

STATE GOAL IS SET:

Carbon Neutrality by 2045

DECARBONIZED CALIFORNIA: A BOLD VISION

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In September 2018, Governor Brown issued [Executive Order \(EO\) B-55-18](#), which established a new statewide goal to achieve carbon neutrality by 2045. Additionally, [Senate Bill \(SB\) 100](#), the 100 Percent Clean Energy Act of 2018, was signed into law. The enactment of SB 100 marked a major commitment by the state to fully decarbonize electricity generated by publicly and privately owned utilities by 2045. Together, these actions create both the opportunity to advance statewide sustainability and the challenge of how to account for the goals in planning and environmental analysis. This paper discusses implications of these carbon neutrality policies for state and local agencies preparing greenhouse gas (GHG) analyses that support climate action planning and California Environmental Quality Act (CEQA) compliance.

STATEWIDE GHG TARGETS

EO B-55-18 directs state agencies to update plans and policies to meet the carbon neutrality goal. This policy complements existing statewide GHG targets, such as in [EO S-3-05](#), which set a long-term goal to achieve a GHG target of 80 percent below 1990 levels by 2050, and [SB 32 \(Statutes of 2016\)](#), which set the statutory goal of 40 percent below 1990 levels by 2030. EO B-55-18 is the first California executive order or legislative action to set a goal of carbon neutrality and the first to explicitly mention the use of carbon sequestration to achieve GHG reduction targets.

California's evolution of GHG emission reduction targets is momentous. The International Panel on Climate Change (IPCC) [Special Report: Global Warming of 1.5 °C](#) suggests that global temperatures are likely to increase by 1.5°C by 2030 based on recent trends, elevating the urgency from previous estimations. IPCC concluded that a net zero emission future is needed to limit global temperature increases to 1.5°C. The State of California is not the only major government to undertake this challenge; [Sweden](#) has committed to a carbon-neutral goal by 2045 and the [European Union](#) recently adopted a goal of becoming carbon neutral by 2050.

Figure 1 shows California's statewide GHG emissions between 1990 and 2050. The orange line depicts historic GHG emissions inventories based on the California Air Resources Board's (CARB's) annual statewide GHG inventory, as well as legislatively mandated GHG reduction targets (i.e., Assembly Bill [AB] 32, Statutes of 2006 [1990 levels by 2020] and SB 32 [40 percent below 1990 levels by 2030]). The dotted lines show the projected pathways for long-term GHG reduction. The green dotted line represents the pathway to achieve carbon neutrality by 2045, as established by EO B-55-18. The purple dotted line represents the pathway to 80 percent below 1990 emission levels by 2050, as set by EO S-3-05. The gray wedge in Figure 1 shows the difference in GHG emission reductions between the pathways to meet the two goals, which would be approximately 140 million metric tons of carbon dioxide equivalent [MMTCO₂e] in 2045.

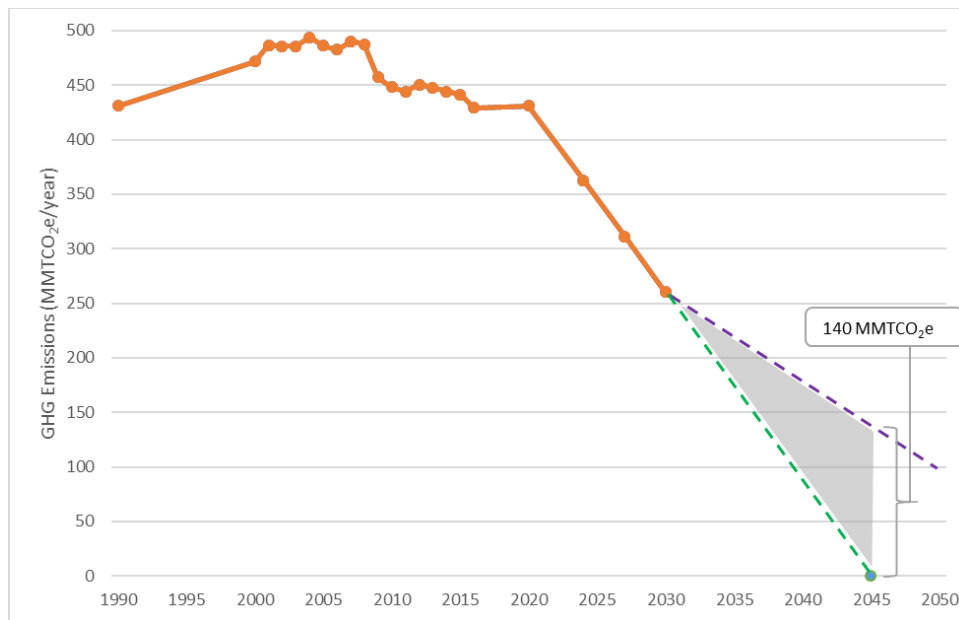


Figure 1. California's Greenhouse Gas Emissions Targets

Source: Ascent Environmental

ACHIEVING CARBON NEUTRALITY

Attainment of statewide carbon neutrality requires GHG reductions in every emissions sector combined with carbon sequestration. IPCC's Special Report: Global Warming of 1.5°C defines carbon neutrality as net zero carbon dioxide (CO₂) emissions, which are "achieved when anthropogenic CO₂ emissions are balanced globally by anthropogenic CO₂ removals over a specified period." A definition of carbon neutrality has not yet been adopted by policymakers, but EO B-55-18 directs CARB and other state agencies to update future Scoping Plans to reflect the new goal.

The Role of the Electricity Sector in Decarbonization

Decarbonization of statewide electricity generation over the next 25 years will play an important role in achieving carbon neutrality. Electricity generation, including both in-state production and imported sources, accounted for 16 percent of [California's statewide GHG emissions](#) in 2016. These GHG emissions were the result of power plants using natural gas and coal to produce [40 percent](#)

[of the electricity](#) supplied throughout the state. The 2016 figure indicates a decline from previous years when the combined share of natural gas and coal supplying statewide electricity was 61, 57, and 43 percent in 2001, 2006, and 2011, respectively. Contributors to the reduced share of fossil fuels include a phaseout of coal-fired power plants and rapid growth in renewable energy deployment driven by utilities complying with the California's Renewables Portfolio Standard (RPS).

The RPS was initially signed into law in 2002 and required utilities to incorporate renewable energy into the sources used for producing electricity for retail customers. The policy is designed to reduce emissions from the state's electricity sector by replacing carbon-intensive fuel sources with solar, wind, geothermal, small-scale hydropower, biogas, and other eligible technologies. The passage of SB 100 accelerates the pace for utilities to meet increasingly stringent targets for renewable generation under the RPS. SB 100 requires utility providers to procure 50 percent of their electricity from eligible renewable sources by 2026 and 60 percent by 2030, as depicted in Figure 2. With [statewide demand for electricity](#) projected to increase as much as 1.6 percent annually through 2030, accelerating RPS requirements to 60 percent by that year is an important step in reducing the GHG emissions from increased demand. SB 100 also goes beyond the scope of previous RPS-related legislation with a new requirement that an additional 40 percent of total retail sales of electricity in California come from either eligible renewable or "zero-carbon" sources by 2045, resulting in the state's retail electricity supply coming entirely from renewable and zero-carbon sources. Sources considered to be "[zero-carbon](#)" include large-scale hydropower and the renewable sources that already qualify for the RPS.

SB 100 is not the first state policy to require totally decarbonized electricity generation, nor is it likely to be the last. In 2015 Hawaii passed legislation mandating 100 percent renewable energy for electricity by 2045. Recently, officials in [Washington](#), [New York](#), and the [District of Columbia](#) have proposed similar policies for the decarbonization of electricity generation by 2045.

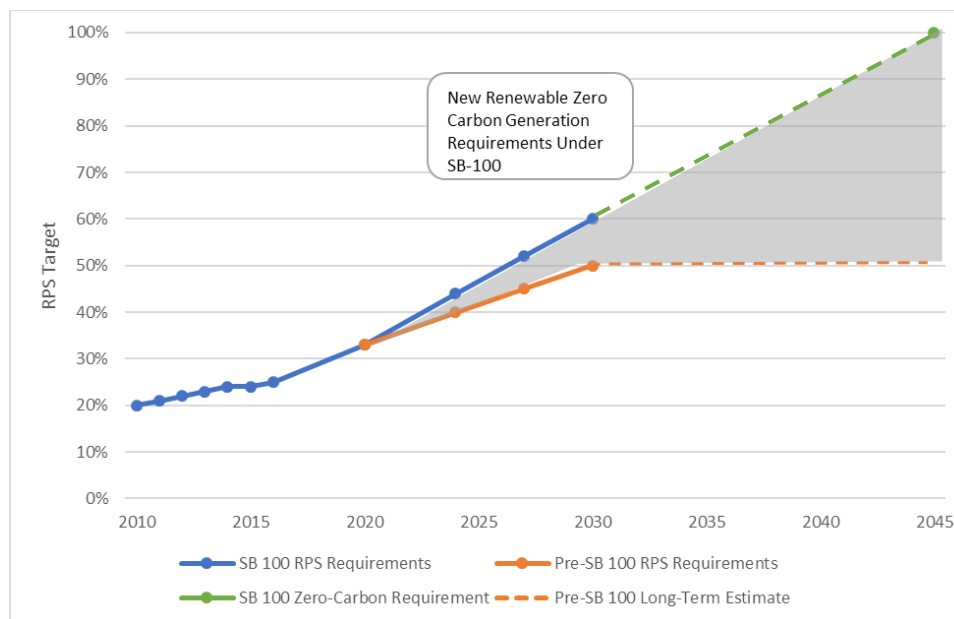


Figure 2. Previous Renewables Portfolio Standard and SB 100 Revisions

Source: Ascent Environmental

The Role of Buildings

Not only is it imperative that electricity generation becomes entirely renewable or zero carbon, energy consumption patterns in buildings must also change to achieve statewide carbon neutrality goals. This pattern change will entail improved energy efficiency strategies for new and existing buildings to reduce overall energy consumption, as well as new programs to switch fuel sources to those with lower carbon intensities, such as electricity or renewable natural gas. Electrification of buildings involves substituting gas-consuming equipment (e.g., water heaters, furnaces, stoves, ovens) with high-efficiency electric versions. Additionally, GHG reductions can be achieved by using electricity derived from on-site renewable energy systems, such as rooftop solar, in place of fossil fuels, supported by on-site energy storage technology. Another alternative is to use grid-sourced electricity generated with higher proportions of renewable energy, as described in the previous section. In buildings where full electrification is [infeasible](#) due to the demand for high-temperature processing (e.g., manufacturing facilities), renewable natural gas derived from the decomposition of organic waste could also be used to reduce carbon intensities.

Existing buildings play an important role in decarbonization strategies, as GHG emissions from [residential and commercial buildings](#) accounted for 24 percent of the statewide emissions in 2016. SB 1477 and AB 3232, both Statutes of 2018, direct state agencies to develop programs supporting the decarbonization of new and existing buildings and assess the potential for reducing GHG emissions from the state's building stock by 40 percent below 1990 levels by 2030, aligning with the 2030 GHG target pursuant to SB 32.

Though decarbonization of buildings is becoming an important GHG reduction strategy, increased demand for electricity in buildings means that energy efficiency and renewable energy still play important roles in reducing total energy consumption. Energy efficiency in new buildings is being addressed through updated energy code requirements. The California Energy Code (California Code of Regulations Title 24, Part 6) establishes energy efficiency standards for residential and nonresidential buildings and is updated every three years. The 2019 California Energy Code (which takes effect January 1, 2020) is designed to move the state closer to its net zero energy goals for new residential construction. It does so by requiring most new residences to install enough renewable energy to offset all the electricity needs of each residential unit (California Code of Regulations, Title 24, Part 6, Section 150.1[c]14). Energy efficiency in existing buildings is being addressed by [SB 350](#), the Clean Energy and Pollution Reduction Act of 2015, which requires utilities to double energy efficiency savings in electricity and natural gas for retail customers by 2030.

The combination of energy efficiency, distributed renewables, and decarbonization of new and existing buildings is placing the state on a trajectory toward reducing the contribution of buildings to statewide GHG emissions.

The Role of Transportation

The largest GHG emission sector statewide (and locally in many jurisdictions) is transportation, accounting for 41 percent of the state [GHG emissions inventory in 2016](#). To date, the state has taken several steps to reduce transportation-related emissions, including adopting requirements for:

- ▲ Reducing petroleum use by 45 percent by 2030;
- ▲ Deploying 5 million zero-emission vehicles (ZEVs) by 2030;
- ▲ Reducing the carbon intensity of transportation fuels by 20 percent below 2010 levels by 2030 through the Low Carbon Fuel Standard; and
- ▲ Improving the freight system's efficiency by 25 percent by 2030.

These goals align with SB 32's GHG emission targets for 2030, but do not yet adequately extend planned reductions to meet the 2045 goal. If the state achieves all legislatively adopted transportation goals, GHG emissions associated with the transportation sector would still be 103 to 111 MMTCO₂e in 2030. Meeting carbon neutrality goals will require accelerating attainment of these goals in conjunction with local actions to incentivize ZEV adoption, improve transit, and reduce overall vehicle miles traveled (VMT).

The Role of Carbon Sequestration

Carbon sequestration will need to play a major role in attaining carbon neutrality. In the near term, a large potential source of sequestration is the natural and working lands sector, which consists of forests, farmland, rangeland, grasslands, wetlands, and soils that absorb CO₂ from the atmosphere. Sequestration would be achieved by enhancing Earth's natural processes of reducing CO₂ through measures aimed at land conservation, ecological restoration, forestry management, and coastal restoration. The 2019 draft of the [California 2030 Natural and Working Lands Climate Change Implementation Plan](#) outlines proposed strategies for sequestering 15 to 20 MMTCO₂e by 2030. By comparison, the gap between current executive order goals and statutory GHG emissions reduction goals for achievement of carbon neutrality is 140 MMTCO₂e in 2045. Meeting the carbon neutrality goal will require scaling up the strategies in the natural and working lands sector for higher volumes of sequestration, accelerating achievement of the GHG reduction goal for 2050 set in EO S-3-05, or a combination of both. Carbon capture and storage technologies may also complement emissions reductions from the natural and working lands sector as a sequestration strategy, but development of this technology is in its infancy with very high costs per ton of CO₂ captured.

ASCENT'S RECOMMENDATIONS

Recent executive policies and state legislation have important implications for state and local agencies conducting GHG analyses pursuant to CEQA or preparing new or updated climate action plans (CAPs) to reduce carbon emissions. The carbon intensity of electricity production is often used to determine the current and anticipated GHG emissions of proposed development projects

and land use plans. An acceleration of the use of renewable and zero-carbon energy sources by utilities under SB 100 will help pursue mid- and long-term GHG targets by reducing the projected GHG emissions associated with electricity consumption in buildings and transportation, as well as other activities that require electricity (e.g., water pumps, landscaping equipment).

Electrification of Buildings and Transportation

Under SB 100, electrification of buildings and transportation may become an attractive long-term strategy for GHG reduction because a larger portion of grid-sourced electricity will come from renewable and zero-carbon sources. Although energy efficiency and mandatory solar requirements can reduce the GHG emissions from buildings, electrification can provide a complementary pathway by reducing fossil fuel consumption in buildings.

Implementation of Guidance by the Supreme Court

Beyond agency planning and legislation, court rulings also influence the consideration of long-term GHG reduction targets. In the 2017 decision [*Cleveland National Forest Foundation v. San Diego Association of Governments \(SANDAG\)*](#), the California Supreme Court's assessment of an environmental impact report (EIR) for the San Diego region's Sustainable Communities Strategy (SCS) determined that while the EIR need not use consistency with the explicit EO target as a threshold of significance, it must include analysis that reflects "the pace and magnitude of reduction efforts that the scientific community believes necessary to stabilize the climate..." and provide information of "important value to policymakers and citizens in considering the emissions impacts." In the SANDAG SCS and in other recent plans, the 2050 statewide GHG reduction target has been included in the regulatory settings of CEQA documents to express a long-range goal.

With the Governor's issuance of EO B-55-18 and the California Supreme Court's affirmation that planning agencies "must ensure that CEQA analysis stays in step with evolving scientific knowledge and state regulatory schemes," Ascent recommends that the regulatory settings in CEQA GHG analyses include a discussion of the statewide carbon neutrality goal, as described in EO B-55-18. Although assessing consistency with an EO is not a mandatory element of CEQA compliance, this information has great value in environmental review. The EO's carbon neutrality goal will be important whenever state authority is involved (because the EO is a directive for state agencies). Long-range GHG analysis results will help all lead agencies assess the potential environmental impacts of GHG emissions in the context of carbon neutrality, which involves "significant reductions in carbon pollution and removal of carbon dioxide from the atmosphere, including sequestration in forests, soils, and other natural landscapes," according to the recitals contained in the EO.

Carbon Sequestration in CAPs

As a source of information for the public, local agencies preparing new or updated CAPs are expected to address how sequestration fits into their carbon management strategies, along with GHG emissions reduction, to meet long-range goals. Where sequestration is included, local agencies will need to prepare CAPs in accordance with state agency-recommended carbon-offset guidance and protocols regarding how to account for carbon sequestration in local GHG inventories.

Local Land Management Policies Supporting Sequestration

Land management policies of local agencies can assist the state in protecting sequestered carbon through planning actions that conserve carbon resources on natural and working lands. Protection of open space, habitat and natural communities conservation, agricultural land preservation, urban forest management, and fire-fuel management strategies in local plans and policies can integrate well with carbon sequestration.

Policies for Energy Efficiency and Renewable Energy Storage

Local agencies can work with energy utilities to improve the success of existing energy efficiency, renewable energy storage strategies, and other decarbonization programs by encouraging increased levels of community participation through education, marketing, technology innovations, and design standards. Some cities and counties have joined efforts with utilities to provide financial incentives for building and vehicle electrification. For example, Sonoma and Napa Counties are working with Pacific Gas & Electric and local community choice energy programs to incentivize the rebuilding of homes destroyed by wildfires as all-electric units. The City of Palo Alto, which operates its own electric utility, is offering rebate programs for heat pump water heaters, electric vehicle (EV) chargers, and other electric appliances and systems.

Electricity-producing utilities throughout the state are currently tasked with [doubling energy efficiency savings by 2030](#), and the required [implementation plans](#) for meeting or exceeding this goal often include coordination with local agencies.

Adoption of Local Reach Codes More Stringent Than State Code

Under state regulations, local agencies can adopt green building ordinances for energy conservation in commercial and residential buildings featuring design standards that exceed state requirements. Public Resources Code Section 25402.1(h)2 and Building Energy Efficiency Standards Section 10-106 establish a process for local adoption of more stringent energy standards. These standards, also known as “reach codes,” have been adopted by many local governments, including for example, the cities of Davis, Santa Monica, Palo Alto, Pasadena, Los Angeles, and San Francisco, where local ordinances exceed 2013 standards. Specific design requirements capable of achieving GHG reductions through energy conservation include high-performance building envelopes, energy-efficient appliances, on-site renewable energy generation, on-site renewable energy storage, and EV charging. Reach codes can also introduce compliance options that deter the use of natural gas and propane in new buildings, particularly residential uses. Alternatives include electric space and water heating, and induction cooking appliances that can replace conventional fossil fuel-powered equipment. These requirements can also be introduced as CEQA mitigation measures and CAP GHG reduction strategies.

Carbon-Efficient Transportation Strategies

To assist the state in achieving GHG reductions from the transportation sector, [local agencies](#) can craft policies that “maximize the integration of electrified rail and transit to improve reliability and travel times, increase active transportation such as walking and bicycling, encourage use of streets for multiple modes of transportation, improve freight efficiency and infrastructure development, and shift demand to low carbon modes,” as noted in the CARB 2017 *Scoping Plan*. CARB anticipates

that most of the GHG reductions from this sector can be achieved from technology and low-carbon fuels, but local agencies play an important role in reducing VMT. Crafting a policy would be timely because the requirement for analyzing VMT in CEQA review, pursuant to SB 743, becomes mandatory in 2020.

Supply and Accessibility of EV Charging Stations

Local planning actions that increase the supply and accessibility of EV charging stations can also contribute to GHG reductions by [accelerating the market adoption](#) of ZEVs. Increased share of ZEVs for cars, trucks, and fleet vehicles can result in lower GHG emissions associated with VMT. Also, deployment of ZEVs by car-share companies, such as Zipcar's and Gig's rollout of EVs in Sacramento, can reduce travel-generated GHG emissions. These GHG reduction benefits increase over time as the retail electricity used to charge vehicles is decarbonized in compliance with SB 100.

Planning approaches that focus on zero emission modes of transportation, electrification of residential and nonresidential buildings, and land conservation for carbon sequestration purposes will promote the pursuit of statewide carbon neutrality goals. They will also create co-benefits in communities, including energy cost savings, economic opportunity from the conversion to sustainable and zero-carbon energy systems, and more sustainable and equitable communities.

QUESTIONS

If you have questions about California's climate policy and legislation and how to apply GHG emission reductions in environmental analyses or planning, please feel free to contact us.



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