (by

[4] The statutory requirements for IRPs are listed in California Public Utilities (PU) Code Section 9621
[5] California Energy Commission. December 2017. Tracking Progress. California's Declining Reliance on Coal – Overview. Retrieved from: http://www.energy.ca.gov/renewables/tracking_progress/documents/current_expected_energy_from_coal.pdf
[6] California Energy Commission. December 2017. Tracking Progress. Renewable Energy – Overview. Retrieved from: http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

SB 350) in 2015. Figure 1 shows renewable energy procured by California utilities from 1983–2017 by resource type.[7]

Figure 1 – Renewable Energy Generation 1983-2017



Source: California Energy Commission, 2017

Electricity Demand

Numerous factors, including population and economic growth, personal income, employment, electrification, and efficiency measures, affect electricity demand. Population in the State of California increased from 34 million in 2000 to nearly 40 million in 2016—a nearly 18 percent increase from 2000 levels.[8] During the same time, the economy has grown by more than 40 percent, from $1.6 trillion in 2000 to $2.3

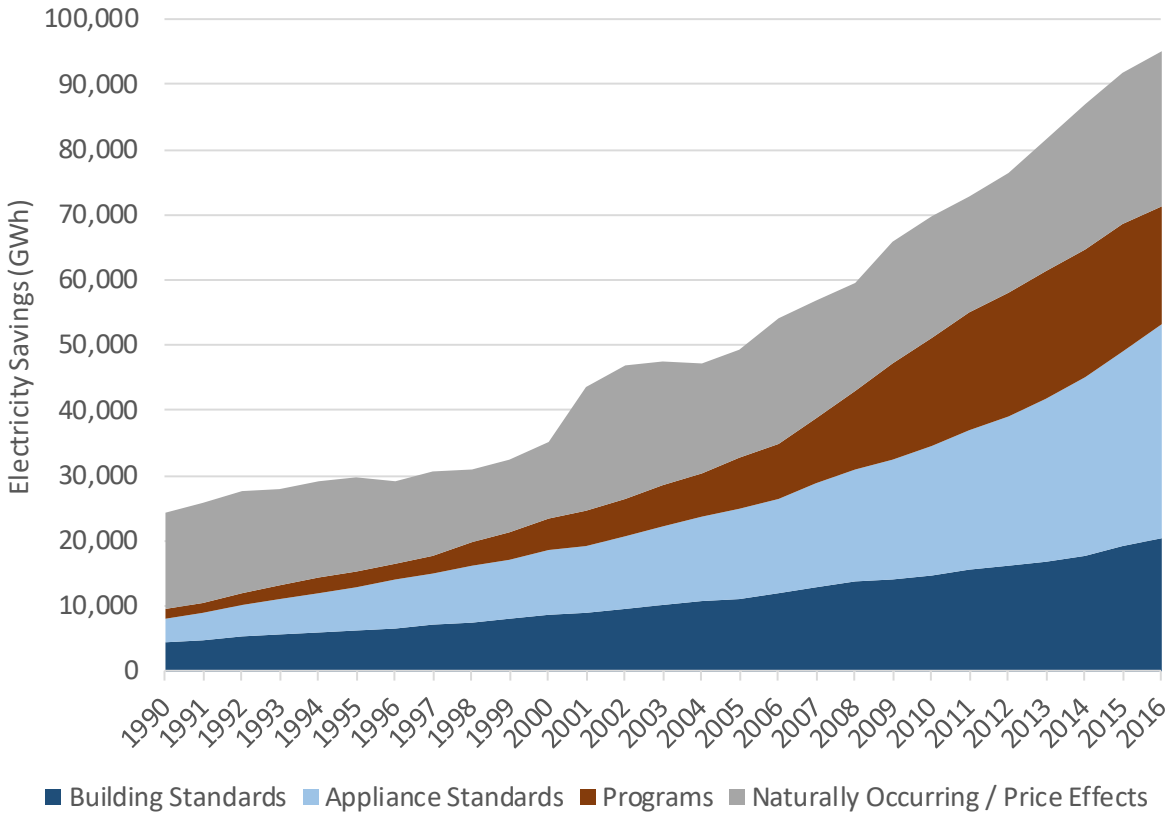
[7] This does not include large hydropower and does not include self-generation or behind-the-meter generation. California Energy Commission. December 2017. Tracking Progress. Renewable Energy – Overview. Retrieved from: http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

[8] Population data obtained from California Department of Finance Data in Action-1970 to 2060 on March 22, 2018. Additional information available at: http://www.dof.ca.gov/Forecasting/Demographics/Data_In_Action/

trillion in 2016 in gross state product (reported in 2009 $).[9] Population is estimated to increase further, to 44 million by 2030.

Energy efficiency efforts in California have reduced energy demand. California has been a leader in advancing appliance and building energy efficiency, and over the last 40 years, California has implemented cost-effective appliance and building energy efficiency standards, as well as utility efficiency programs, that have saved consumers billions of dollars. The annual efficiency and conservation savings for electricity were estimated to surpass 95,000 gigawatt hours (GWh) by 2016, as shown in Figure 2.[10]

Figure 2 – Electricity Savings from Statewide Efficiency and Conservation



Source: California Energy Commission, Demand Analysis Office, 2017

Carbon Dioxide Emissions

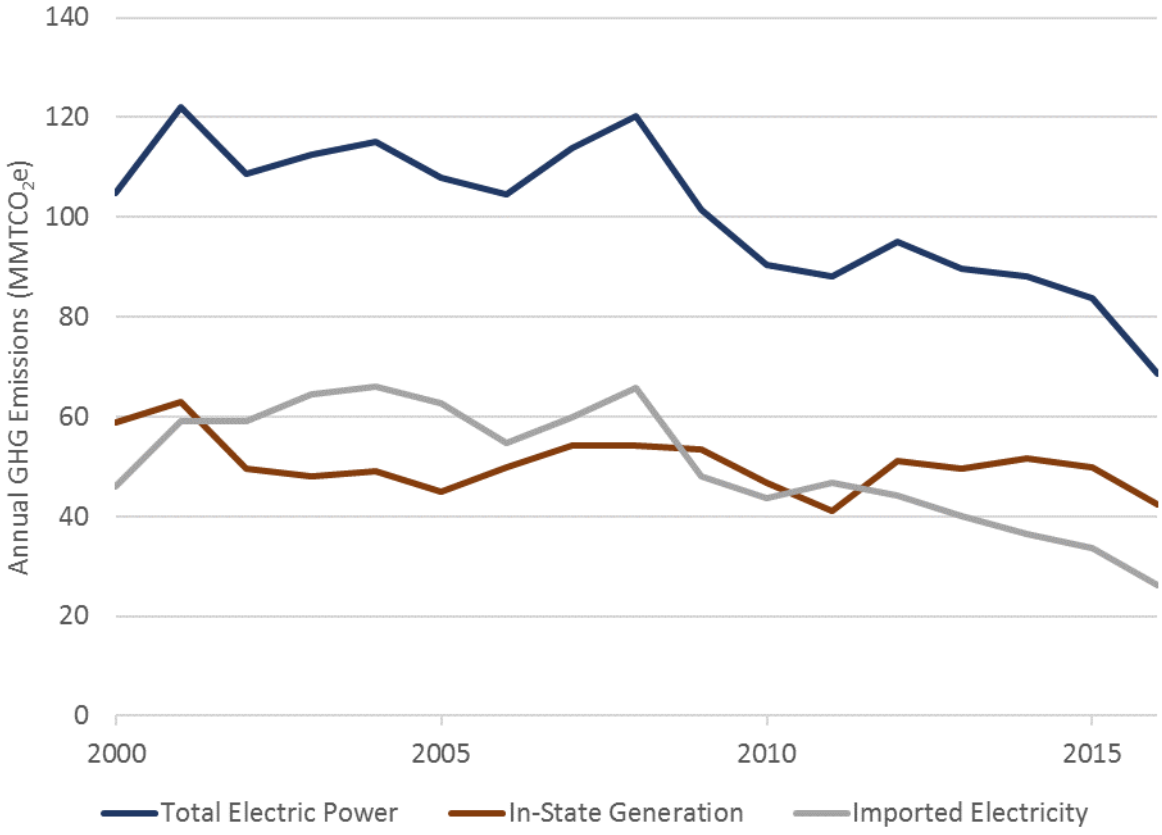
Carbon dioxide is the primary GHG associated with the electricity sector, which is composed of in-state generation and imported power to serve California load. GHG emissions from the electricity sector have decreased by 35 percent since 2000, and are

[9] Gross State Product, California Department of Finance. Retrieved from: http://www.dof.ca.gov/Forecasting/Economics/Indicators/Gross_State_Product/

[10] California Energy Commission. July 2017. Tracking Progress. Energy Efficiency. Retrieved from: http://www.energy.ca.gov/renewables/tracking_progress/documents/energy_efficiency.pdf

on the way to achieving deeper emissions cuts by 2030. Figure 3 illustrates the trend of declining GHG emissions in the electricity sector between 2000 and 2016.[11]

Figure 3 – Electricity Sector GHG Emissions Trends

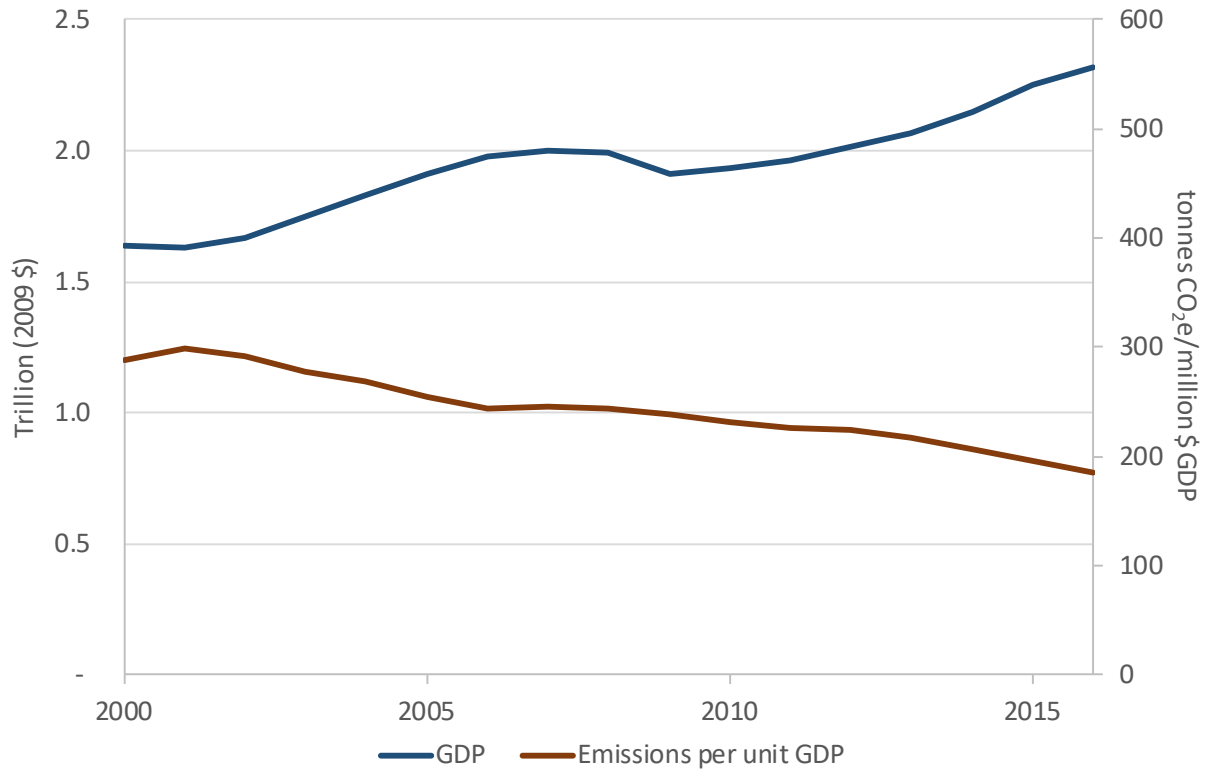


Source: California Air Resources Board, 2018

The population and economy of California have grown, while also becoming less carbon intensive. Since the launch of many of the State's major climate programs, including RPS, energy efficiency standards, and Cap-and-Trade, California has succeeded in reducing GHG emissions while also developing a cleaner, resilient economy that uses less energy and generates less pollution. Figure 4 depicts the trends in economic growth and GHG emissions.[9, 11]

[11] 2018 California GHG Emission Inventory, Scoping Plan Categorization. Retrieved from: https://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_sum_00-16.xlsx

Figure 4 – Carbon Intensity of California Economy



Source: California Air Resources Board, 2018

Section 3: Key Climate Legislation and Directives

This section provides a summary of major climate legislation and executive orders that have shaped California's climate programs. These directives and legislation are the underpinnings for the GHG planning target requirements in the IRP process established by SB 350. Together they underscore the critical role the electricity sector has in achieving California's GHG emissions targets.

Assembly Bill 32 (AB 32) (Nuñez, Chapter 488, Statutes of 2006), California Global Warming Solutions Act of 2006

AB 32 codified California's first GHG target, calling on the State to reduce GHG emissions to 1990 levels by 2020 with maintained and continued reductions post-2020. California is on track to achieve its 2020 GHG reductions target earlier than 2020.

Senate Bill 1368 (SB 1368) (Perata, Chapter 598, Statutes of 2006), Emissions Performance Standards

SB 1368 limits long-term investment by the State's utilities in baseload generation to resources that meet emissions performance standards set by CEC and CPUC. The emissions performance standards have been a driving force behind phasing out of long-

term contracts for coal-fired generation with California utilities, and have a key role in decreasing GHG emissions in the electricity sector.[5]

Executive Order B-30-15

In his January 2015 inaugural address, Governor Brown identified actions in five key climate change strategy "pillars" necessary to meet California's ambitious climate change goals:

- Reducing today's petroleum use in cars and trucks by up to 50 percent
- Increasing from one-third to 50 percent our electricity derived from renewable sources
- Doubling the efficiency savings achieved at existing buildings and making heating fuels cleaner
- Reducing the release of methane, black carbon, and other short-lived climate pollutants
- Managing farm and rangelands, forests, and wetlands so they can store carbon

A "sixth pillar" of the Governor's strategy included safeguarding California in the face of a changing climate, highlighting the need to prioritize actions to reduce GHG emissions and build resilience in the face of a changing climate.

Consistent with these goals, Executive Order B-30-15 extended the goals of AB 32 and set a 2030 goal of reducing emissions 40 percent from 1990 levels. This action keeps California on target to achieve the level of reductions scientists say is necessary to meet the Paris Agreement goals.

Executive Order B-30-15 called on CARB, in coordination with sister agencies, to update the AB 32 Climate Change Scoping Plan to incorporate the 2030 target, which the Board adopted in December 2017.

Senate Bill 350 (SB 350) (De Leon, Chapter 547, Statutes of 2015), Clean Energy and Pollution Reduction Act of 2015

SB 350 built on two of the Governor's pillars from his 2015 inaugural address by increasing in the Renewable Portfolio Standard (RPS) to 50 percent by 2030 and directing the Energy Commission to establish targets for statewide energy efficiency savings to achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas end uses by 2030.

SB 350 established the requirement to set GHG planning targets for use in IRP for the electricity sector as a whole and among individual POUs and LSEs.[12] Specific requirements include that LSEs and POUs develop IRPs that:

- Meet greenhouse gas reduction targets

[12] Load-serving entities include investor-owned utilities (IOUs), electric service providers (ESPs) and community choice aggregators (CCAs).

- Achieve 50 percent RPS
- Serve customers at just and reasonable rates
- Minimize impacts on ratepayers' bills
- Ensure system and local reliability
- Strengthen diversity, sustainability, and resilience of bulk transmission and distribution systems and local communities
- Enhance distribution systems and demand-side energy management
- Minimize localized air pollutants and other GHG emissions with early priority on disadvantaged communities

Specifically, as it relates to the greenhouse gas planning target, LSEs and POUs are to:

> "Meet the greenhouse gas emissions reduction targets established by the State Air Resources Board, in coordination with the [California Public Utilities Commission] and the Energy Commission, for the electricity sector and each load-serving entity [and publicly owned utility] that reflect the electricity sector's percentage in achieving the economy-wide greenhouse gas emissions reductions of 40 percent from 1990 levels by 2030."[13]

Senate Bill 32 (SB 32) (Pavley, Chapter 249, Statutes of 2016), California Global Warming Solutions Act of 2016

SB 32 affirms the importance of addressing climate change by codifying into statute the GHG emissions reductions target of at least 40 percent below 1990 levels by 2030 contained in Executive Order B-30-15. The 2030 target reflects the same science that informs the agreement reached in Paris by the 2015 Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at keeping the global temperature increase below 2 degrees Celsius (°C). California's 2030 target represents the most ambitious GHG reduction goal for North America. Based on the emissions reductions directed by SB 32, the annual 2030 statewide target emissions level for California is 260 MMTCO$_2$e.

2017 Scoping Plan Update

The 2017 Scoping Plan Update establishes a path that will enable California to achieve the 2030 GHG emissions reductions target set forth in SB 32. The 2017 Scoping Plan Update builds on the State's successes to date, proposing to strengthen major programs that have been a hallmark of success, while further integrating efforts to reduce both GHG emissions and air pollution.

The 2017 Scoping Plan Board Update Resolution 17-46 adopted by CARB directs staff to use the 2017 Scoping Plan Update to inform the GHG planning targets for the electricity sector and each retail electricity provider pursuant to SB 350.

[13] PU Code Section 454.52(a)(1)(a) and PU Code Section 9621(b)(1)

Board Resolution 17-46 states:

> "…the Board hereby determines that the Final Plan should inform the preliminary 2030 GHG planning target range for the electricity sector, which in coordination with the California Public Utilities Commission and the California Energy Commission, will be evaluated and revised, as appropriate, as part of the Board's process to establish GHG planning targets for the electricity sector and each load-serving entity for use in Integrated Resource Plans pursuant to SB 350."

Section 4: Planning Target Setting Process

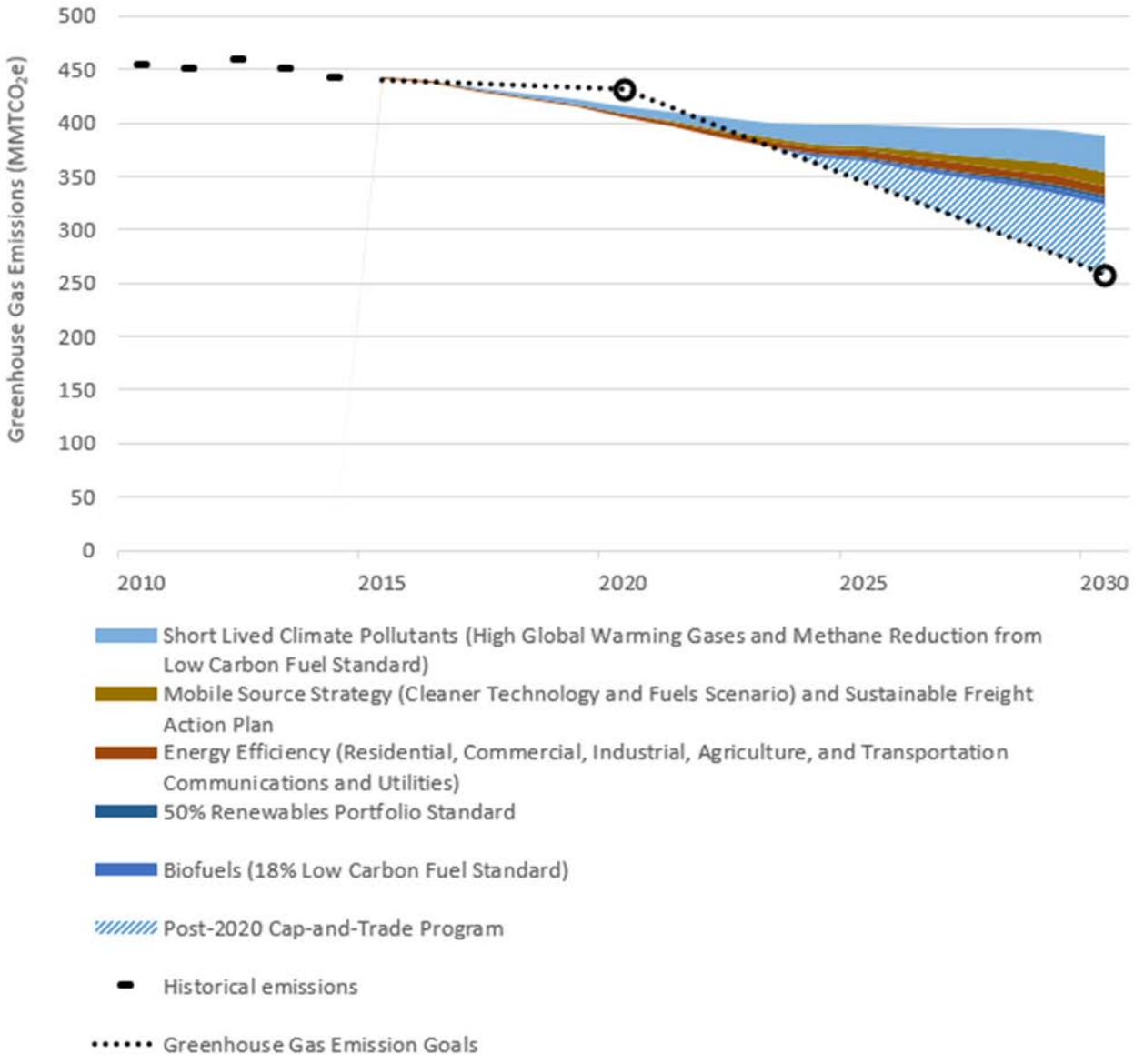
The 2017 Scoping Plan Update[3] informs CARB's approach to setting GHG planning target ranges. CARB staff considered the 2017 Scoping Plan Update and analysis; recommendations made by CEC and CPUC,[14] along with underlying information, data, and analyses; and public input.

2017 Scoping Plan Update

The 2017 Scoping Plan Update reflects the statewide goal of reducing GHG emissions 40 percent below 1990 levels by 2030 called for in SB 32. The 2017 Scoping Plan Update identifies an achievable and cost-effective path to reduce GHG emissions, which includes specific electricity sector actions such as implementation of the 50 percent RPS, doubling of energy efficiency savings, and additional emissions reductions via the Cap-and-Trade Program. Figure 5 illustrates the estimated emissions reductions associated with the measures evaluated in the 2017 Scoping Plan Update Scenario that achieves the State's 2030 GHG target.

[14] CPUC and CEC recommendations are included in Appendices A and B and also posted online at: https://www.arb.ca.gov/cc/sb350/sb350.htm

Figure 5 – Scoping Plan Scenario from the 2017 Scoping Plan Update[15]



Source: California Air Resources Board, 2017

The 2017 Scoping Plan Update used PATHWAYS[16] to model different emissions pathways, or scenarios, that achieve the 2030 GHG emissions target, while acknowledging the need to continue these efforts for the State's long-term 2050 goal. PATHWAYS models GHG emissions while recognizing the integrated relationships of the industrial, economic and energy sectors. For example, if more electric vehicles are

[15] 2017 Scoping Plan Update, PATHWAYS Outputs (December 2017). Retrieved from: https://www.arb.ca.gov/cc/scopingplan/pathways_ghgs_by_measure_101917.xlsx
[16] California PATHWAYS Model Framework and Methods (January 2017). Retrieved from: https://www.arb.ca.gov/cc/scopingplan/california_pathways_model_framework_jan2017.pdf

added to the transportation sector, PATHWAYS responds by reflecting an energy demand increase in the electricity sector. PATHWAYS' ability to capture a subset of interactive effects of policies and measures helps to provide a representation of the interconnected nature of the system and impacts on GHG emissions.

In addition to using the PATHWAYS model to account for GHG emissions and interactive effects of policies, the 2017 Scoping Plan Update also includes an Uncertainty Analysis.[17] The Uncertainty Analysis examines the range of outcomes that could occur under the Scoping Plan Scenario of current and proposed GHG reduction policies and measures, including the measures that affect the electricity sector. The uncertainty factors included in the analysis are:

- Economic growth through 2030
- Emission intensity of the California economy
- Cumulative emissions reductions (2021 to 2030) achieved by the known commitments, including GHG reductions from SB 350 actions
- Cumulative emissions reductions (2021 to 2030) that can be motivated by emission prices under the Cap-and-Trade Program

While the Uncertainty Analysis shows a high probability of the suite of policies achieving the 2030 target, any one of the 2017 Scoping Plan Update measures has the potential to under- or over-perform, adding to the uncertainty of achieving the economy-wide 2030 GHG target. To the extent any measure interacts with the electricity sector, it further increases the uncertainty around the ultimate contribution from the electricity sector in achieving the 2030 target.

CEC and CPUC GHG Planning Target Recommendations

Per SB 350, CARB staff coordinated with CEC and CPUC staff to establish the GHG planning targets. CEC and CPUC made recommendations to CARB on the GHG planning targets for the electricity sector, POUs, and LSEs, as appropriate. Both CEC and CPUC explored defining an overall electricity sector GHG emissions planning target in 2030 for IRP purposes. In addition, CEC and CPUC each developed a methodology to divide the electricity sector planning target among relevant LSEs under CPUC's jurisdiction and POUs filing IRPs with CEC and to set LSE- and POU-specific GHG planning targets. This work formed the basis for CEC and CPUC recommendations for the planning targets. To view CPUC and CEC recommendations to CARB, see Appendices A and B.

Electricity Sector Target Recommendations

CPUC used a capacity-expansion model called RESOLVE to evaluate the need for new resources to achieve GHG planning targets at least cost, while also satisfying reliability

[17] Appendix E, Economic Analysis. 2017 Scoping Plan Update. Retrieved from: https://www.arb.ca.gov/cc/scopingplan/2030sp_appe_econ_final.pdf

requirements and other SB 350 objectives. CPUC analyzed three GHG emissions scenarios, which are further described below.[18] The CPUC based these scenarios on the 2030 electricity sector GHG range identified in the January 2017 Scoping Plan Update draft.[19]

Each scenario the CPUC modeled was designed to represent achievement of the 50 percent RPS requirement, plus roughly 1.5x energy efficiency (consistent with CEC 2016 Integrated Energy Policy Report (IEPR) Mid Additional Achievable Energy Efficiency (AAEE) + AB802 Efficiency),[20] the CPUC's storage requirements, and the continued deployment of rooftop solar under the net energy metering tariff. The CPUC's demand-side assumptions were largely based on the CEC 2016 IEPR Mid Case demand forecast.

- Default Scenario (52 $MMTCO_2e$): Reflected the impact of existing policies and baseline resources, including the 50 percent RPS, but without a binding constraint on GHG emissions by 2030. This scenario was designed to represent the electricity sector constrained by the 50 percent RPS, with the existing policy trajectory maintained.[21]
- 42 $MMTCO_2e$ Scenario: Reflected the midpoint of electricity sector emissions in the Scoping Plan and represented an increase in momentum from current policies, including achieving between 53–57 percent RPS-eligible resources by 2030. This scenario was shown to be roughly on the straight-line path from 2018 toward achieving the State's 2050 goal of 80 percent reductions in GHG emissions below 1990 levels.[22]
- 30 $MMTCO_2e$ Scenario: Reflected electricity sector emissions in the Scoping Plan using additional measures to achieve the statewide GHG emissions goal. In this scenario, the electricity sector contributed a larger share of emission reductions. The results of the CPUC's 30 $MMTCO_2e$ scenario suggested that additional electricity sector investments beyond those included in the 2017 Scoping Plan Update would be needed to achieve the State's economy-wide GHG reduction goals. The CPUC determined that at this time a 30 $MMTCO_2e$

[18] CPUC Proposed Reference System Plan (September 2017). Retrieved from: http://cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/ElectPowerProcurementGeneration/irp/AttachmentA.CPUC_IRP_Proposed_Ref_System_Plan_2017_09_18.pdf
[19] The 2017 Climate Change Scoping Plan Update: The Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target (January 2017). Retrieved from: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf
[20] CEC 2016 Integrated Energy Policy Report. Retrieved from: http://www.energy.ca.gov/2016_energypolicy/
[21] CPUC Decision (D.) 18-02-018 Retrieved from: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K771/209771632.PDF
[22] *Id.*

planning target would represent too high a cost burden for the electric sector relative to other sectors of the economy.[23]

Based on this analysis, the CPUC recommended a single point GHG planning target of 42 $MMTCO_2e$ by 2030 for the electricity sector as it represented an increase in momentum relative to current policies and was not so burdensome as to discourage electrification of transportation and natural gas end uses that would benefit the state as a whole.[24] Additionally, the CPUC adopted an optimal system-wide electric resource portfolio, or "Reference System Portfolio," that meets the single point 42 $MMTCO_2e$ GHG planning target and provides planning direction for its jurisdictional load-serving entities. The CPUC point target recommendation is within the 2017 Scoping Plan Update electricity sector range. While a point target can be useful for implementation purposes, the range construct, described below in section 5, is CARB's preferred approach to establishing the GHG planning target in order to provide flexibility and reflect uncertainty of electricity load and supply in 2030.

CEC recommended that CARB establish the electricity sector planning target, and that CARB apportion the electricity sector planning target among POUs using estimated future GHG emissions for the year 2030 for each of these entities from information developed for CARB's Cap-and-Trade Program 2021-2030 Allowance Allocation to Electrical Distribution Utilities (EDUs).[25] The GHG range for the electricity sector from the 2017 Scoping Plan Update was discussed as an option in a draft CEC staff proposal,[26] at joint agency public workshops, [27] and is included in CEC's recommendations to CARB in Appendix B.

Individual POU and LSE Target Recommendations

For establishing individual POU and LSE planning targets, both CEC and CPUC recommended a process that apportions the electricity sector planning target to POUs and CPUC jurisdictional LSEs based on estimated GHG emissions for the year 2030 from information developed for CARB Cap-and-Trade Program 2021-2030 Allowance

[23] *Id.* Finding of Fact 5

[24] Note that due to differences in how CARB and the CPUC account for GHG emissions from combined heat and power facilities sited at industrial facilities, the CPUC estimates the single point 42 MMT GHG planning target equates to approximately 46 MMT under the Scoping Plan Update.

[25] EDUs are defined in the Cap-and-Trade Regulation as entities that own and/or operate an electrical distribution system and include POUs, IOUs and cooperatives. See 2021-2030 EDU Allocation Spreadsheet (April 2017) for the estimated future GHG emissions by EDU. Retrieved from: https://www.arb.ca.gov/regact/2016/capandtrade16/attach10.xlsx

[26] CEC Draft Staff Paper: Proposed Guideline Topics for Publicly Owned Utilities' Integrated Resource Plans, February 2017. Http://docketpublic.energy.ca.gov/publicdocuments/17-IEPR-07/TN216093_20170217T143155_DRAFT_STAFF_PAPER_Proposed_Guideline_Topics_for_Publicly_Owned.pdf

[27] See Joint Agency Workshop on 2030 Greenhouse Gas Emission Reduction Targets for Integrated Resource Planning, February 23, 2017; Workshop to Discuss SB 350 Integrated Resource Plans, March 2, 2018

Allocation to EDUs.[28] For POUs, the CEC recommended that the electricity sector planning target be scaled by each POU's share of total 2030 GHG emissions across all EDUs. CPUC recommended two options for LSEs to demonstrate compliance with the single point 42 $MMTCO_2e$ GHG planning target for the electricity sector: 1) through use of the GHG Planning Price of $150 per $MTCO_2e$ in 2030,[29] which is an output of RESOLVE, or 2) a mass-based, LSE-specific GHG benchmark based on estimated emissions for the year 2030 from information developed for the CARB Cap-and-Trade Program 2021-2030 Allowance Allocation to EDUs. The LSE-specific GHG Benchmarks, proposed by CPUC, include a further proportional division among the host-EDU (Investor Owned Utilities) and non-EDUs within the host-EDU's territory (Community Choice Aggregators and Electric Service Providers)[30] based on their projected 2030 load shares. As described below in Section 6, CARB's proposed approach to establishing LSE and POU GHG planning target ranges reflects both CEC's proposed apportionment methodology and CPUC's benchmarking approach, and results in a range that encompasses CPUC's recommended point estimate.

Public Engagement

Since December 2015, CARB staff has coordinated with CEC and CPUC per SB 350, and has engaged with a wide range of public stakeholders to establish the GHG planning targets. CARB, CEC, and CPUC workshops were made available via webcast, and a web-based comment system was established to provide stakeholders with a medium to publicly communicate their comments to CARB, CEC, and CPUC staff on an ongoing basis.

On December 14, 2015, CARB held a public workshop to kick-off the process of implementing the SB 350 mandates for the electricity sector. Throughout 2015, 2016, and 2017, CARB hosted more than 15 public workshops as part of the 2017 Scoping Plan Update process, including the August 23, 2016 Scoping Plan workshop on the GHG emissions in the electricity sector.

In developing the 2017 Scoping Plan Update, CARB staff maintained a multi-year engagement with the Environmental Justice Advisory Committee (Committee). Starting in July 2016, the Committee, a Legislatively created advisory body, convened almost 20 community meetings throughout California to discuss the 2017 Scoping Plan Update, in

[28] The use of the projected emissions developed in support of the 2021-2030 Allowance Allocation to EDUs as a basis to set GHG planning targets is for IRP planning purposes only and does not affect EDU compliance obligations or allowance allocation within the Cap-and-Trade Program.
[29] The CPUC's GHG Planning Price is distinct from Cap-and-Trade allowance prices. The GHG Planning Price was developed by CPUC to reflect the expected amount LSEs should be willing to pay for marginal GHG emissions reductions in order to meet CPUC's 42 MMT GHG Planning Target in IRPs, and is a tool to guide LSE procurement and planning, not a compliance instrument.
[30] CCAs are governmental entities formed by cities and counties as authorized under PU Code Section 366 to procure electricity for their residents, businesses, and municipal facilities within the service territory of IOUs. ESPs are non-utility entities authorized under PU Code Section 394 that offer direct access electric service to customers within the service territory of IOUs. IOUs provide transmission and distribution service for both CCAs and ESPs.

addition to 20 meetings of its own to provide recommendations. CARB staff coordinated with staff from local government agencies and sister State agencies to contribute insights to the community engagement process. At the community meetings, staff from State and local agencies participated in extensive, topic-specific "world café" discussions with local groups and individuals, including on the electricity sector. The extensive dialogue between the Committee, State agencies, and local agencies provided community residents the opportunity to share concerns and provide input on ways California can meet its 2030 GHG target while addressing a number of environmental and equity issues. For the energy sector, the Committee provided the following key recommendations:

- Developing aggressive energy goals toward 100 percent renewable energy by 2030, including a vision for a clean energy economy, and prioritizing actions in disadvantaged communities
- Setting goals for green buildings
- Enforcing GHG reduction targets for existing buildings, and providing upgrades that enable buildings to use renewable energy technologies and water capture
- Prioritizing and supporting community-owned technologies, such as community-owned solar, for environmental justice communities

On February 23, 2017, CARB participated in the joint agency workshop on 2030 GHG reduction targets for IRP with CEC and CPUC, and on April 17, 2017 CARB presented at the CEC-organized workshop on potential methodologies to establish POU GHG planning targets for IRP. On March 2, 2018, CARB hosted a joint agency workshop with CEC and CPUC to discuss GHG planning targets and the GHG planning target setting process and requested written comments from stakeholders.

In addition to these efforts, CEC and CPUC organized workshops with their respective stakeholders to gather additional input on GHG planning targets and the broader IRP process. CEC has held numerous workshops and webinars since 2016 to obtain stakeholder feedback on IRP, including February and April 2017 joint agency workshops on GHG planning targets.[31] Likewise, CPUC has engaged with stakeholders in a variety of ways since 2016, including through eight public workshops; 13 webinars on modeling, scenario development, and other technical aspects of IRP; 11 staff proposals and other work products; and review of public comments from over 50 parties.[32] On February 13, 2018, CPUC adopted the process and requirements for LSEs to file IRPs.[21] CPUC and CEC submitted their recommendations on the GHG planning targets, which can be found in Appendices A and B, to CARB on March 27, 2018 and April 12, 2018 respectively.

[31] CEC Workshops and Meetings, Integrated Resource Plans. Retrieved from: http://www.energy.ca.gov/sb350/IRPs/documents/
[32] CPUC IRP Events and Materials. Retrieved from: http://www.cpuc.ca.gov/General.aspx?id=6442451195

On April 27, 2018, CARB released the "Draft Staff Report: Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets" (Draft Staff Report) containing proposed GHG planning targets for the electricity sector, and each applicable LSE and POU. An accompanying Draft Environmental Assessment was also released for 45-day public review starting on April 27, 2018, and ending on June 11, 2018. CARB hosted a public workshop on April 30, 2018 on the draft GHG planning targets, which provided an additional opportunity to engage with the public on setting electricity sector, LSE, and POU GHG planning targets.

Staff evaluated public comments and updated the Staff Report to improve clarity, add detail, and utilize comparable and consistent, publicly available data. Some of the public comments recommended specific technologies or approaches to reduce electricity sector GHG emissions, methodologies to estimate future GHG emissions, and additional data. While these comments were deemed out of scope for establishing GHG planning targets, entities filing IRPs may choose to review and to consider these concepts when developing their IRPs.

Section 5: Proposed GHG Planning Target Range for the Electricity Sector

Pursuant to Board Resolution 17-46, CARB staff is using the 2017 Scoping Plan Update to inform the GHG planning targets pursuant to SB 350. The 2017 Scoping Plan Update identifies an achievable and cost-effective path to reduce GHG emissions in achieving the 2030 GHG target. As described in Section 4, the 2017 Scoping Plan Update used PATHWAYS to model different GHG emissions scenarios that achieve the 2030 GHG target, while recognizing the integrated relationships of the industrial, economic and energy sectors.[16]

The 2017 Scoping Plan Update includes a range of GHG emissions by sector in 2030 as shown in Table 1.[33] The sector ranges in Table 1 include the electricity sector range, and these ranges may change in response to how the sectors respond to the Cap-and-Trade Program. The 2030 electricity sector range from the Scoping Plan forms the basis for the GHG planning target ranges.

[33] The low end of the sector range is the estimated emissions from the Scoping Plan Scenario, and the high end adjusts the expected emissions by a risk factor that represents sector under-performance – with two exceptions. The electric power range is represented on the high end by the Scoping Plan Scenario and, on the low end, by enhancements and additional electricity sector measures such as deployment of additional renewable power, greater behind-the-meter solar PV and additional energy efficiency. High GWP GHG emissions are anticipated to increase by 2030. As such, the high end of the sector range is the estimated emissions from the Scoping Plan Scenario and the low end adjusts the expected emissions by a risk factor that represents sector over-performance.

Table 1 – Estimated 2030 GHG Emissions by Sector ($MMTCO_2e$)[3]

	1990	2030 Scoping Plan Ranges	% change from 1990
Agriculture	26	24–25	-8 to -4
Residential and Commercial	44	38–40	-14 to -9
Electric Power	108	30–53	-72 to -51
High GWP	3	8–11	267 to 367
Industrial	98	83–90	-15 to -8
Recycling and Waste	7	8–9	14 to 29
Transportation (Including TCU)	152	103–111	-32 to -27
Natural Working Lands Net Sink	-7	TBD	TBD
Sub Total	431	294–339	-32 to -21
Cap-and-Trade Program	n/a	34–79	n/a
Total	431	260	-40

The electricity sector contribution shown in Table 1 will vary depending on the degree of transportation electrification and building energy demand, the degree of energy efficiency demand reduction, and the degree of electrification in the industrial sector, among other factors. The Scoping Plan scenario represents existing programs or actions required by statute (see Figure 5) and results in electricity sector GHG emissions of 53 $MMTCO_2e$ (excluding any additional contribution from the electricity sector associated with the Cap-and-Trade Program). An alternative scenario developed as part of the 2017 Scoping Plan Update includes additional energy efficiency gains, additional ZEVs, and an increase in the RPS, among other measures, that result in electricity sector GHG emissions as low as 30 $MMTCO_2e$.[34]

Uncertainty is inherent in forecasting future emissions. Modeled scenarios incorporate expectations that existing programs continue in their current form and drivers of GHG emissions, such as energy demand, population growth, and economic growth, match modeled projections. It is unlikely that the future will precisely match projections, and use of the modeled range of electricity sector GHG emissions, versus a point estimate, captures some of this uncertainty. Plans for the future electricity sector will reflect similar uncertainties. CARB anticipates IRPs will be based on best available assumptions about current and future projections for electricity demand (e.g., IEPR[35]).

CARB's proposed GHG planning target range for the electricity sector is a range of 30 $MMTCO_2e$ to 53 $MMTCO_2e$. This translates to a GHG decrease in the electricity sector of 55 MMTCO2e to 78 MMTCO2e from 1990 levels by 2030, or 51 to 72 percent below 1990 levels.

[34] For a summary of assumptions, see Appendix D, PATHWAYS from the 2017 Scoping Plan Update. Retrieved from: https://www.arb.ca.gov/cc/scopingplan/2030sp_appd_pathways_final.pdf
[35] For this cycle of IRP, the "2017 Integrated Energy Policy Report" is the most recently adopted IEPR. Retrieved from: http://www.energy.ca.gov/2017_energypolicy/

Alternatives Evaluated

In developing the proposed electricity sector GHG planning target range, CARB evaluated and considered alternative electricity sector ranges and setting an electricity sector point planning target. The specific alternatives evaluated included:

- 30 $MMTCO_2e$ to 42 $MMTCO_2e$ GHG planning target range. This range reflects increased action beyond existing statutes or other requirements, such as greater deployment of renewable energy and increased energy efficiency, or potentially new responses and innovative technologies developed by POUs and LSEs.
- 42 $MMTCO_2e$ to 53 $MMTCO_2e$ GHG planning target range. This reflects some increased action beyond existing statutes or other requirements, such as greater deployment of renewable energy and increased energy efficiency, or potentially new responses and innovative technologies developed by POUs and LSEs.
- 65 $MMTCO_2e$ GHG planning target point. This point target equates to 40 percent below the 1990 levels of electricity sector GHG emissions, which were 108 $MMTCO_2e$ in 1990.

LSEs and POUs each cover different regions of the state and these regions can vary greatly in terms of climate, population, future load growth, and access to transmission.[36,37] These factors may impact the ability of some LSEs and POUs to cost-effectively achieve GHG reductions at the lower end of the range. Technological advancements and progress of greater than expected renewable deployment would lend itself to support a lower GHG planning target range of 30 $MMTCO_2e$ to 42 $MMTCO_2e$ for a subset of the POUs and LSEs, but not all. In addition to technological feasibility, our evaluations also considered cost effectiveness, as the State is attempting to achieve GHG reductions across all sectors with the least cost impact to the economy and households. As described in Section 4, CPUC's IRP modeling results estimated higher costs for meeting 30 $MMTCO_2e$, at this time.[38] CPUC also found that the load-serving entities could meet their share of a 42 $MMTCO_2e$ target in a cost-effective manner.[39] Based on these factors, CARB determined that a more ambitious and

[36] *See,* City of Pasadena Comments on the March 2, 2018 Joint Agency Workshop on SB 350 Integrated Resource Plans, p. 2: Available at: https://www.arb.ca.gov/lists/com-attach/9-carbsb350irp-ws-AXFWJwNyAw8CZwhn.pdf
[37] *See*, California Independent System Operator, 2017-2018 Transmission Plan, March 22, 2018 p.53. Available at: http://www.caiso.com/Documents/BoardApproved-2017-2018_Transmission_Plan.pdf
[38] Attachment A: *CPUC Energy Division Proposed Reference System Plan* from Administrative Law Judge's Ruling Seeking Comment on Proposed Reference System Plan and Related Commission Policy Actions, September 19, 2017, p.65. Retrieved from: http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M195/K910/195910807.PDF
[39] California Public Utilities Commission Decision (D.) 18-02-018, Finding of Fact 4.

narrower range of 30 $MMTCO_2e$ to 42 $MMTCO_2e$ may not be achievable for all POUs and LSEs due to cost-effectiveness and other unique regional factors.[40]

However, a narrower, higher range of 42 $MMTCO_2e$ to 53 $MMTCO_2e$ may not be sufficiently broad to signal and enable deeper reductions possible for some LSEs and POUs. Deployment of additional renewable power beyond the SB 350 mandate of 50 percent RPS is likely feasible from a technological perspective, based on the largest three IOUs' aggregated forecast that they will meet the 50 percent RPS requirement ten years early, by 2020.[41] Some POUs are also planning for renewable procurement goals that go beyond the RPS level, indicating that additional GHG emissions reductions are possible.[42] As indicated above, CPUC modeling results estimated that for LSEs, 42 $MMTCO_2e$ is likely achievable in a cost-effective manner. In addition, CPUC found that approximately 51 $MMTCO_2e$ is not aggressive enough for LSEs and that the electric sector could do more to reduce GHGs without creating undue cost burdens.[21] An electric sector GHG planning target range that is limited to the upper half of the proposed range will likely result in fewer or less aggressive GHG reduction options and may limit the measures considered and technologies explored to achieve GHG reductions. In addition, the narrow upper range may not accommodate the POUs and LSEs planning for greater GHG reductions.

CARB also evaluated a 65 $MMTCO_2e$ point planning target in 2030. This is higher than the estimated electricity sector GHG emissions in 2030 under business-as-usual conditions (62 $MMTCO_2e$)[43] and equates to less than a 41 percent RPS in 2030, which is inconsistent with the 50 percent RPS mandate in SB 350. Planning for an increase in GHG emissions in the electricity sector is in opposition to achieving the SB 32 mandated economy-wide GHG emissions reductions of 40 percent below 1990 levels by 2030 and other State mandates. With the potential for increased load due to greater electrification and load shift from transportation and other sectors in 2030, it is important to explore electricity generation options such that increased demand does not equate to increased GHG emissions. This concern is reduced as the electricity sector is further decarbonized over the next 15 to 30 years. In addition, a point target does not accommodate for uncertainty inherent in future load and supply projections or LSE- and POU-specific constraints, noted above.

CARB's proposed GHG planning target for the electricity sector is a range of 30 $MMTCO_2e$ to 53 $MMTCO_2e$. This range is sufficiently ambitious on the low end to

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[40] *See,* Turlock Irrigation District Comments on March 2, 2018 Workshop to Discuss SB 350 Integrated Resource Plans, p.2. Available at: https://www.arb.ca.gov/lists/com-attach/10-carbsb350irp-ws-UWBWaFdmAmIHMwU2.pdf

[41] CPUC Renewables Portfolio Standard Annual Report, November 2017. Retrieved from: http://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Utilities_and_Industries/Energy/Reports_and_White_Papers/Nov%202017%20-%20RPS%20Annual%20Report.pdf

[42] *See,* SMUD Comments on the March 2, 2018 Joint Agency Workshop on SB 350 Integrated Resource Plans, p. 2: Available at: https://www.arb.ca.gov/lists/com-attach/5-carbsb350irp-ws-BmoFZgRiBAgANAIy.pdf

[43] 2017 Scoping Plan Update Reference Scenario

support those POUs and LSEs planning for greater reductions, avoids planning for increases in GHG emissions in the sector, and is consistent with other State mandates. It should also enable POUs and LSEs to evaluate and balance GHG emission reductions with other objectives, including ratepayer impacts, reliability, and local needs. As this range would result in a 51 to 72 percent reduction in the electricity sector's GHG emissions relative to 1990 levels, while recognizing the spectrum of unique factors across different LSEs and POUs, staff believes this range is appropriate to support the flexibility needed to establish initial realistic and achievable IRPs that also take into consideration of ratepayer impacts. Experiences gained during development and implementation of the first IRPs will help inform future efforts to revise the sector and LSE and POU planning ranges.

Section 6: Proposed GHG Planning Target Ranges for POUs and LSEs

Under SB 350, CARB must establish GHG planning targets for individual POUs and LSEs. Staff proposes to utilize the information developed for CARB's Cap-and-Trade Program 2021-2030 Allowance Allocation to EDUs[44] as the basis of apportionment for POUs and IOUs. The information in the EDU Allocation Spreadsheet[45] includes estimated future GHG emissions for each of these entities. These estimates provide a transparent basis for calculating the relative proportion of GHG emissions in 2030 associated with individual POUs and IOUs. The methodology to allocate allowances to EDUs, including the data in the EDU Allocation Spreadsheet, was developed through a multi-year public process. It was adopted by the Board in July 2017 and became effective October 1, 2017.[46]

CARB allocates allowances to EDUs on behalf of electricity ratepayers to ensure that ratepayers do not experience sudden increases in their electricity bills associated with the Cap-and-Trade Regulation.[47] In order to allocate these allowances, the Cap-and-Trade Program developed a methodology to estimate the cost burden to electricity

[44] Attachment C: 2021-2030 Allowance Allocation to Electrical Distribution Utilities. Retrieved from: https://www.arb.ca.gov/regact/2016/capandtrade16/attachc.pdf.
[45] 2021-2030 EDU Allocation Spreadsheet: Retrieved from: https://www.arb.ca.gov/regact/2016/capandtrade16/attach10.xlsx. Note EDU-specific GHG emissions are listed on tabs for each EDU; EDU-specific GHG emissions include the industrial source electricity demand in the spreadsheet. Industrial source electricity demand is excluded for EDU allowance allocation purposes.
[46] Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms (October 2017) Retrieved from: https://www.arb.ca.gov/cc/capandtrade/capandtrade/unofficial_ct_100217.pdf, https://www.arb.ca.gov/regact/2016/capandtrade16/ctfinro.pdf and Attachment C, 2021–2030 Allocation to Electrical Distribution Utilities (December 2016) https://www.arb.ca.gov/regact/2016/capandtrade16/attachc.pdf
[47] The Regulation stipulates that EDUs must use the value associated with these allowances for the benefit of retail ratepayers of each EDU, consistent with the goals of AB 32.

ratepayers of compliance with the Cap-and-Trade Program. The cost burden is based on estimates of future GHG emissions associated with their loads and related costs that utilities are likely to face due to compliance with the Cap-and-Trade Program.

The EDU Allocation Spreadsheet utilizes 2015 EDU-specific electricity demand and supply forecasts submitted to CEC.[48] These forecasts were the most recent, publicly available projections of load and EDU resources at the time the EDU Allocation Spreadsheet was developed. Resource-specific emissions factors were applied to the forecast electricity supply to estimate GHG emissions for each EDU in the years 2021 through 2030. Resulting EDU-specific GHG emissions were reviewed through the multi-year public process prior to the Board adoption of the allocation methodology and provide a robust basis for estimating the relative proportion of future GHG emissions by EDU. Staff proposes to use the 2030 GHG emissions estimates from the EDU Allocation Spreadsheet to apportion the electricity sector GHG planning target range among the POUs and IOUs.

More recent projections of future electricity demand and expected resource supply are now available. Because updating inputs for one utility impacts planning targets for all utilities, new data must be carefully considered. EDU-specific GHG emissions estimates associated with updated electricity demand and supply projections have not gone through CARB's public review process. Therefore, it would be premature to incorporate these changes at this time. In addition, as some utilities have begun to make resource commitments to achieve GHG reductions, updating the inputs could reduce the GHG planning target ranges for these utilities. Establishing a common baseline for the GHG planning targets utilizing the 2030 emissions projections from the Board-adopted EDU allocation methodology ensures early action is not penalized while providing a clear basis for the initial GHG planning targets. In recognition of the inherent uncertainty and ongoing improvements in projecting future load growth, staff proposes to establish GHG planning target ranges. Each entity is expected to reflect the most recent load projections in its IRP and evaluate the resource supply options to meet its multiple needs. In doing so, Staff expects the resulting IRPs to consider and evaluate whether and how future load growth will impact future resource needs and the ability to meet the GHG planning targets. GHG planning targets will be updated periodically.

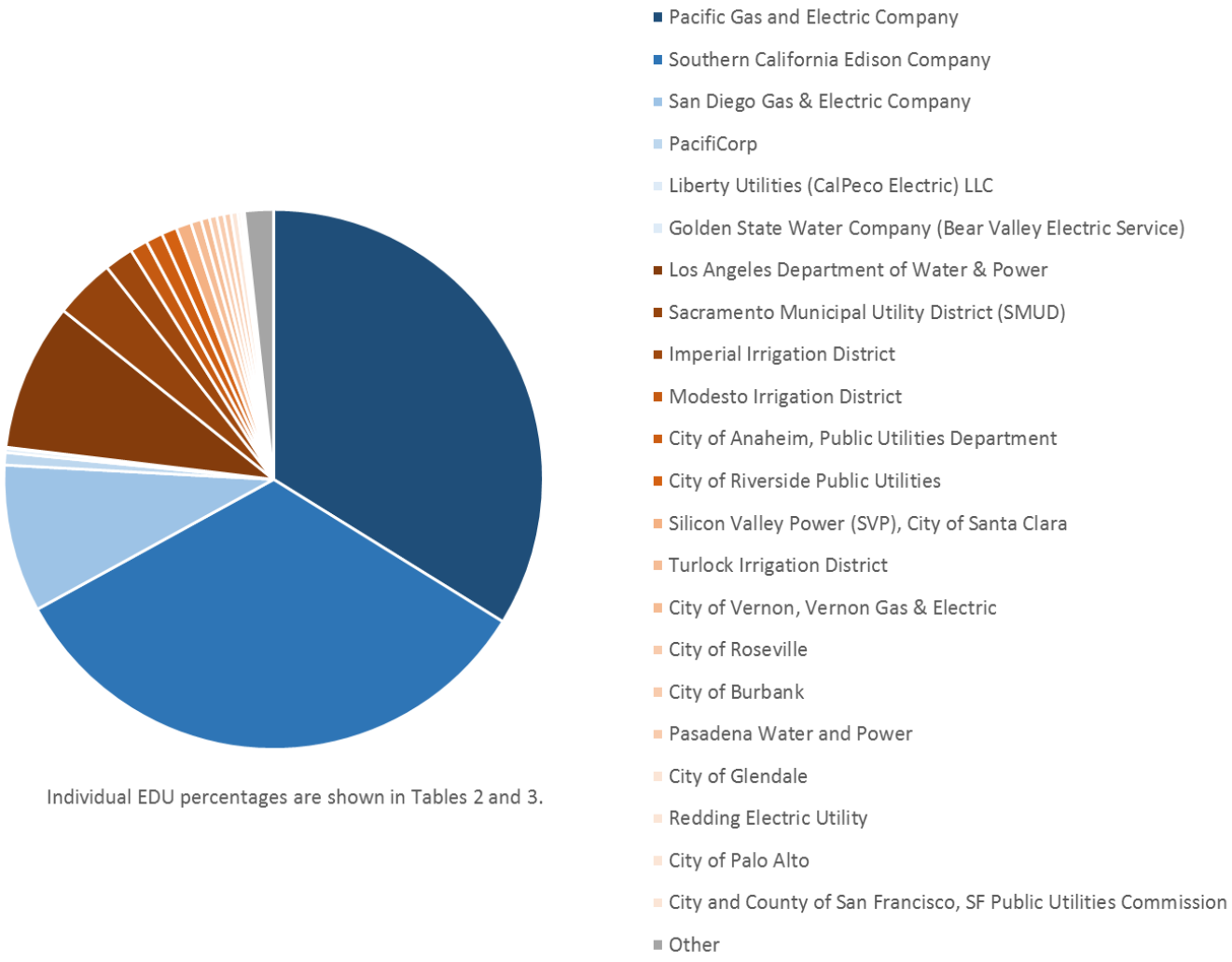
The use of the 2030 GHG emissions estimates from the EDU Allocation Spreadsheet as a basis to set GHG planning target ranges is for IRP planning purposes only and does not affect EDU compliance obligations or allowance allocation within the Cap-and-Trade Program.

Staff proposes to utilize the percentage of 2030 GHG emissions associated with each EDU from the EDU Allocation Spreadsheet in order to apportion the electricity sector GHG planning target range to individual POUs and IOUs. Since IRPs should reflect

[48] 2015 Integrated Energy Policy Report. Retrieved from: http://www.energy.ca.gov/2015_energypolicy/

total electricity demand, the estimated 2030 GHG emissions for the electricity use of covered industrial sources are included in the corresponding EDU proportions of 2030 GHG emissions.[49] Figure 6 shows the proportion of 2030 electricity sector GHG emissions associated with EDUs, the majority of which are required to prepare IRPs under SB 350. The percentage of 2030 electricity sector GHG emissions by EDU is listed in Tables 2 and 3.

Figure 6 – Proportion of 2030 Electricity Sector GHG Emissions by EDU



Source: California Air Resources Board, 2018

Of the 54 EDUs that receive freely allocated allowances in the Cap-and-Trade Program, six EDUs representing 76.9 percent of the 2030 electricity sector GHG emissions report to the CPUC (blue) and 16 EDUs representing 21.4 percent of the electricity sector GHG emissions report to the CEC (brown). There are 32 EDUs representing 1.7

[49] Some EDUs detailed electricity demand and emissions projections have been redacted due to the confidential nature of the electricity demand for some industrial sources.

percent of the 2030 electricity sector GHG emissions that fall under the three-year average annual threshold of 700 gigawatt hours (grey) and are not required to prepare IRPs. Of these, four are cooperatives that report to the CPUC (0.07 percent of the 2030 electricity sector GHG emissions).

This differentiation among entities is relevant for determining which entities have an IRP filing requirement and thus require a GHG planning target, in addition to categorizing entities by LSE and POU classifications pursuant to the requirements of SB 350. The percentages attributed to each EDU are relevant for purposes of establishing each entity's GHG planning target range, as discussed in subsequent sections.

Proposed GHG Planning Target Ranges for POUs

The 2030 GHG emissions percentage associated with each of the 16 POUs that are required to submit IRPs to the CEC is multiplied by the electricity sector GHG planning target range, 30 $MMTCO_2e$ (low) to 53 $MMTCO_2e$ (high). Table 2 lists each POU, the associated proportion of the 2030 electricity sector GHG emissions, and the corresponding 2030 GHG planning target range. The GHG planning target ranges for POUs are consistent with the CEC recommendations in Appendix B.

Table 2 – Proposed GHG Planning Target Ranges for POUs

Publicly Owned Utility	Percentage of 2030 Electricity Sector Emissions*	2030 GHG Planning Target Range, 30-53 MMTCO2e**	
		Low ($MTCO_2e$)	High ($MTCO_2e$)
City of Burbank	0.430%	129,000	228,000
City of San Francisco	0.041%	12,000	22,000
City of Anaheim	1.015%	305,000	538,000
City of Palo Alto	0.174%	52,000	92,000
City of Pasadena	0.426%	128,000	226,000
City of Riverside	0.918%	275,000	487,000
City of Vernon	0.497%	149,000	263,000
City of Glendale	0.396%	119,000	210,000
Imperial Irrigation District	1.745%	524,000	925,000
Los Angeles Department of Water & Power	8.851%	2,655,000	4,691,000
Modesto Irrigation District	1.055%	317,000	559,000
City of Redding	0.191%	57,000	101,000
City of Roseville	0.452%	136,000	240,000
Silicon Valley Power	0.915%	275,000	485,000
Sacramento Municipal Utility District	3.621%	1,086,000	1,919,000
Turlock Irrigation District	0.629%	189,000	333,000

* Percentage of 2030 Electric Sector Emissions are rounded to the nearest thousandth.

** Emission targets for each utility are rounded to the nearest 1,000 $MTCO_2e$.

Proposed GHG Planning Target Ranges for LSEs

A growing number of LSEs are required to submit IRPs to CPUC, particularly as new Community Choice Aggregators (CCAs) are forming. CCAs and Electricity Service Providers (ESPs) serve load but are not EDUs.[30] Each of these entities is located in or can be associated with a host-EDU's (IOU) territory. In order to develop GHG planning target ranges for these LSEs, the GHG planning target ranges associated with the host-EDU are apportioned to the host-EDU and any CCAs or aggregated ESPs operating in the host-EDU territory. The apportionment is equivalent to the projected 2030 electricity demand of the LSE relative to the host-EDU. For most LSEs, the projected 2030

demand for IRP planning purposes is equivalent to what was reported in the adopted 2017 IEPR demand forecasts.[50]

For example, Sonoma Clean Power (SCP) is a CCA operating within the territory of host-EDU, Pacific Gas and Electric Company (PG&E). Based on the EDU Allocation Spreadsheet, PG&E is associated with 33.8 percent of projected 2030 GHG emissions. The 2017 IEPR forecast estimates that SCP will provide 3.1 percent of the electricity demand associated with PG&E. Therefore, the 2030 GHG emissions proportion associated with SCP is 33.8 percent * 3.1 percent or 1.1 percent of the electricity sector GHG planning target range.

Some LSEs, however, were not reflected in the 2017 IEPR demand forecast due to their very recent formation. Because those LSEs are expected to file IRPs with the CPUC in 2018, they were requested by an administrative law judge ruling to file a motion providing their annual demand forecasts until 2030, so that their load would be accounted for and their GHG planning targets could be estimated.[51] Furthermore, all LSEs were permitted the option to file a motion in the CPUC IRP proceeding to modify their 2030 demand forecasts for IRP planning purposes, in case the LSE's internal demand forecast had materially changed since the adoption of the 2017 IEPR. A total of eight CCAs (five of which are new) were assigned forecasts by the CPUC that differ from the 2017 IEPR, in addition to three IOUs whose forecasts were changed as a result of the load departure to CCAs.[52] The apportionment formula described above has been applied to each of these LSE's forecasts as well.

The 2030 GHG emissions percentage associated with each of the LSEs that are required to submit IRPs to the CPUC is multiplied by the electricity sector GHG planning target range, 30 $MMTCO_2e$ to 53 $MMTCO_2e$. Table 3 lists each LSE, the associated proportion of the 2030 GHG emissions, and the corresponding 2030 GHG planning target range. In addition, Table 3 includes the host-EDU proportion of the estimated 2030 GHG emissions and the proportion of 2030 electricity demand for the EDU and

[50] 2017 Integrated Energy Policy Report, Form 1.1c California Energy Demand Forecast 2018 - 2030, Mid Demand Baseline Case, Mid AAEE and AAPV Savings. Retrieved from: http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-03/TN222582_20180216T094947_LSE_and_BA_Tables_Mid_Baseline_Demand_Mid_AAEEAAPV_Revised_CCA.xlsx

[51] Administrative Law Judge's Ruling Seeking Comment on Greenhouse Gas Emissions Accounting Methods And Addressing Updated Greenhouse Gas Benchmarks, available at: http://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=212646820

[52] New or amended load forecasts were assigned to the following LSEs: Clean Power San Francisco, Desert Community Energy, King City, Los Angeles Community Choice Energy, Marin Clean Energy, Rancho Mirage Energy Authority, San Jacinto Power, Pacific Gas and Electric, San Diego Gas & Electric, Solana Beach, and Southern California Edison Company. See http://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=216500593.

CCAs or ESPs operating in the host-EDU territory.[53] The GHG planning target ranges for LSEs are consistent with the CPUC recommendations in Appendix A.

[53] Each ESP is provided one aggregate GHG planning target range for all load served statewide; see Table 4 for individual ESP GHG planning target ranges.

Table 3 – Proposed GHG Planning Target Ranges for LSEs

Electric Distribution Utility	Load Serving Entity	Host-EDU percentage of 2030 Electricity Sector GHG Emissions*	Percentage of 2030 Host-EDU Electricity Demand*	Percentage of 2030 Electricity Sector GHG Emissions*	2030 GHG Planning Target Range, 30-53 $MMTCO_2e$**	
					Low ($MTCO_2e$)	High ($MTCO_2e$)
Pacific Gas and Electric Company	Pacific Gas and Electric Company	33.837%	42.725%	14.457%	4,337,000	7,662,000
	Aggregated Electricity Service Providers		11.898%	4.026%	1,208,000	2,134,000
	Marin Clean Energy CCA		8.490%	2.873%	862,000	1,523,000
	Sonoma Clean Power CCA		3.133%	1.060%	318,000	562,000
	Clean Power San Francisco Clean CCA		4.658%	1.576%	473,000	835,000
	Peninsula Clean Energy Authority CCA		4.473%	1.514%	454,000	802,000
	Silicon Valley Clean Energy CCA		4.364%	1.477%	443,000	783,000
	Redwood Coast Energy Authority CCA		0.779%	0.264%	79,000	140,000
	Pioneer Community Energy CCA		1.344%	0.455%	137,000	241,000
	Monterrey Bay Community Power Authority CCA		4.163%	1.409%	423,000	747,000
	East Bay Community Energy CCA		7.668%	2.595%	779,000	1,375,000
	Valley Clean Energy Alliance CCA		0.907%	0.307%	92,000	163,000
	San Jose City CCA		5.349%	1.810%	543,000	959,000
	King City Community Power CCA		0.050%	0.017%	5,000	9,000
Southern California Edison Company	Southern California Edison Company	33.171%	67.450%	22.374%	6,712,000	11,858,000
	Aggregated Electricity Service Providers		14.603%	4.844%	1,453,000	2,567,000
	Lancaster Energy Clean CCA		0.731%	0.242%	73,000	128,000
	Apple Valley Choice Energy CCA		0.252%	0.084%	25,000	45,000
	Pico Rivera Innovative Municipal Energy CCA		0.088%	0.029%	9,000	15,000
	Los Angeles Community Choice Energy CCA		14.302%	4.744%	1,423,000	2,514,000
	Desert Community Energy CCA		1.920%	0.637%	191,000	338,000
	Rancho Mirage Energy Authority CCA		0.410%	0.136%	41,000	72,000
	San Jacinto Power CCA		0.240%	0.080%	24,000	42,000
San Diego Gas & Electric Company	San Diego Gas and Electric Company	8.843%	79.660%	7.044%	2,113,000	3,733,000
	Aggregated Electricity Service Providers		19.921%	1.762%	529,000	934,000
	City of Solana Beach CCA		0.420%	0.037%	11,000	20,000
PacifiCorp	PacifiCorp	0.746%	100.000%	0.746%	224,000	395,000
Liberty Utilities (CalPeco Electric) LLC	Liberty Utilities (CalPeco Electric) LLC	0.255%	100.000%	0.255%	77,000	135,000
Golden State Water Company (Bear Valley Electric Service)	Golden State Water Company (Bear Valley Electric Service)	0.059%	100.000%	0.059%	18,000	31,000

* Host-EDU percentage of 2030 GHG Emissions, Percentage of 2030 Host-EDU Electricity Demand and Percentage of 2030 Electric Sector Emissions are rounded to the nearest thousandth.

** Emission targets for each utility are rounded to the nearest 1,000 $MTCO_2e$.

ESPs serve customers in areas served by PG&E, Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E). Table 3 lists the aggregated GHG planning target ranges for ESPs by each of the three host-EDUs, which is estimated using the same approach as for other LSEs. Each individual ESP GHG planning target range is established by apportioning the aggregated ESP GHG planning target range by the proportion of each ESP's total retail sales. Due to a lack of long-term forecast information for all ESPs, CARB proposes to utilize a three-year historical average for each ESP's retail sales from 2014-2016.[54] Table 4 lists each ESP and its associated GHG planning target range.

[54] Retail sales data is based on CEC Energy Consumption Data Management System (ECDMS), form CEC-1306B. Disclosure of this information on a statewide aggregated LSE basis and as an average over a multi-year period is in conformance with California Code of Regulations, Title 20, Sec. 2507, subd. (e)(1)(A)1., which states that data for an LSE that is not a UDC can be released if aggregated at the statewide level by year and by major customer sector. For entities that did not report via ECDMS (Tiger Natural Gas and Commercial Energy), averaged annual retail sales from CEC Power Source Disclosure (PSD) reports for 2014-2016 was used. Where three-years of data was not available (Agera Energy, EDF Industrial Power Services and UC Regents), the most recent data from the year's 2014-2016 was used. Where no ECDMS or PSD data was available, a de minimis target was set (American Powernet).

Table 4 – Proposed GHG Planning Target Ranges for ESPs

Electricity Service Providers	2030 GHG Planning Target Range, 30-53 MMTCO$_2$e	
	Low (MTCO$_2$e)	High (MTCO$_2$e)
3 Phases Renewables, Inc.	44,000	77,000
Agera Energy, LLC	9,000	15,000
American Powernet Management, LP	1,000	2,000
Calpine Energy Solutions, LLC	907,000	1,603,000
Champion Energy Services,LLC	115,000	204,000
Commercial Energy Of California	11,000	19,000
Constellation Newenergy, Inc.	707,000	1,249,000
Direct Energy Business	598,000	1,056,000
EDF Industrial Power Services (Ca), LLC	64,000	113,000
Just Energy Solutions Inc.	50,000	89,000
Liberty Power Delaware LLC	Not serving load as of June 2018	
Palmco Power Ca	Not serving load as of June 2018	
Pilot Power Group, Inc.	202,000	356,000
Praxair Plainfield, Inc.	Not serving load as of June 2018	
Shell Energy	447,000	789,000
Tenaska Power Services Co.	Not serving load as of June 2018	
The Regents of the University of California	35,000	61,000
Tiger Natural Gas, Inc.	1,000	2,000
Yep Energy , Y.E.P	Not serving load as of June 2018	

Note: Table values may not add to the aggregated GHG planning target ranges for ESPs by each of the three host-EDUs due to rounding.

Implementation of GHG Planning Target Ranges in IRPs

For implementation purposes, POUs and LSEs may choose to utilize a point planning target that falls within its specific GHG planning target range. This includes the use of a GHG Planning Price or a mass-based or LSE-specific GHG Benchmark, as recommended by the CPUC and described in Section 4, above.

Section 7: Proposed Process for Future GHG Planning Target Ranges

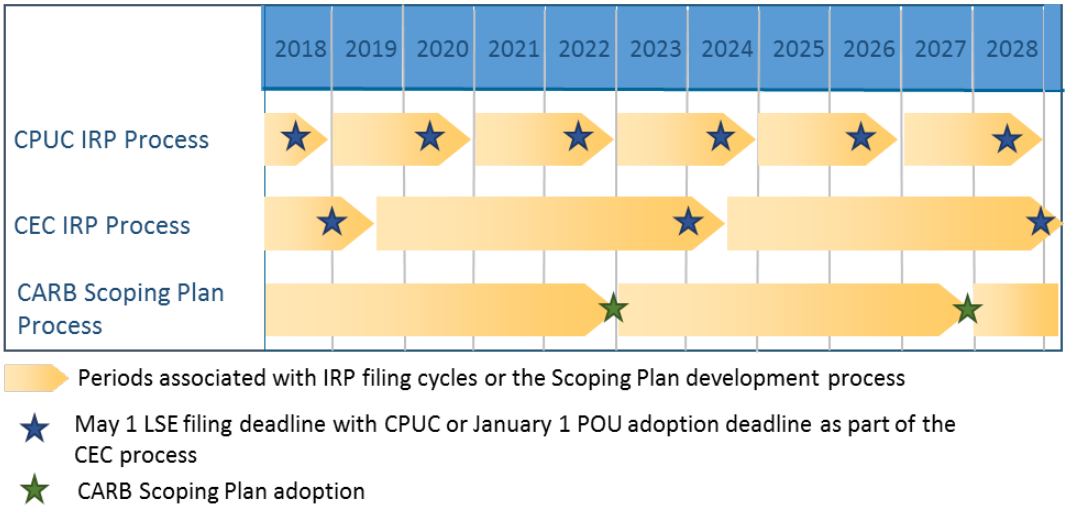
Scoping Plan and IRP Processes

CARB proposes to update the GHG planning target ranges for the electricity sector in coordination with updates to the Scoping Plan, which occurs at least once every five years. During that process, economy-wide trends and progress towards achieving the State's GHG emissions reduction goals will be evaluated and potential changes to the GHG planning target ranges for the electricity sector, LSEs, and POUs will be considered.

CARB believes the five-year schedule for the updates to the Scoping Plan allow for reasonable alignment with the five-year schedule for POUs to submit their IRPs to CEC. For the LSEs, which are on a two-year planning cycle at CPUC, GHG planning target ranges may be revised in advance of each of the CPUC's two-year IRP planning cycles as needed to accommodate shifts in load share between LSEs and the formation of new entities, as described below. While the schedule below offers a way to align planning processes across the Scoping Plan updates and IRP filing requirements, future legislation could result in changes to when electricity sector planning ranges need to be updated, independently of the Scoping Plan update process.

Figure 7 illustrates the timelines associated with CPUC and CEC IRP processes, and CARB Scoping Plan process, along with the dates for IRP filing or adoption and Scoping Plan completion.[55]

Figure 7 – IRP Filing and Scoping Plan Adoption Timelines



[55] The CPUC filing deadline for 2018 was extended to August 1.

Updates to Reflect New LSE Entrants

CARB recognizes that new CCAs and ESPs may form prior to the planned updates to the GHG planning target ranges. In order to address planning target-setting for these new entities and shifts in load share among the host-EDU LSEs, CARB, in coordination with CPUC, proposes to update the GHG planning target ranges by reapportioning the existing GHG planning targets to the host-EDU, existing LSEs, and new CCAs, consistent with the methodology in section 6, above.[56] Staff proposes that the reapportionment be equivalent to the projected 2030 electricity demand of each CCA and aggregated ESP load by host-EDU relative to the host-EDU as reported in the most recently adopted IEPR demand forecasts or CPUC-adopted demand forecasts, depending on the best available information at that time.[57]

As new ESPs form, CARB, in coordination with CPUC, proposes to reapportion the existing GHG planning target ranges to new and existing ESPs, consistent with the methodology in section 6, above. The reapportionment for the new ESPs shall be equivalent to the new ESPs contracted first-year sales as a proportion of the total existing ESP retail sales based on the most recent three-year historical average for each existing ESP or best available historical data.

Based on the GHG planning target ranges for LSEs that CARB establishes, CPUC may use its inherent regulatory authority to further implement or impose IRP requirements on LSEs. If needed for implementation, a single point within the GHG planning target range for the electricity sector may be identified and used for planning purposes by CPUC for LSEs, or by POUs independently. Any additional CPUC requirements for LSEs must ensure that the overall GHG planning target range for the electricity sector is maintained.

Updates Where the Electricity Sector GHG Planning Target Range is Maintained

CARB proposes the Board delegate authority to CARB Executive Officer to update, in coordination with CEC and CPUC, LSE GHG planning target ranges, so long as the most recent Board-approved GHG planning target range for the electricity sector is maintained, and the process utilizes the methodology adopted to establish LSE GHG planning target ranges. This delegation of authority is necessary given the on-going emergence of new and expanding CCAs and ESPs, with corresponding changes in load-share among LSEs. It is important to note that if one LSE's GHG planning target range increases, this necessarily means that another LSE's GHG planning target range must decrease in order to maintain the Board approved GHG planning target range for the electricity sector. Given that changes to one LSE's GHG planning target can affect

[56] CARB will rely on CPUC's determination related to new CCA formation. This includes, but is not limited to, CPUC approval of CCA implementation plans before IRP filing deadlines (August 1 of 2018, or May 1 of each subsequent even-numbered year).

[57] Due to the rapid emergence of CCAs, there may be CCAs that do not yet have IEPR forecasts but are required to submit IRPs. In such cases, CARB will rely on the demand forecasts approved by the CPUC for use in the IRPs.

others, any proposed individual LSE GHG planning target changes will go through a CARB public process in order to provide LSEs, POUs, and the public the opportunity to review and provide comment on proposed changes.

Updates Requiring Modification to the Electricity Sector GHG Planning Target Range

In the event of materially changed circumstances that renders the Board approved electricity sector planning target range redundant, for example due to new legislation, CARB, in coordination with CEC and CPUC, shall revise and propose for Board approval a GHG planning target range for the electricity sector in advance of a Scoping Plan update. This will likely also require revising and seeking Board approval of the POU and LSE planning targets, which will be done through a public process.

Measuring Progress

The IRP process is intended to guide energy planning and procurement decisions, such that LSEs and POUs are able to serve ratepayers, maintain reliability, and are on track to help the State achieve GHG emissions reductions consistent with California's 2030 climate goals, among other state mandates. CARB is supportive of, and will continue to coordinate with, CPUC and CEC efforts to implement IRPs.

IRPs are distinct from other statewide initiatives that are focused on reducing or reporting GHG emissions, including the Cap-and-Trade Program, the Mandatory Reporting Regulation, the Statewide GHG Inventory Program, RPS, or the Power Source Disclosure Program. Table 5 includes a summary of the purpose and point of assessment of these programs and the time periods associated with measuring the progress of each program.

Table 5 – Description of GHG-related Programs

Program	Purpose	Time Period
Integrated Resource Plans (SB 350)	Planning process to guide energy procurement decisions. Objectives include: reliability, achieving 50 percent RPS, energy efficiency, promoting transportation electrification, advancing clean energy access in disadvantaged communities, and planning to meet GHG emissions targets.	IRPs and GHG planning targets for the year 2030
Cap-and-Trade Program	Economy-wide market-based regulation that reduces GHGs from multiple sources. Cap-and-Trade establishes a cumulative statewide limit on GHG emissions through 2030. Compliance obligation is assessed for covered entities, including in-state electricity generation facilities and electricity importers, based on verified GHG emissions from each facility.	Cap on GHG emissions through 2030. Compliance events occur annually and are based on reported emissions of prior 2-3 years.
Mandatory Reporting Regulation	The mechanism to report and verify annual GHG emissions by facility and importer.	Historical; on previous calendar year.
California GHG Emissions Inventory	GHG Inventory tracks progress toward and compliance with the climate goals, includes verified emissions from MRR.	Historical; on previous calendar year.
Renewables Portfolio Standard[a]	Objective of RPS is to increase procurement of eligible renewable energy sources for electricity serving retail customers.	Historical, three-year compliance period.
Power Source Disclosure (AB 1110)	Disclose fuel mix and emission intensity associated with electricity used to by each utility to serve its retail customers.	Historical; annual reporting on previous calendar year

[a] Certain resources may be RPS-eligible but actually GHG-emitting. Other GHG-free resources may not be RPS-eligible.

IRPs are inherently forward-looking, requiring estimates of electricity demand, resource supply, and GHG emissions through 2030. The other initiatives listed in Table 5 require measurements or reporting of past activities. The extent to which estimated GHG emissions in 2030 in each entity's IRP provide reasonable approximations of the GHG emissions that will be measured, verified, and reported in 2030 aids decision-making and increases the likelihood that the State's GHG emission targets will be achieved.

IRPs from all reporting entities, when viewed together, will be a valuable resource to assess the likelihood of meeting the State's GHG emissions targets. The extent to which IRPs include common assumptions and methodologies can increase transparency of that assessment and aid decision-making. In addition, IRPs should utilize each LSE's and POU's best available information regarding characteristics of the 2030 electricity sector. CARB encourages POUs, to the extent feasible, to consider adopting relevant assumptions and methodologies similar to those adopted by the CPUC when incorporating GHG planning targets in IRPs. This will provide greater transparency about how the future electricity sector will contribute to meeting the GHG

planning target ranges and the State's overall GHG emissions goals. It will also facilitate comparison of plans across the entire electricity sector to identify barriers or impediments to achieving the GHG planning target ranges as well as potential solutions.

The electricity sector will play an increasingly prominent role in the State's transition to a low-carbon economy. IRPs provide a mechanism for the electricity sector to proactively plan for this transformation.