8. Local Policy Opportunity

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Overview

Other chapters in this report present results of technical analysis to determine levels of activity in each of four pathways that are possible and would be needed to reach deep decarbonization goals in the San Diego region. This chapter assesses current commitments in Climate Action Plans (CAP) to determine if additional activity would be needed to put the region on a trajectory to meet these goals and to identify opportunities for local jurisdictions in the region to take further action to support the decarbonization pathways.

To this end, EPIC completed an analysis of the authority of local governments and agencies to act to influence and regulate greenhouse gas (GHG) emissions, based on a summary of key federal, state, and local agencies, and key legislation and regulation at the federal and state levels to help to clarify the ability of local governments to act to reduce GHG emissions; a review of CAPs to determine the frequency of measures, relative GHG impact of decarbonization pathways and measures, and integration of social equity considerations; and a scenario analysis to estimate the total impact of the GHG reduction commitments in all adopted and pending CAPs and the potential GHG impact of a scenario of applying the best adopted CAP commitments to all jurisdictions. We use results of the above analysis and additional research to identify opportunities for further local action and regional collaboration in each of the four decarbonization pathways. Figure 8.1 summarizes the overall project approach.

In general, opportunities exist for additional GHG reductions by increasing the number of jurisdictions adopting an existing measure or policy, making existing measures or policies more aggressive, and implementing policies not previously adopted in the region. Opportunities for regional collaboration can include efforts to support local policy development and implementation and those that are regional in scope that are intended to serve the entire region.

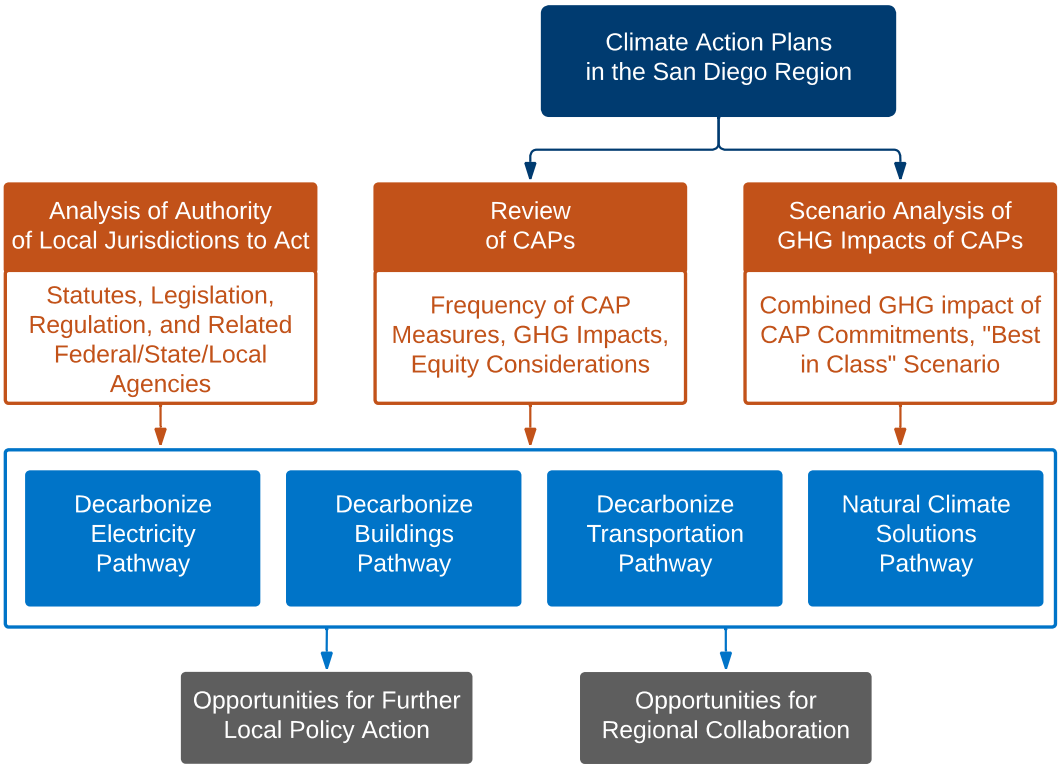

Figure 8.1 Overall Approach to Identifying Local Policy Options

Figure 8.2 illustrates the organizational structure for the analysis and results presented here and indicates the related Regional Decarbonization Framework Technical Report chapter. The three main pillars of decarbonization — focused on buildings, electricity supply, and transportation — represent both the highest emitting sectors and those with the highest potential to reduce GHG emissions. Natural climate solutions, including agriculture, are important and will be included in the analysis but to a lesser extent than the three main pathways. The broad pathways can be further organized into policy categories and subcategories, which allow for a more detailed analysis of policies in CAPs.

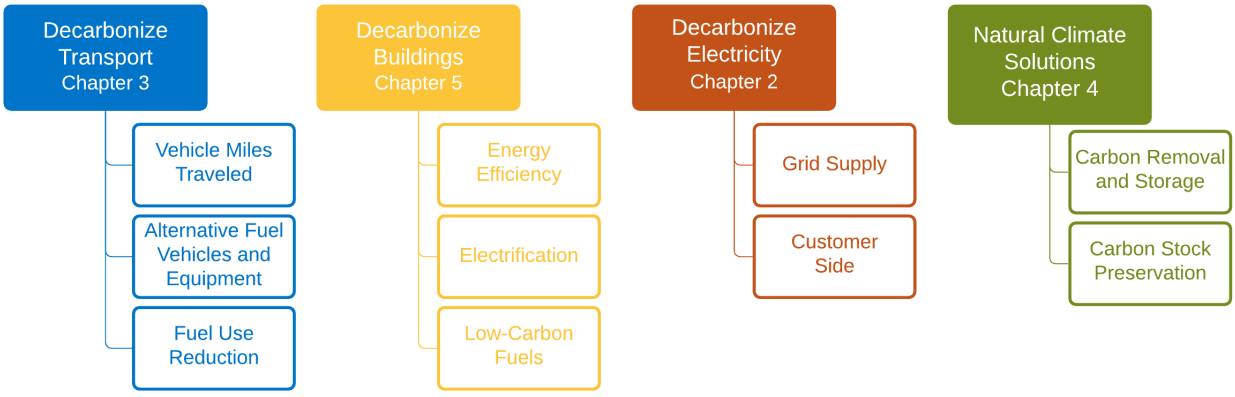

Figure 8.2 Examples of Decarbonization Pathways and Related Policy Categories

Organization of Chapter

Section 8.2 summarizes local jurisdiction authority to act to influence GHG emissions. Summaries related to each decarbonization pathway are provided in those sections. Section 8.3 provides an overview of the results of the review of CAPs, including general information about CAPs, and data on the frequency and GHG impacts of CAP measures related to the four decarbonization pathways. A summary of results from the scenario analysis of GHG impacts is presented in Section 8.4. The next four sections provide a detailed discussion of the four decarbonization pathways, including opportunities for local policies and regional collaboration: Decarbonize Transportation (Section 8.5), Decarbonize Buildings (Section 8.6), Decarbonize the Electricity Supply (Section 8.7), Natural Climate Solutions (Section 8.8). A brief discussion of the limitations of the analysis presented here is provided in Section 8.9. A brief conclusion is provided in Section 8.10.

8.1 Key Findings

Based on our analysis, the following overall key findings emerge. More detailed findings are provided in each section below, including findings from the analysis and opportunities for local action and regional collaboration.

- Local Jurisdictions Have Authority to Influence and Regulate GHG Emissions – Local governments can influence and regulate GHG emissions by accelerating state statutory targets and policies, adopting ordinances to go beyond state law, and using unique authority to adopt and implement policies. Local authority comes from both constitutionally derived police power and delegated authority from state statutes. Constitutionally derived police power grants a broad, elastic authority to act where such action is reasonably related to a legitimate government purpose and has a reasonable tendency to promote public health, safety, or the general welfare of the community. It is limited by general state law and state and federal constitutions. The full extent of a local jurisdiction's police power to regulate GHG emissions is unknown. Delegated authority includes, among other things, analyzing land use environmental impacts and mitigating them, adopting more stringent building codes, building infrastructure, or creating community choice aggregators (CCA) to supply electricity. Key findings related to authority in each decarbonization pathway are presented in more detail in Section 8.2 and the sections on each decarbonization pathway (Sections 8.5 through 8.8). A full discussion of local authority is provided in Appendix B.
- Adopted and Pending CAP Commitments are Insufficient to Reach Decarbonization Goals – Local commitments in adopted CAPs for transportation, electricity, and natural gas GHG reductions contribute a relatively small portion of the total reductions needed to reach net zero GHG emissions in 2035 — about 2 million metric tons CO_2e (MMT CO_2e), which would leave about 12 MMT CO_2e. Including the commitments from the City of San Diego draft CAP 2022 in this analysis would yield GHG reductions of about 5 MMT CO_2e in 2035, leaving about 8.5 MMT CO_2e. Even if the most aggressive CAP measures are applied to all jurisdictions in the region, regardless of whether they have a CAP in place, significant emissions would remain (approximately 7 MMT CO_2e in 2035), mostly from natural gas combustion and on-road transportation. Note remaining emissions from other emissions categories also would have to be addressed. Similarly, including the best CAP commitments from the City of San Diego draft CAP 2022 would reduce the amount of remaining emissions to about 5 MMT CO_2e in 2035. More detail is provided in Section 8.4 and Sections 8.5 through 8.8.
- Opportunities Exist for More Jurisdiction to Adopt and Strengthen Existing CAP Measures – Based on the review of CAPs, there is an opportunity for more jurisdictions to adopt CAP

measures already adopted by some jurisdictions in the region. Similarly, based on the scenario analysis of the combined GHG impacts of CAP measures, there is an opportunity for most jurisdictions to strengthen their existing CAP measures. While many policy examples exist in our region, there also are other examples from around California and the U.S. of policies that have not been included in CAPs in the region. More detail is provided in Section 8.4 and Sections 8.5 through 8.8.

- Additional Policies Would be Needed to Decarbonize Transportation and Buildings – Based on adopted CAP commitments, expected GHG reductions in 2035 from measures to reduce vehicle miles traveled (VMT) and increase use of zero-emissions vehicles (ZEV) are insufficient to achieve the level of GHG emissions reductions — mainly from ZEVs outlined in Chapter 3. Local uptake of ZEVs beyond what is expected from state and regional incentives likely would require more local incentives. Similarly, expected GHG reductions in 2035 from building measures in adopted CAPs are insufficient to meet the goals outlined in Chapter 4. In particular, more measures would be needed to electrify existing buildings. More detail on decarbonizing transportation is provided in Section 8.5 and on decarbonizing buildings in Section 8.6.
- Opportunities Exist for Regional Collaboration in all Decarbonization Pathways – Regional collaboration could include collecting and tracking data, conducting analysis, providing support to develop and implement policies, and convening stakeholder and working groups to develop regional strategies and monitor progress. Examples exist for regional collaboration, including the Accelerate to Zero (A2Z) project to increase use of ZEVs. More detail on opportunities for regional collaboration is provided in Sections 8.5.7, 8.6.6, 8.7.6, and 8.8.6.
- Additional Work Would be Needed to Integrate Social Equity into Climate Planning – Based on a preliminary review, the integration of social equity in adopted and pending CAPs is limited, inconsistent, and lacks specificity. Additional work would be needed to develop the capacity and tools to understand and address the equity implications of all decarbonization policies in the San Diego region, including data collection and analysis; regional guidance documents; and regional working groups to coordinate, advise, track, and monitor how equity is being addressed in climate planning. Additional discussion on social equity is provided in Sections 8.3.5, 8.5.7, 8.6.6, 8.7.6, and 8.8.6.

8.2 Authority of Local Jurisdictions and Agencies to Influence and Regulate GHG Emissions

In general, to reduce GHG emissions, local governments can accelerate state statutory targets and policies, adopt ordinances to go beyond state law, and use unique authority to adopt and implement policies. This section provides a summary of a detailed review (provided in Appendix B). It seeks to answer the following questions related to the ability of local governments and agencies to influence or regulate GHG emissions:

- What constitutional or delegated authority exists for local action, and to what extent is local authority preempted by federal or California law or regulation?
- What state and federal players can influence or regulate GHG emissions (e.g., state regulators like the California Air Resources Board (CARB)), and what are their respective roles relative to local jurisdictions and agencies?
- What key legislation or regulation applies in a given area (e.g., building electrification) that will affect GHG emissions at the local level?

8.2.1 Summary of Findings

Local jurisdiction authority to regulate GHGs is created by broad, general constitutionally derived "police power"[i] or delegated authority under state or federal law. Use of police authority may not conflict with "general" law (e.g., state law) under preemption principles found in California Constitutional Article XI, §7 or federal expressed or implied preemption under the Supremacy Clause of the U.S. Constitution.[ii] State and federal preemption analysis, as well as the analysis on the full extent of local police power to regulate GHG emissions, are factually specific with local jurisdiction authority uncertainty dependent on the type of action.

Police power of a city or county within its own boundaries is as broad as that of the state legislature and subject only to limitations of general law.[iii] Police power "is not a circumscribed prerogative, but is elastic and, in keeping with the growth of knowledge and the belief in the popular mind of the need for its application, capable of expansion to meet existing conditions of modern life and thereby keep pace with the social, economic, moral, and intellectual evolution of the human race."[iv] Its exercise must be both:

a) Reasonably related to a legitimate government purpose[v]; and
b) Have a reasonable tendency to promote the public health, morals, safety, or general welfare of the community.[vi]

Police power is especially well established in enacting and enforcing land use laws. City and county land use authority does not rely on delegated general law of the state or federal government. Instead, state and federal laws are limitations on a city's or county's exercise of its police power.[vii] To this end, local jurisdictions act with both police power and delegated authority from the legislature to establish climate changes policies and regulations to reduce GHGs in general plans (GPs), CAPs, zoning, transit-oriented development regulations, carbon sequestration (including urban forestry), energy conservation actions through green building practices and reach codes, water conservation, and solid waste reduction. Land use authority is subject to the vested rights doctrine[viii] and Subdivision Map Act[ix] that limits how a subsequent change in local law or the authority to impose conditions apply to a particular improvement to land or a vesting tentative map for subdivisions.

Local jurisdiction police power is also subject to state preemption. Examples include the California Energy Commission's authority to site and license thermal power plants of 50 megawatts[x] or more and energy storage resources of 20 MWs or more that discharge for at least two hours or more and will

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[i] Cal. Const. art. XI, § 7.
[ii] U.S. Const. art. VI, § 2.
[iii] *Candid Enters., Inc. v. Grossmont Union High Sch. Dist.*, 39 Cal. 3d 878, 885 (1985); *Birkenfeld v. City of Berkeley*, 17 Cal. 3d 129, 140 (1976); *Carlin v. City of Palm Springs*, 14 Cal. App. 3d 706, 711 (1971).
[iv] *Miller v. Board of Pub. Works*, 195 Cal. 477, 485 (1925).
[v] *Birkenfeld v. City of Berkeley*, 17 Cal. 3d 129, 158 (1976). See *Consolidated Rock Prods. Co. v. City of Los Angeles*, 57 Cal. 2d 515, 522 (1962).
[vi] *Carlin v. City of Palm Springs*, 14 Cal. App. 3d 706, 711 (1971).
[vii] *DeVita v. County of Napa*, 9 Cal. 4th 763, 782 (1995); *Candid Enters., Inc. v. Grossmont Union High Sch. Dist.*, 39 Cal. 3d 878, 885 (1985).
[viii] *Avco Community Developers v. South Coast Reg'l Comm'n*, 17 Cal. 3d 785, 791 (1976), superseded by statute as stated in *Santa Margarita Area Residents Together v. San Luis Obispo County Bd. Of Supervisors*, 84 Cal. App. 4th 221, 229 (2000).
[ix] See Government Code §§ 66410–66499.38; Govt Code § 66474.2 & 66498.1(b).
[x] See Public Resources Code §§ 25500 et seq.; See Public Resources Code §§ 25120 & 25123.

deliver net peak energy by October 31, 2021.[i] It is notable that the Governor may curtail local land use authority over siting and regional air quality regulation of these and other related energy resources, including emergency backup generation, when an emergency declaration is issued for a specified time period.[ii] Such declarations can suspend local and state laws by either establishing exclusive licensing authority that preempts or by expressly suspending air quality laws, the California Environmental Quality Act (CEQA), and the California Coastal Act (CAC). Emergency declarations may also have the effect of limiting judicial review of such licenses.

Local land use authority is generally concurrent to, and not preempted by, air quality authority law and regulation of air pollutants from stationary, nonvehicular sources of emissions. Concurrent authority may allow local jurisdictions to further regulate air quality under its police power.[iii] It should be noted that there is no power granted to local air districts to infringe on an existing local jurisdiction's authority over land use (e.g., zoning).[iv]

Charter cities and counties act with more autonomy over governance decisions than common law cities and counties[v]; however, all local jurisdictions are controlled and subject to general state law. Of the nineteen local governments in the San Diego region, there are eight charter cities[vi], and the County of San Diego is a charter county. Notably, all cities act with a higher level of autonomy than the County because they are voluntarily formed and perform many essential services. Charter cities also act with more autonomy than common law cities under the "home rule" power to govern matters of "municipal affairs."[vii] Charter counties exercise limited home rule authority.[viii] This power allows local laws to expand beyond state law requirements. However, the extent of home rule authority is a legal determination that depends on the specific charter and municipal code of an individual charter jurisdiction, whether the exercised authority is for a municipal affair, and whether the matter is of statewide concern where it is the intent and purpose of the general laws to occupy the field to the exclusion of municipal regulation.[ix] Finally, because counties are the legal subdivision of the state, the state may delegate or rescind any delegated function of the state to a county.

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[i] See California Energy Commission Order No. 21-0908-1 (Adopted September 8, 2021).
[ii] See Governor's July 30, 2021 Proclamation of A State of Emergency to address energy supply and demand issues; See U.S. Const. Amendment X; See California Emergency Services Act: Government Code §§ 8558, 8567, 8571, 8625, & 8627.
[iii] See Health & Safety Code §§ 39002 & 41508.
[iv] See Health & Safety Code §§ 40716(b) & 41015.
[v] See Cal. Const. art. XI; See Government Code § 34871.
[vi] Cities of Carlsbad, Chula Vista, Del Mar, El Cajon, Oceanside, San Diego, San Marcos, and Vista.
[vii] Cal. Const. art. XI, § 5.
[viii] Charter County limited "home rule" authority includes: 1) providing for lection, compensation, terms, removal, and salary of the governing board; 2) for the election or appointment (except the sheriff, district attorney, and assessor who must be elected), compensation, terms, and removal of all county officers; 3) for the powers and duties of all officers; and for consolidation and segregation of county offices. It excludes additional authority over: 1) local regulations; 2) revenue-raising abilities; 3) budgetary decisions; or 4) intergovernmental relations.
[ix] See Cal. Const. art. XI, § 5, subd. (a); See *Jackson v. City of Los Angeles*, 111 Cal. App. 4th 899 (2d Dist. 2003); See *City of Santa Clara v. Von Raesfeld*, 3 Cal. 3d 239 (1970); See *Baron v. City of Los Angeles*, 2 Cal. 3d 535 (1970); *Dairy Belle Farms v. Brock*, 97 Cal. App. 2d 146, 217 P.2d 704 (1st Dist. 1950); See *Wilkes v. City and County of San Francisco*, 44 Cal. App. 2d 393, (1st Dist. 1941); See *People ex rel. Scholler v. City of Long Beach*, 155 Cal. 604 (1909); See *Galli v. Brown*, 110 Cal. App. 2d 764 (1st Dist. 1952); See *Pearson v. Los Angeles County*, 49 Cal. 2d 523 (1957).

Local jurisdictions also act with the authority to tax,[i] issue bonds,[ii] and impose fees, charges, and rates.[iii] This authority is derived from and limited by the California Constitution and statute, including requiring voter approval for taxes and bonds.[iv]

Summary of Findings by Decarbonization Pathway

Table 8.1 summarizes local jurisdiction authority for each decarbonization pathway and policy category. Also, brief summaries of the authority related to the decarbonization pathways are presented in the sections on Decarbonize Transportation (Section 8.5), Decarbonize Buildings (Section 8.6), Decarbonize the Electricity Supply (Section 8.7), and Natural Solutions (Section 8.8). Appendix B contains a more detailed discussion of the underlying research that forms the basis of the summary below and authority summaries found in each pathway section.

Table 8.1 Summary of Authority by Decarbonization Pathway

Decarbonization Pathway	Policy Category	Policy Subcategory
Decarbonize Transportation	VMT Reductions	Limited federal or state preemption. Local jurisdiction police power and delegate authority over land use are primary, with decisions implemented almost exclusively at the local level. Some authority uncertainty exists over regulation of indirect emission from developments.
	Fuel Use Reductions	Limited federal or state preemption. Local jurisdiction police power and delegate authority over land use are primary, with decisions for transportation system efficiencies implemented almost exclusively at the local level.
	Alternative Fuel Vehicles and Equipment	Local jurisdiction authority is clear over infrastructure development and municipal fleet procurement. California currently regulates carbon intensity of fuel with limited opportunity for further local action beyond incenting and accelerating low-carbon fuels and vehicles.
Decarbonize Buildings	Electrification	Clear authority to mandate electrification using delegated authority if statutory requirements are met. Police power may be used but there is uncertainty as to the extent of this power and how to best implement such a requirement.
	Energy Efficiency	Federal and state preemption exists over appliance energy standards. Clear police power and delegated authority to create more stringent building standards if statutory requirements are met. It may be possible to also exercise police power in this regard.
	Low Carbon Fuels	Police authority may allow mandates that require low-carbon fuels for end-uses as well GHG based performance standards and benchmarking for buildings. There is clear authority to procure for public buildings. It may also be possible to regulate GHGs directly or indirectly from buildings.

[i] Cal. Const. art. XIIIC, § 2(a) & (d).
[ii] See generally Municipal Bond Act of 1901 (Government Code §§ 43600–43638) & Government Code §§ 50665.1–50670.
[iii] Cal. Const. art XI, § 7; see also Revenue Bond Act of 1941 (Government Code §§ 54300 et seq., Uniform Standby Charge Procedure Act (Government Code §§ 54984 et seq.); Government Code § 66013; Government Code § 66014; Health & Safety Code § 5471 & 5473; See generally Government Code § 37112.
[iv] See generally Cal. Const. art. XIIIA, XIIIC, & XIIID; See Bradley-Burns Uniform Local Sales and Use Tax Law (Revenue & Tax Code §§ 7200 et seq.).

Decarbonization Pathway	Policy Category	Policy Subcategory
Decarbonize Electricity Supply	Grid Supply	Clear authority to create community choice aggregator (CCA), determine content of electricity for citizens under a CCA, and act to procure low- or zero-carbon generation to ensure reliability. This authority is subject to and limited by state and federal reliability requirements.
	Customer Side Supply	Clear authority to support distributed energy generation through CCA, incentives, CPUC proceedings, and streamlined permitting. Must account for changes in state policy that change the regulation and/or economics for customer side resources across multiple load serving entities.
Natural Climate Solutions	Carbon Removal & Storage	This is an evolving area of state action and law with significant mandates on state land agencies through executive orders. It is complicated by federal, tribal, state, private, and local land ownership, land use authority, and land management agencies. Cooperative agreements amongst these stakeholders are paramount to achieving any regionwide action. Existing local jurisdiction land use authority exists, but additional research and development of what is legally feasible to develop or mandate these types of projects would be needed. Aligning with state planning and funding could be evaluated.
	Carbon Stock Preservation	This is an evolving area of state action and law with significant mandates on state land agencies through executive orders. It is complicated by federal, tribal, state, private, and local land ownership, land use authority, and land management agencies. Cooperative agreements amongst these stakeholders are paramount to achieving any regionwide action. Existing local jurisdiction land use authority exists, but additional research and development of what is legally feasible beyond easements and land conservation, particularly with regard to activities on private land, would be needed. Aligning with state planning and funding could be evaluated.
	Agriculture Methane Reduction	State authority exists for CARB to regulate, but legislation sets January 1, 2024, as the effective date of any regulation. It is unclear whether CARB will enact regulations in 2024, leaving potential opportunity for local jurisdiction action.

8.2.2 Limitations of Review of Authority

The review of authority analyzed federal and state preemption with regards to local jurisdiction police power and delegated authority. It evaluated opportunities for local jurisdictions to act within existing constitutional, legislative, and regulatory frameworks and to identify uncertainty with regard to authority. It was designed to be comprehensive but not exhaustive given the complexity of some of the laws involved and the lack of activities in certain areas such as natural climate solutions. It did not evaluate specific local policies — such as permit approval processes — to find barriers. Additional work would be needed in this area to understand the opportunities and challenges presented by local policies.

8.3 Review of Climate Action Plans in the San Diego Region

CAPs are planning documents that demonstrate how a local jurisdiction can achieve an adopted

emissions target. Cities develop plans for a variety of reasons, including as mitigation for General Plan updates or to act as general, aspirational guidance for city actions. In general, CAPs represent what local jurisdictions have determined to be a reasonable and feasible commitment to reduce GHG emissions at the time of adoption. EPIC reviewed and analyzed measures and supporting actions contained in 17 adopted and pending CAPs to identify current local policy commitments in the San Diego region that support decarbonization pathways.

For this analysis, we determined (1) the frequency and distribution of measures and supporting actions across all 17 CAPs, (2) how much CAP measures and supporting actions contributed to the local GHG reduction in CAPs, and (3) whether and how CAPs integrate social equity considerations.

8.3.1 Summary of Findings

- Nearly half of the CAPs in the region are scheduled to be updated between 2021 and 2025.
- No adopted CAP analyzed has a net zero GHG emissions target. The City of San Diego draft 2022 CAP update, the only pending CAP as of July 2022, has a net zero emissions target by 2035.
- Significant variability exists across CAPs in how much each decarbonization pathway and policy category contributes to the local GHG reduction. For example, the contribution from decarbonizing electricity ranges from 10% to nearly 70% of local GHG reductions. Similarly, decarbonizing transportation ranges from about 7% to 50%, building decarbonization ranges from 0% to 42%, and natural climate solutions range from 0% to 5%.
- All adopted and pending CAPs have measures to approach or achieve 100% carbon-free grid electricity supply before the state deadline of 2045. On average, these measures account for about 42% of local GHG reductions in CAPs; the majority is through a CCA program.
- Based on GHG commitments in CAPs, transportation-related measures account for the next highest contribution to local GHG emissions reductions (30%), with alternative fuel use contributing on average about 16% and VMT reduction on average about 12%.
- On average, GHG reductions in CAPs come disproportionately from decarbonizing electricity even though on-road transportation is the highest emitting GHG emissions category. This is due mostly to the statewide policy to achieve 100% carbon-free electricity in California by 2045 and suggests an opportunity for additional reductions from the Decarbonize Transportation Pathway.
- Opportunities exist across all decarbonization pathways for more local jurisdictions to adopt existing CAP measures.
- CAP measures employ a range of implementation mechanisms, including making capital expenditures and infrastructure investments, typically by local jurisdictions; education, outreach, and collaboration; financial incentives and financing; evaluations of potential programs and policies; plans or programs; and requirements. It is common for local governments to combine approaches.
- In general, social equity considerations in CAPs are limited, inconsistent, and lack specificity. The City of San Diego draft 2022 CAP update has the most comprehensive integration of social equity of any CAP in the San Diego region. CAP updates provide an opportunity to integrate social equity into the entire climate action planning cycle. The SANDAG ReCAP Framework could be expanded to include guidance for integrating equity considerations into CAPs.
- Regional equity indicators could be developed through a regional program and collaboration, with a consistent definition of equity, that regularly reports on climate-related equity topics. A Regional Climate Equity Collaborative or Working Group could educate and advise regional leaders and collect stakeholder input.

8.3.2 Review of CAPs Approach

To analyze CAP measures and supporting actions, EPIC updated its CAP Mitigation Measure Database to reflect the most recently adopted and pending CAPs. CAP measures and supporting actions were categorized using several different characteristics to facilitate analysis in line with the structure of this report, including decarbonization pathways, policy categories and subcategories, and implementation mechanisms. The following sections provide more details on this approach.

CAPs Included in the Analysis

Table 8.2 summarizes which CAPs we included or excluded from the review of CAPs. We evaluated sixteen adopted CAPs or similar plans and one pending. The City of San Diego draft CAP update, which was released for public review in November 2021 and is anticipated to be adopted in Summer 2022, is the only draft CAP pending adoption in the region as of July 2022. We excluded the City of National City because its CAP was adopted in 2011 and had a 2020 emissions target. Further, its methods, data, and measures predate significant development in methods and state guidance. In addition, the City of El Cajon rescinded its CAP in 2020; however, it was replaced with a Sustainability Initiative, which contains measures and actions substantially similar to the CAP and is treated as such in this analysis. Lastly, the County of San Diego's CAP, which was adopted in 2018, has since been invalidated through litigation; however, the County is in the process of revising its CAP and is actively implementing measures included in its 2018 CAP. For this reason, the County is included in the 17 jurisdictions with adopted and pending CAPs out of the 19 jurisdictions in the region.

Note that results from the analysis completed based on the Review of CAPs presented throughout this document, including the frequency of policies and the relative contribution to local GHG emissions, are based on *adopted and pending* CAPs. The Scenario analysis presented in Section 8.4 is based on *adopted CAPs only*. An alternative scenario that includes the GHG impact of the City of San Diego draft 2022 CAP update is included.

Table 8.2 CAPs Included in Local Policy Analysis

Jurisdiction	CAP Status	Included in Analysis
Carlsbad	2020	Y
Chula Vista	2017	Y
Coronado	2022	Y
County of San Diego	In Progress	Y
Del Mar	2016	Y
El Cajon[1]	2020	Y
Encinitas	2020	Y
Escondido	2021	Y
Imperial Beach	2019	Y
La Mesa	2018	Y
Lemon Grove	2020	Y
National City	2011	N
Oceanside	2019	Y
Poway	N/A	N/A
San Diego	Pending	Y
San Marcos	2020	Y
Santee	2020	Y
Solana Beach	2017	Y
Vista	2021	Y

[1] The City of El Cajon has adopted a Sustainability Initiative with measures similar to a Climate Action Plan.

Policy Categories and Subcategories

The decarbonization pathways constitute the main parts of an overall strategy to reduce GHG emissions. These include decarbonize electricity, decarbonize buildings, decarbonize transportation, and natural climate solutions. Policy categories represent the main methods to reduce emissions within a decarbonization pathway. These can be further broken down into policy subcategories, which we derived by reviewing adopted and pending CAPs, to allow for more specificity. This categorization structure provides a framework for this chapter and our analysis of CAP measures.

Table 8.3 shows the categorization used here. In later sections of this chapter, policy subcategories are further subdivided where appropriate and necessary for discussion on additional policy opportunities. For instance, building electrification policy options differ between new construction and the current building stock, and between building types (e.g., residential and non-residential).

Table 8.3 Decarbonization Pathways and CAP Policy Categories

Decarbonization Pathway	CAP Policy Category	CAP Policy Subcategory
Decarbonize Transportation	VMT Reductions	Bike, Walk, & Complete Streets
		Mass Transit
		Parking Reductions
		Commuter TDM
		Smart Growth Development
		Micromobility (excluding bicycles)
	Fuel Use Reductions	Traffic Signal Synchronization
		Traffic Calming Infrastructure
		Vehicle Retirement
		Driver Behavior
	Alternative Fuel Vehicles and Equipment	Electric Vehicles
		Low Carbon Fuel Vehicles
		Hybrid Vehicles
		Preferred Parking
		EV Charging Infrastructure
		Low Carbon Fuel Infrastructure
		Low Carbon Fuel Equipment (Off-Road)
		Electric Equipment (Off-Road)
Decarbonize Buildings	Electrification	Electrify Select End-Uses
		All-Electric
	Energy Efficiency	Audits, Benchmarking, and Disclosure
		Implement Efficiency Improvement(s)
	Low Carbon Fuels	NA
Decarbonize Electricity Supply	Grid Supply	CCA or Similar
		Utility Customer Renewable Energy Procurement
	Customer Side Supply	Renewable Distributed Generation
Natural Climate Solutions	Carbon Removal & Storage	Urban Tree Planting
		Conservation & Restoration Projects (Removal)
		Urban Gardens
		Carbon-Farming Practices (Removal)
		Turf Management
	Carbon Stock Preservation	Agriculture Easements
		Open Space Easements
		Wildfire Prevention
		Carbon-Farming Practices (Preservation)
		Conservation & Restoration Projects (Preservation)
	Agriculture Methane Reduction	NA

Implementation Mechanisms

CAP measures and actions are differentiated by implementation mechanism, which is how a local jurisdiction intends to achieve the desired activity. Table 8.4 summarizes the implementation mechanisms used to organize CAP measures for this analysis. In some instances, a CAP measure or action may require multiple implementation mechanisms to achieve the stated goal (e.g., education and outreach, incentives, and requirements).

Table 8.4 CAP Policy Implementation Mechanism Categories

Implementation Mechanism	Description
Capital Improvement & Infrastructure	CAP measures and actions that require municipal funds to be completed. For instance, city-wide projects, such as the installation of bike lanes, or projects that impact municipal facilities or operations, such as conversion of the municipal fleet.
Requirement(s)	CAP measures and actions that require a GHG reduction activity through a regulation, ordinance, or some other mandatory means.
Incentive(s)	CAP measures and actions that encourage a GHG reduction activity through monetary and non-monetary incentives, such as rebates and permit streamlining.
Plan or Program	CAP measures and actions to expand or create new plans and or programs that facilitate mitigation activity.
Education, Outreach, & Coordination	CAP measures and actions that expand awareness, communicate and share information, and/or initiate or expand partnerships and relationships.
Evaluation	CAP measures and actions that improve feedback, input, and data and information or conduct further or new analyses.

Policy Frequency

The review of CAPs identified the number of jurisdictions that have committed to one or more policy action and organized results by decarbonization pathway, policy category, and implementation mechanism. Identifying the frequency with which specific types of measures and actions are adopted helps to determine which policy options are most commonly used to achieve GHG reduction. This can, in turn, illustrate where jurisdictions can achieve additional reductions, either by adopting a new policy or by strengthening policy commitments. For example, policies that rely solely on education and outreach efforts are likely to achieve fewer GHG reductions than a requirement. In some instances, a jurisdiction may have limited authority to use certain implementation mechanisms (e.g., requirements); discussion on local authority throughout this chapter will help determine the extent to which jurisdictions can use specific approaches to implement their CAP measures and actions.

Relative Contribution to Local GHG Reduction in CAPs

Comparing GHG reduction values across CAPs can be problematic given potential differences in emission sources, measures included, methods used to estimate GHG impacts, target, and target year. One way to compare across CAPs is to show how measures or groups of measures contribute to the overall local GHG reduction in a particular target year. For example, the portion of GHG reductions in a CAP that would result from local measures to decarbonize buildings.

One challenge comparing GHG impacts is that there is no common target year across adopted and pending CAPs in the region; however, 2035 is a common target year in CAPs. For those CAPs where GHG reductions were not reported for 2035, reductions were extrapolated linearly if 2035 fell between two target years (e.g., 2030 and 2050), or carried forward from the previous target year (e.g., if 2030 were the last target year, emissions reductions from 2030 were applied in 2035).

Analyzing the relative GHG reduction contribution of CAP measures at the policy subcategory or a lower level is difficult given differences in how measures are structured across CAPs. In many instances, a CAP measure may have multiple elements that cut across policy subcategories, making it difficult to separate out the GHG reductions associated with each individually. For this reason, the relative GHG contribution of CAP measures was only analyzed at the decarbonization pathway and policy category levels in target year 2035.

Local GHG Commitments in CAPs in the San Diego Region

The GHG reductions in CAPs represent the GHG impacts of federal and State mandates and local commitments that lead to reductions at the local level. After developing a baseline GHG emissions inventory, emissions are projected to a future year. The jurisdiction establishes one or more emission targets, and develops the local actions needed to achieve that target.[i]

The baseline GHG emissions inventory for a given year serves as the basis for projections and targets. Emissions target levels are most often determined as a percentage reduction from the baseline year. A business-as-usual (BAU) projection is made based on population, employment, and housing growth, with no additional future policy changes after the baseline year. The BAU projection is then adjusted to account for the future emissions impact of federal and State policies in place at the time of CAP development. This is sometimes called the legislatively-adjusted BAU projection. The difference between the legislatively-adjusted BAU emissions in a target year and the target level of emissions is sometimes referred to as the "local emissions gap" or "local gap."

In Figure 8.3, the upper black line is the BAU projection, and the blue line below is the legislatively-adjusted BAU projection. The green dashed line represents the emissions trajectory to meet target emissions levels. The gap between the blue and green dashed lines represents the local gap.[ii] Throughout this chapter, we refer to the measures to address this local gap as "local CAP measures" or "local measures," which is the focus of the analysis presented here. Remaining emissions are those left after reaching target emission levels or whatever level can be attained.

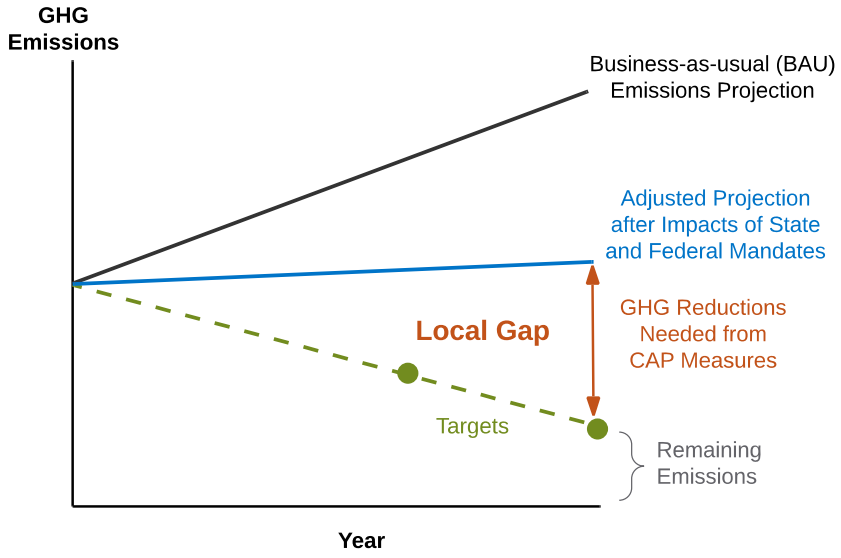

Figure 8.3 Illustration of CAP Projections, Legislatively-Adjusted Projection, and Local Gap

8.3.3 General Characteristics of CAPs

Eighteen local jurisdictions in the San Diego region have adopted CAPs or similar plans (Table 8.5). The County of San Diego previously adopted a CAP but is in the process of updating the document as a result of litigation. Only the City of Poway has not begun activity to develop a CAP. CAPs are generally updated

[i] SANDAG Regional Climate Action Planning Framework: TECHNICAL APPENDIX I- GHG Inventories, Projections, and Target Selection, VERSION 1.1: OCTOBER 2020.

[ii] For details on this, see SANDAG ReCAP Technical Appendix I, Id.

on a regular basis. Table 8.5 lists the years when local jurisdictions could update their CAP. Eight CAPs are scheduled to be updated between 2021 and 2025, which provides an opportunity to revise measures. As noted in the table, nine CAPs are considered to be CEQA-qualified. According to the SANDAG ReCAP, "[a] 'CEQA-qualified' CAP meets the criteria specified in Section 15183.5(b) for a 'plan for the reduction of greenhouse gas emissions,' such that a 'qualified' CAP may then be used for the specific purpose of streamlining the analysis of GHG emissions in subsequent projects."[i]

Other public agencies also adopt GHG reduction plans, including the San Diego International Airport, which has a Carbon Neutrality Plan,[ii] and the Unified Port District of San Diego.[iii] Emissions associated with these public agencies are excluded from local jurisdiction GHG inventories given the lack of authority to act but are included in the regional GHG inventory included in the SANDAG Regional Plan. These plans are not included in this analysis.

Table 8.5 Status of CAPs in the San Diego Region

Jurisdiction	CAP Adoption Year	CAP Update Year[2]	Whether CEQA Qualified CAP
Carlsbad	2020	2021	Y
Chula Vista	2017	2021	N
Coronado	2022	NA	N
County of San Diego	In Progress	NA	NA
Del Mar	2016	2023	N
El Cajon[1]	2020	2025	N
Encinitas	2020	2025	Y
Escondido	2021	2025	Y
Imperial Beach	2019	2026	N
La Mesa	2018	2027	Y
Lemon Grove	2020	2025-2030	N
National City	2011	NA	N
Oceanside	2019	NA	Y
Poway	NA	NA	NA
San Diego	2015	NA	Y
San Marcos	2020	NA	Y
Santee	2020	2021	Y
Solana Beach	2017	2021	N
Vista	2022	2025	Y

[1] The City of El Cajon has adopted a Sustainability Initiative with measures similar to a Climate Action Plan.
[2] NA (Not Applicable) indicates no CAP, or no updated timeline has been specified in the CAP.

GHG Emissions Targets in CAPs

As noted above, CAPs establish emissions targets. This is the level of emissions the plan seeks to achieve

[i] SANDAG Regional Climate Action Planning Framework: TECHNICAL APPENDIX V-California Environmental Quality Act (CEQA) and Climate Action Planning VERSION 1.1: OCTOBER 2020.
[ii] San Diego International Airport, July 2020. Carbon Neutrality Plan: A Roadmap for Airport Carbon Accreditation and Beyond. Available at https://www.san.org/Portals/0/Documents/Environmental/2020-Plans/2020_Carbon-Neutrality-Plan-min.pdf.
[iii] Unified Port of San Diego, 2013. Climate Action Plan. Available at https://www.portofsandiego.org/environment/energy-sustainability/climate-action-plan.

after accounting for federal and state mandates and through a range of local actions. Local jurisdictions have some discretion when selecting target levels of emissions. One source of guidance on target selection is CARB's 2017 Scoping Plan. In addition to providing statewide per capita emissions targets of no more than six metric tons CO_2e per capita by 2030 and no more than two metric tons CO_2e per capita by 2050, it provides general guidance on GHG emission targets for local jurisdictions.[i] Another source of guidance is GHG-related CEQA litigation, which supports the use of statewide GHG reduction targets by jurisdictions (lead agencies) and new projects to set thresholds of significance for GHG emissions and required mitigation. Consistency with statewide GHG emission targets is generally legally defensible and found to be supported by substantial evidence.

Table 8.6 presents the GHG emission targets in CAPs in the San Diego region, which include both per capita targets and mass emission reductions that are expressed as a percentage reduction below a baseline year. La Mesa, Oceanside, and Santee provided targets both in terms of per capita and mass emissions levels. Escondido, Oceanside, and Santee have targets for multiple years.

Table 8.6 Adopted CAP GHG Emissions Targets

Jurisdiction	Baseline Year	Target (per capita, % below baseline year[1])	Target Year
Carlsbad	2012	52%	2035
Chula Vista	NA	6 MT/person	2030
Coronado	2016	39%	2030
County, SD	NA	NA	NA
Del Mar	2012	50%	2035
El Cajon	2012	42%	2030
Encinitas	2012	44%	2030
Escondido	2012	42% 52%	2030 2035
Imperial Beach	2012	42%	2030
La Mesa	2010	3.5 MT/person, 53%	2035
Lemon Grove	2012	42%	2030
National City	2005/2006	15%	2020
Oceanside	2013	4 MT/person, 25% 3 MT/person, 42%	2030 2040
Poway	NA	NA	NA
San Diego	2010	50%	2035
San Marcos	2012	42%	2030
Santee	2005	3.8 MT/person, 40% 1.27 MT/person, 49%	2030 2035
Solana Beach	2010	50%	2035
Vista	2012	42%	2030

[1] Note: the Draft CARB 2022 Scoping Plan excludes per capita targets.

[i] CARB 2017 California's 2017 Climate Change Scoping Plan: The strategy for achieving California's 2030 greenhouse gas target. Available at https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf; Note: CARB's proposed 2022 Scoping Plan excludes per capital targets, See CARB Draft 2022 Scoping Plan, Appendix D Local Actions, May 2022. Available at: https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp-appendix-d-local-actions_0.pdf .

Net Zero GHG Emissions Targets

No adopted CAP has a net zero GHG emissions target. The City of San Diego is the first local jurisdiction in the San Diego region to propose a 2035 net zero GHG emissions target in its pending 2022 CAP update.[i] Several other cities in California have adopted such targets, including the Cities of San Jose,[ii] Irvine,[iii] and Santa Barbara.[iv]

8.3.4 CAP Measure Frequency and GHG Impacts

This section summarizes the findings of an analysis to determine on average how frequently categories of GHG reduction measures are included in adopted and pending CAPs and the GHG impact of those categories. The findings presented here are broken down by decarbonization pathway.

GHG Contribution by Decarbonization Pathways and Other Categories

Figure 8.4 shows how reductions from local policy efforts in the decarbonization pathways (e.g., decarbonize buildings) align with emission sources (e.g., transportation and electricity). For example, many CAPs rely on measures to decarbonize the electricity supply for a majority of their emissions reductions; however, the regional inventory shows that a significant majority (44%) of emissions come from the transportation sector. This signals a potential need — and opportunity — for more local policies that decarbonizes the transportation sector.

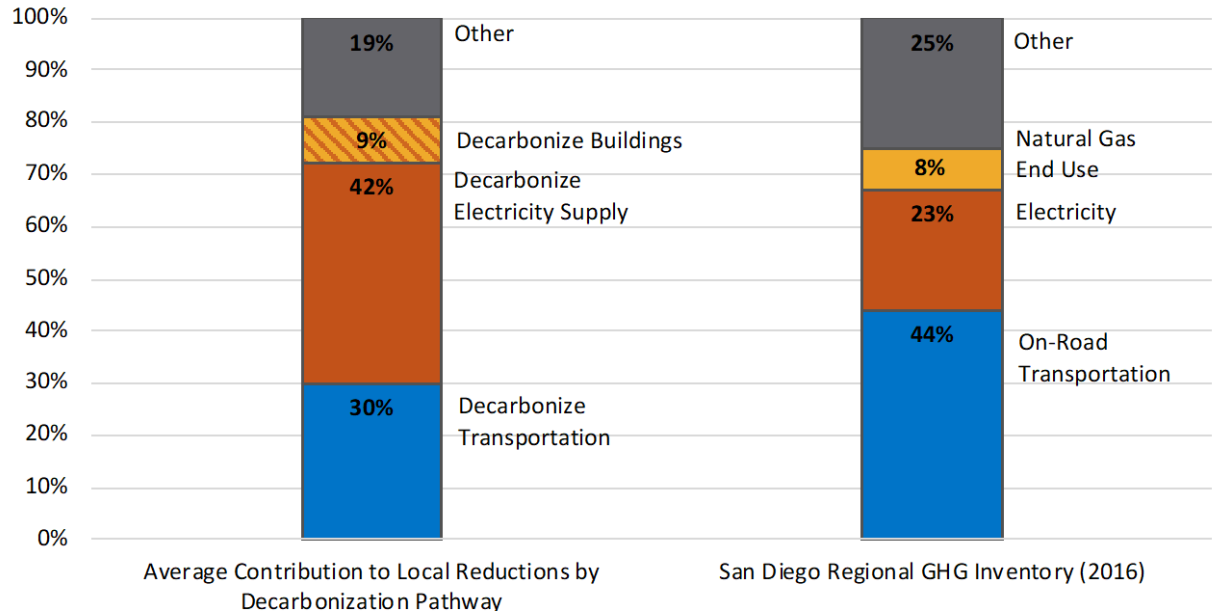

Figure 8.4 Average Contribution to Local GHG Reduction in Adopted and Pending CAPs by Decarbonization Pathway (left) and San Diego Regional GHG Inventory (right)

[i] City of San Diego, November 2021. Draft City of San Diego Climate Action Plan: Our Climate, Our Future. Available at https://www.sandiego.gov/sites/default/files/climate_action_plan_draft.pdf.

[ii] Maggie Angst, San Jose sets a new goal to become the largest U.S. City to go carbon neutral by 2030. San Jose Mercury News. November 8, 2021. See also http://sanjose.legistar.com/gateway.aspx?M=F&ID=3fe2ff5e-c5ff-4573-81ff-7bf3aaf30e98.pdf.

[iii] City of Irvine Resolution No. 21-50 adopted on August 10, 2021. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=33611.

[iv] See City of Santa Barbara Sustainability and Resilience Website at https://sustainability.santabarbaraca.gov/carbon-neutrality/.

Figure 8.5 shows the breakdown of local CAP GHG reductions across decarbonization pathways for the year 2035.[i] While there is significant variability across the 17 CAPs shown here, on average, reductions from decarbonizing the electricity supply (42%) and decarbonizing transportation (30%) account for most local GHG reductions in CAPs. On average, measures associated with decarbonizing buildings account for about 9% of total local CAP reductions, and 1% are from measures related to natural climate solutions. The remaining 18% come from other measures, such as solid waste reduction and water conservation.

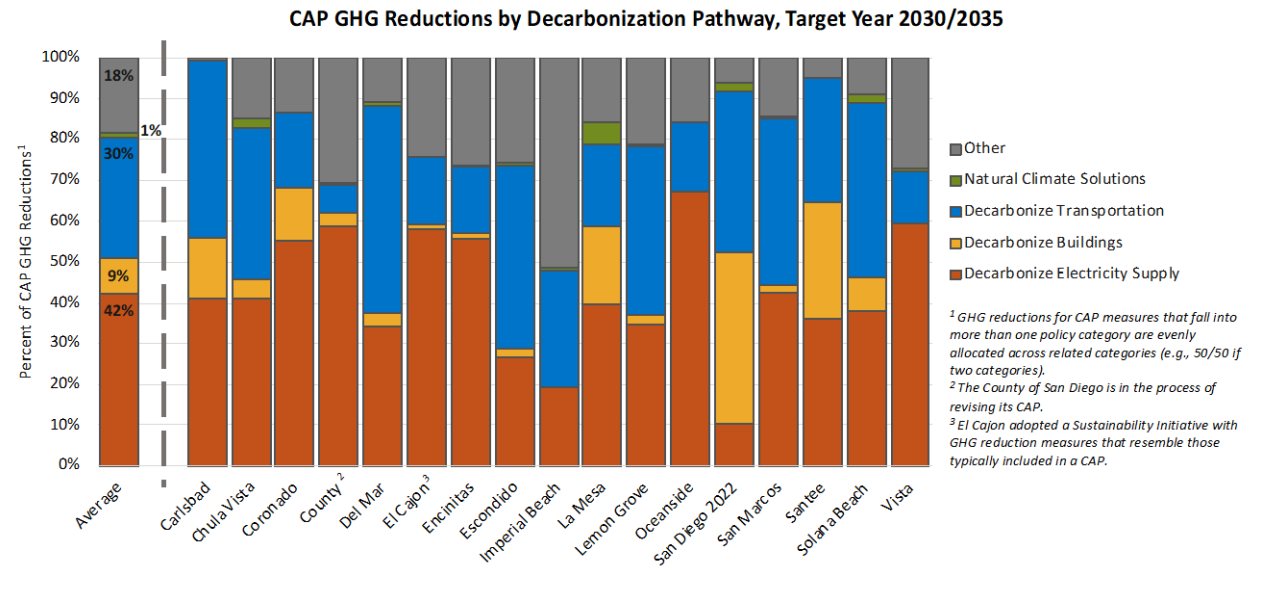

Figure 8.5 Contribution to GHG Reductions by Policy Category (2035).

Figure 8.6 further breaks down local CAP measures into more specific policy categories. It shows both the number of CAPs with at least one related measure and the average contribution of related measures toward the local GHG reduction. All 17 adopted and pending CAPs have measures related to increasing the supply of carbon-free electricity from the grid, typically through CCA programs. On average, these measures contribute more than one-third of the reductions from local measures. By contrast, measures related to customer-side energy projects, like rooftop solar, contribute an average of about 10% to local CAP reductions. This is because much of the reductions associated with customer side solar projects derive from state policies and general market uptake. All 17 CAPs have measures related to energy efficiency that contribute on average 8% to local CAP reductions. Only 7 CAPs had measures related to building electrification, a central strategy in the overall decarbonization strategy, with minimal GHG reductions. Of the transportation related CAP measures, those to increase use of alternative fuels, including electric vehicles and charging infrastructure, contribute on average 16% to local CAP reductions. Those related to reducing vehicle miles traveled represent about 12% of local reductions. Other policy categories represent relatively minimal GHG reductions in comparison. While most CAPs have measures related to carbon removal, mostly urban tree planting, they represent about 1% of local CAP reductions.

[i] Values in figure represent the estimated or extrapolated GHG reductions in the year 2035 to provide a better comparison across CAPs. Not all jurisdictions include 2035 as a target year and extrapolated values may not perfectly align with how reductions are calculated in those CAPs. Nevertheless, this figure provides a representative look at how reductions are spread across decarbonization pathways within each CAP.

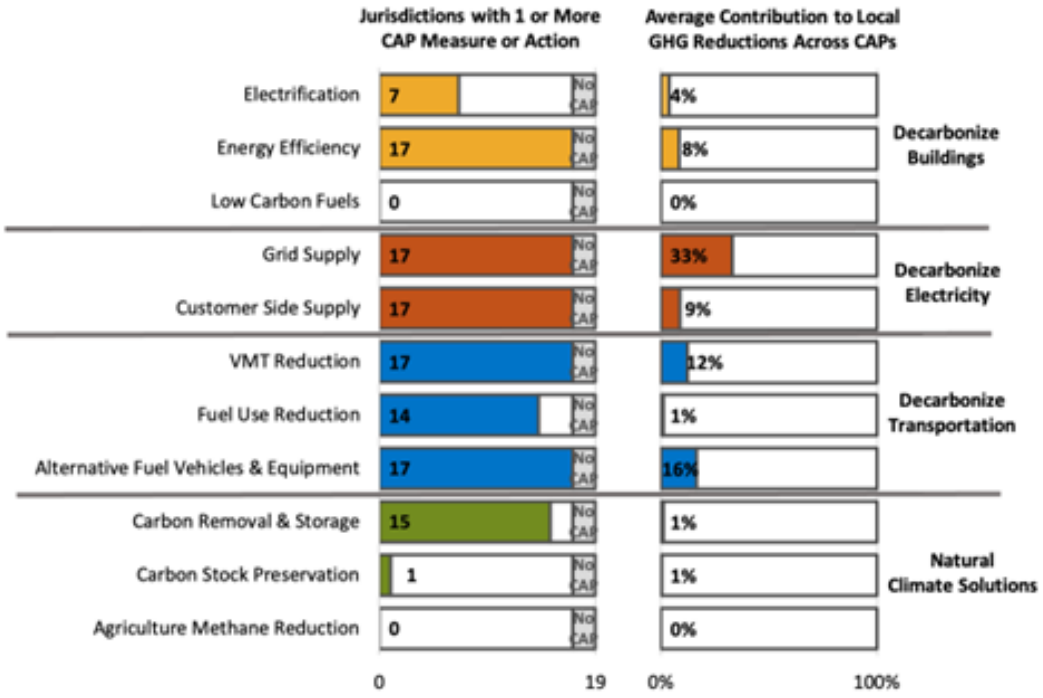

Figure 8.6 Summary of Adopted and Pending CAP Measures in Decarbonization Pathways.

More detailed breakdowns by policy subcategory and implementation mechanism are provided in the sections below that address each building decarbonization pathway.

8.3.5 Social Equity in Climate Action Plans

EPIC completed a preliminary review of adopted and pending CAPs to determine whether and how social equity factors are considered. This section briefly summarizes findings from this review and presents opportunities for additional local action and regional collaboration.

Summary of Key Findings

- Inclusion of equity in adopted CAPs is limited, inconsistent, and lacks specificity.
- It appears that the City of San Diego draft 2022 CAP update has the most comprehensive integration of social equity into a CAP in the San Diego region, including targeted outreach to communities of concern, equity-focused selection criteria for CAP measures, and an air quality section to address local emissions of criteria pollutants.
- There is an opportunity to improve integration of equity considerations when CAPs are updated.
- Equity can be integrated across the entire climate action planning cycle. SANDAG's ReCAP Framework could be expanded to include guidance for integrating equity considerations into CAPs.
- Regional programs and collaboration could support the development of regional indicators, guidance, and regular reporting on climate-related equity topics. For example, a Regional Climate Equity Collaborative or Working Group could serve to educate regional leaders and collect stakeholder input.

Defining Social Equity

Most CAPs in the San Diego region do not clearly define social equity. The City of San Diego draft 2022

CAP update defines and provides approaches to address social equity in the context of climate planning. It states that "[c]limate equity requires addressing historic inequities suffered by people of color, allowing everyone to fairly share the same benefits and burdens from climate solutions and attain full and equal access to opportunities regardless of one's background and identify."[i]
Other definitions of social equity exist. As an example, the Urban Sustainability Directors Network has defined equity in the sustainability context to include the following:[ii]

- Procedural Equity – Inclusive, accessible, authentic engagement and representation in processes to develop or implement sustainability programs and policies;
- Distributional Equity – Sustainability programs and policies result in fair distribution of benefits and burdens across all segments of a community, prioritizing those with the highest need;
- Structural Equity – Sustainability decision makers institutionalize accountability; decisions are made with a recognition of the historical, cultural, and institutional dynamics and structures that have routinely advantaged privileged groups in society and resulted in chronic, cumulative disadvantage for subordinated groups;
- Transgenerational Equity – Sustainability decisions consider generational impacts and don't result in unfair burdens on future generations.

A similar definition is used in a regional adaptation planning guidance document in the San Diego region.[iii]

Communities of Concern

The State of California has created various definitions of communities related to social equity through statute. SB 535 (2012) defines disadvantaged communities (DAC) and directed the California Environmental Protection Agency (CalEPA) to define and identify DACs for investment opportunities and allocate funds to their benefit. As part of SB 535 (2012), the CalEPA identified low-income and highly polluted geographical areas, now available through CalEnviroScreen. AB 1550 (2016) created an additional income-related definition. It defines low-income households as those at or below 80% of state median income (SMI) or below a threshold identified by the California Department of Housing and Community Development (HCD). AB 1550 (2016) also identifies low-income communities; however, analysis of low-income communities would only help to identify where concentrated populations of low-income residences are within an unincorporated county, not how many households qualify.

In the context of electricity and natural gas policy, the CPUC often includes within the definition of low-income household "residential customers eligible for California Alternate Rates for Energy (CARE) and the Family Electric Rates Assistance (FERA) programs, resident-owners of single-family homes in disadvantaged communities (as defined in Decision (D.) 18-06-0127), or residential customers who live in California Indian Country (as defined in D.20-12-003)… ."[iv]

For our purposes here and throughout this chapter, we will use the term "communities of concern" as

[i] City of San Diego Climate Action Plan: Our Climate, Our Future. Downloaded June 8, 2022 from https://www.sandiego.gov/sustainability/climate-action-plan.
[ii] Angela Park, 2014. Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs. Urban Sustainability Directors Network. Available at http://usdn.org/public/Innovation.html#EquityScan.
[iii] San Diego Regional Climate Collaborative and San Diego Association of Governments, "Equity- First Approach to Climate Adaptation" (2021). San Diego Regional Climate Collaborative. 15. https://digital.sandiego.edu/npi-sdclimate/15.
[iv] California Public Utilities Commission. Proposed Decision Revising Net Energy Metering Tariff and Subtariffs in Rulemaking 20-08-020, 12-13-21.

adopted by the City of San Diego in their Climate Equity Index,[i] understanding that there are many other terms used.

Local Commitments to Social Equity in CAPs

Although limited, CAPs in the San Diego region integrate social equity considerations in several ways, including gathering stakeholder input from communities of concern, having a separate section or chapter on equity, designating equity as a co-benefit, and integrating equity into measure language and implementation plans.

- Stakeholder Input – Given the relatively limited integration of social equity considerations in CAPs in the San Diego region, it appears that stakeholder outreach to communities of concern also was limited. Not all CAPs describe the outreach process used, so it can be difficult to understand the outreach completed. The City of San Diego's draft 2022 CAP update released in November 2021 and intended to be adopted in Summer 2022 includes a detailed explanation about the process undertaken to solicit and receive stakeholder input, particularly from communities of concern.[ii]
- CAP Section or Chapter on Equity – Some CAPs include a separate section or chapter to discuss how the CAP incorporates and responds to social equity concerns. The City of Del Mar has a separate chapter on social equity that briefly describes local and regional strategies to ensure benefits accrue to all residents. Examples include using CCA revenues to subsidize energy improvements for low-income and senior residents and ensuring that outreach related to CAP implementation is designed to reach all residents.[iii] Similarly, the City of San Diego CAP adopted in 2015 includes a chapter on social equity and job creation, which focuses mainly on job creation but seeks to prioritize programs and actions in communities of concern. The adopted San Diego CAP also includes regular monitoring on CAP-related job creation and social equity impacts of CAP implementation.[iv]
- Equity as a Co-Benefit – Several cities designate social equity impacts as a co-benefit to identify measures that would benefit communities of concern, though there is no specificity on how this would occur and the steps needed to realize positive impacts. In the context of CAPs, a co-benefit is a positive outcome that results from activity to reduce GHG emissions. For example, installing solar photovoltaics on a home will reduce emissions from electricity use but may also reduce utility bills. The energy cost savings and potential return on investment would be considered co-benefits. This is different from ensuring that CAP measures and policies are designed and implemented in ways that encourage social equity. For example, CAPs could consider how to make electric vehicle use or solar photovoltaic installation more equitable across all communities and how programs to require or encourage solar would affect communities of concern.
- Integrating Equity into CAP GHG Measures – Few CAPs integrate equity into the development and implementation of CAP measures. The City of Escondido includes equity considerations as a performance metric for certain measures and seeks to develop a Clean Energy Equity Plan and identify priority investment neighborhoods (PIN) to help prioritize implementation in communities of concern. The CAP states that "[w]here applicable, GHG reduction measures will

[i] City of San Diego, 2019, San Diego's Climate Equity Index Report. Available at https://www.sandiego.gov/sites/default/files/2019_climate_equity_index_report.pdf.
[ii] City of San Diego, November 2021. Draft City of San Diego Climate Action Plan: Our Climate, Our Future. Available at https://www.sandiego.gov/sites/default/files/climate_action_plan_draft.pdf.
[iii] City of Del Mar, June 2016. Del Mar Climate Action Plan.
[iv] City of San Diego, December 2015, City of San Diego Climate Action Plan.

be targeted and prioritized for funding and implementation in priority investment neighborhoods. These are measures that will improve quality of life, housing stock, health, and quality of life for residents in vulnerable neighborhoods."[i] The Escondido CAP includes recommended priority neighborhoods based on CalEnviroScreen. The City of San Diego draft 2022 CAP update used climate equity selection criteria to evaluate CAP measures, including the following:
    - Community benefits & burdens: Can it be implemented in a way that distributes benefits and burdens equitably?
    - Community empowerment: Can it be implemented in a way to increase community capacity or level of engagement?
    - Addresses historical disparity: Can it address historical disparities in Communities of Concern, i.e., lack of sidewalks or low air quality?[ii]
- Considering Equity in Implementation Sections or Plans – Few CAPs considered equity in the implementation section of CAPs or separate plans. Cities with stand-alone implementation plans include high-level consideration of equity but do not include specifics. Some CAPs also mention social equity in the context of adaptation measures, which we did not consider here because the focus of the Regional Decarbonization Framework is reducing GHG emissions. As noted above, City of San Diego integrated implementation considerations when evaluating CAP measures.

Opportunity for Local Jurisdictions to Integrate Social Equity into CAPs

Given the limited consideration of equity in CAPs in the San Diego region, an opportunity exists to integrate social equity across the CAP planning cycle as described in SANDAG's Regional Climate Action Planning (ReCAP) Framework.[iii] In general, this cycle includes developing and maintaining the CAP, implementing CAP measures, monitoring and reporting progress, and identifying equity as a cross-cutting consideration that can apply across all aspects of climate planning. The following sections briefly discuss how equity could be integrated into each of the main steps in the CAP planning cycle.

Develop and Maintain CAP

This step includes developing a baseline GHG inventory, projecting emissions, setting emissions targets, and developing and estimating the GHG impacts of CAP measures. Social equity considerations could be integrated into this step in the following ways.

- Conduct Stakeholder Outreach – While it is true that stakeholder engagement cuts across all aspects of the climate planning cycle, soliciting and receiving stakeholder input at this initial step, particularly from communities of concern, could help to inform subsequent steps in the process.
- Collect and Analyze Data Related to Social Equity – Historically, data related to equity has not been readily available, particularly as related to CAP development. In recent years, a focus on equity has expanded access to data and tools related to equity. Examples include the Climate Equity Index developed by the Cities of Chula Vista and San Diego. Data included in these indexes can provide context for CAP development. In addition, a specific analysis may be needed to develop CAP measures, targets for activity levels, and performance metrics related to

[i] City of Escondido, March 2021. City of Escondido Climate Action Plan.
[ii] City of San Diego Climate Action Plan: Our Climate, Our Future. Downloaded June 8, 2022 from https://www.sandiego.gov/sustainability/climate-action-plan.
[iii] SANDAG, 2020. Regional Climate Action Planning (ReCAP) Framework Summary.

communities of concern. Other analyses could inform aspects of CAP development, including benefit cost analysis, job impacts analysis, etc.

- Develop Specific Equity-Focused Targets – Another option is to integrate equity into each measure of the CAP and to develop specific performance indicators that can be monitored over time. For example, many CAPs include measures to increase the number or coverage of trees. Developing a specific goal for the number or percentage of trees planted in communities of concern could help to guide implementation activities. As noted above, detailed analysis may be needed to determine the best way to direct funding and activity to ensure equitable outcomes.
- Consider Equity Implications of CAP Measures – Local jurisdictions also could consider whether and how GHG reduction measures could disproportionately affect communities of concern. For example, the potential increase in utility costs due to building electrification or inequitable adoption of rooftop solar. The specific equity implications of decarbonizing transportation, buildings, and the electricity supply are discussed further in the sections below (8.5 through 8.7).

Implement CAP Measures

Most CAPs include a section that provides a high-level summary of how measures will be implemented. This typically includes a timeline, responsible departments, and sometimes also cost implications. Some jurisdictions also develop a separate implementation plan. The following actions could help to integrate social equity into CAP implementation.

- Develop Equity-Focused Implementation Strategies – CAPs could include implementation strategies that seek to specifically address equity concerns and that prioritize activities in communities of concern. Several options exist to integrate equity-focused implementation strategies, including adding specific strategies to the implementation section in a CAP, including a separate section within the CAP focused on the equity aspects of implementation, and/or developing a separate implementation plan – or section of plan – that focuses on equity.
- Equity Related Staff Positions in Local Jurisdictions – Several jurisdictions have full-time staff positions related to equity and environmental justice. These positions can support and monitor the equity aspects of CAPs. To the extent feasible, other local jurisdictions could create a similar position.

Monitor and Report Progress

The final step in the climate planning cycle, monitoring and reporting progress, helps local jurisdictions understand whether emissions targets have been reached and the extent to which CAP measures have been implemented. This provides an opportunity to track specific equity-focused performance indicators included in the CAP or to monitor related implementation strategies. In addition to CAP-related indicators, it also is possible to monitor other equity indicators like energy poverty that might help to track the overall progress of social equity regardless of whether they are connected to CAP measures.

Opportunity for Regional Collaboration

In addition to the opportunities for local jurisdictions to integrate equity, there are opportunities for regional collaboration.

Guidance for Integrating Equity into CAPs

Given the relative lack of information to help local jurisdictions address equity in CAPs, there is an opportunity to develop a guidance document for integrating equity into CAP. For example, developing an additional element of the ReCAP Framework could provide customizable options to encourage

consistency across jurisdictions. Figure 8.7 illustrates how equity could be integrated into all aspects of the climate action planning cycle.

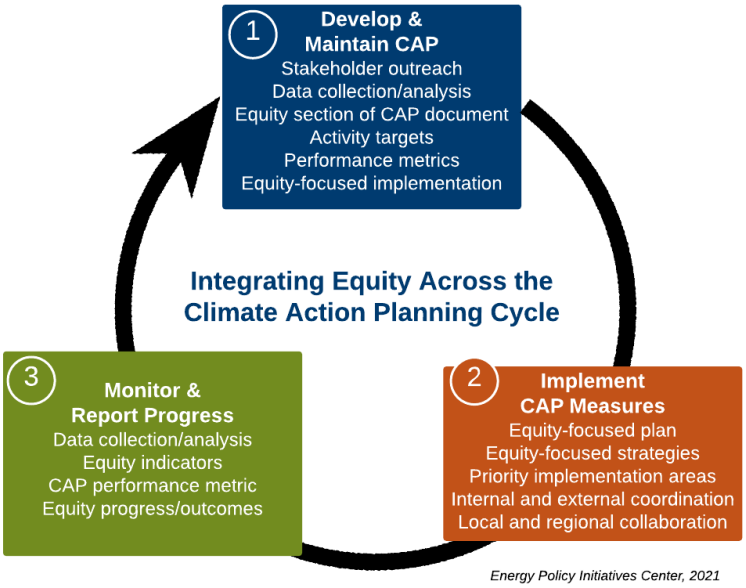

Figure 8.7 Illustrative Example of Integrating Equity Across the Climate Action Planning Cycle.

Regional Support for Smaller Jurisdictions

As with climate planning generally, there may be a need for a regional program to provide equity-related support to smaller jurisdictions that may lack the resources to hire a part- or full-time position dedicated to equity. A model for this approach is SANDAG's Energy Roadmap Program, which provided climate planning support to the smallest 16 cities in the region. SANDAG is still providing some support to these cities, including GHG inventory development and monitoring and reporting support.[i]

Develop Regional Equity Indicators

While some local governments have collected and analyzed data related to social equity and climate, including climate equity indexes, there is no single clearinghouse of equity indicators in the San Diego region. A regional approach to collect data, develop equity indicators, and publicly display and report information could help to facilitate integration of equity into CAPs. For example, a regional database that includes indicators at the census tract level could be displayed geospatially in a public data portal, similar to SANDAG's Climate Action Data Portal. Such a tool would allow for regional or subregional analysis but also enable analysis on a jurisdictional or community level. This could help to identify gaps and help to allocate resources. For example, while each city has goals to plan trees, a regional analysis would help to identify the areas with the lowest tree cover that coincide with other equity indicators like income. A regional program, potentially in addition to CAP efforts, could be developed to direct tree planting activities into these high-priority areas.

State of Regional Climate Equity Report

Data from a regional database of equity indicators could be used to regularly report on the state of equity as it relates to climate action planning. The Equinox Project's Quality of Life Dashboard[ii] provides an example of regular reporting on a suite of indicators.

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[i] See ReCAP Snapshots and Climate Data Portal available at https://climatedata.sandag.org/.

[ii] Equinox Projects' Quality of Life Dashboard. Non-Profit Institute, University of San Diego. Available at https://www.sandiego.edu/soles/hub-nonprofit/initiatives/dashboard/.

8.3.6 Limitations of the Review of CAPs and Associated Analysis

While our methods seek to minimize them, we acknowledge several limitations when analyzing local policy commitments across CAPs, including the following.

- CAP language may be high-level and/or vague, requiring subjective judgment when categorizing the policy into one or more groups.
- CAPs may rely on different methods and inputs (e.g., emission factors) that may change over time or may vary based on the consultant preparing the CAP.
- Jurisdictions may not have activity in all emissions sectors (e.g., agriculture) and will consequently not have associated policies included in their CAP.
- Some jurisdictions may implement decarbonization-related policies that are not included within their CAP.
- Some CAP measures have, since adoption, been superseded by federal, state, and regional requirements and/or activity (e.g., low carbon fuel standards, updated building code standards, and SB 375).
- CAP target years do not consistently align and, for some CAPs, data on GHG reductions in interim years may be limited.

8.4 Scenario Analysis of GHG Impacts from Adopted CAPs in the San Diego Region

This section presents the results of analysis to estimate the impact of the GHG commitments in adopted and pending CAPs and a scenario to show the impact of applying the most aggressive GHG reduction measures across the entire region. This analysis focuses on a subset of GHG emissions, namely, on-road transportation, electricity, and natural gas. These emissions categories are consistent with the four decarbonization pathways included in the other chapters of the Technical Report. While the review of CAPs presented above in Section 8.3 allows for comparison of GHG reductions across CAPs, the scenario analysis presented here estimates the *combined* GHG impacts of CAPs.

8.4.1 Summary of Findings

- Commitments in adopted CAPs (Adopted CAP Commitment Scenario) for transportation, electricity, and natural gas GHG reductions contribute a relatively small portion of the total reductions needed to reach net zero GHG emissions in 2035, about 2 MMT CO_2e, which would leave about 12 MT CO_2e remaining in these categories. Including the commitments from the City of San Diego draft 2022 CAP update in this analysis would yield GHG reductions of about 5 MMT CO_2 in 2035, leaving about 8.5 MMT CO_2e remaining to be addressed.
- CAP measures that aim to increase renewable electricity to 80–100%, mainly through CCA programs, contribute the largest GHG emissions reduction in 2035 among commitments in adopted CAPs. Local policy actions to achieve 100% carbon-free electricity supply sooner would lead to more cumulative GHG reductions, not important for attaining annual emission targets but consequential to atmospheric warming and the resulting climate impacts.[i]

[i] See Riahi, K., Bertram, C., Huppmann, D. et al. Cost and attainability of meeting stringent climate targets without overshoot. Nat. Clim. Chang. (2021). https://doi.org/10.1038/s41558-021-01215-2. See also Drouet, L., Bosetti, V., Padoan, S.A. et al. Net zero-emission pathways reduce the physical and economic risks of climate change. Nat. Clim. Chang. (2021). https://doi.org/10.1038/s41558-021-01218-z.

- Even if the most aggressive CAP measures are applied to all jurisdictions in the region (Best Adopted CAP Commitment Scenario), regardless of whether they have a CAP in place, significant emissions would remain (approximately 7 MMT CO_2e in 2035), mostly from natural gas combustion and medium- and heavy-duty vehicles. This suggests that additional measures are needed to decarbonize buildings and either electrify or use low-carbon fuels in larger vehicles. Including the best CAP commitments from the City of San Diego draft CAP 2022 would reduce the amount of remaining emissions to about 5 MMT CO_2e in 2035.
- The largest GHG emissions reduction in the Best Adopted CAP Commitment Scenario is from CAP measures to decarbonize transportation, such as reducing VMT by reducing parking supply and increasing alternative commute modes.
- Even in the Best Adopted CAP Commitment Scenario, the impact of building electrification is limited because only CAPs adopted in the last two to three years have considered and incorporated these strategies. This improves when including the City of San Diego draft 2022 CAP update.
- Given the differences between Current Adopted CAP Commitments and the Best Adopted CAP Commitments in all decarbonization pathways, even when including the City of San Diego draft 2022 CAP update, there is an opportunity for local jurisdictions to strengthen CAP measures to reduce additional GHG emissions.
- Under the Natural Climate Solutions Pathway, existing CAP measures only include urban tree planting, indicating potential to expand removal and storage or other natural climate solutions in future CAP updates.

8.4.2 Scenario Analysis Approach

The analysis presented here includes the same CAPs and policy organizational structure as described above for the review of CAPs in Section 8.3. For this analysis, we developed three GHG emissions scenarios.

Regionwide Reference Scenario without CAP Commitments

The first step was to develop an estimate of regionwide GHG emissions based on a projection of relevant activity (e.g., electricity use or VMT) without the impact of any CAP commitments. This scenario, which accounts for the emission impacts of state and federal policies in place in 2021 but not of local CAP measures, shows emissions from electricity, natural gas, and on-road transportation. These emissions categories represent the decarbonization pathways evaluated in the other chapters of the report. The resulting emissions represent the reference scenario for the analysis. For the on-road transportation category, we used the light-duty vehicle (LDV) and heavy-duty vehicle (HDV) miles driven and GHG emissions from the 2021 SANDAG Regional Plan.[i] For electricity and natural gas categories, we projected electricity and natural gas demand-based California Energy Commission's mid-case 2020–2030 energy demand forecast for SDG&E planning area.

Adopted CAP Commitment Scenario

As noted above, simply summing GHG reductions reported in CAPs can be problematic potential differences in emission sources, measures included, methods used to estimate GHG impacts, and target type and year. For example, recent CAPs may assume more efficient vehicles and lower vehicle emission rates in GHG calculations, so reducing one vehicle mile would result in lower GHG reductions compared

[i] San Diego Association of Governments (SANDAG). 2021. San Diego Forward the Regional Plan. Appendix X: 2016 Greenhouse Gas Emissions Inventory and Projections for the San Diego Region. For LDV emissions, the GHG reduction from SANDAG.

to older CAPs. Another example is how GHG reductions from federal and State policies are included in CAPs. Measures to encourage or mandate residential solar PV systems were considered a local CAP measure until 2019 when it became a state mandate.

To avoid the potential shortcomings of summing CAP reductions, we developed a scenario to estimate the emissions impact of GHG reduction measures in the adopted CAPs considered here. We evaluated the 17 adopted CAPs and summed the change in activity levels from CAP measures, such as electricity avoided in kWh due to energy retrofit measures and combustion vehicle miles replaced by electric vehicle miles (e-VMT) due to electric vehicle (EV) measures. We then calculated the GHG impact of the aggregated level of activity using a common calculation method. In this way, we avoided the challenge of methodological or data differences across CAPs. Once completed for all policy subcategories listed in Table 8.3 above for which quantified CAP measures existed, the resulting GHG emissions impacts represent GHG impact of all local CAP commitments. Results can be seen as the current regionwide commitment from CAPs to reduce GHG emissions.

Best Adopted CAP Commitment Scenario

To estimate the impacts of more aggressive measures to reduce emissions, we developed a Best Adopted CAP Commitment Scenario. We identified the most aggressive measures in each policy subcategory, regardless of the jurisdiction size or CAP adoption year. For example, under the Decarbonize Transportation pathway Parking Reduction policy subcategory, the most aggressive measure out of the measures in the 17 CAPs is Lemon Grove's CAP Measure T-11 to reduce residential parking requirements near light rail transit stations by 50%. The complete list of the best adopted CAP commitments is provided in Appendix 8.A. Since we only included quantified CAP measures, and not all policy subcategories in Table 8.3 have quantifiable measures associated with them, not all subcategories are represented in this scenario. Some subcategories are broken down further, because some CAP measures only contribute to portions of the subcategories. For example, under the Bike, Walk & Complete Streets subcategory, the most aggressive complete streets policy is from the County of San Diego CAP, while the most aggressive bicycle infrastructure improvement policy is from the Imperial Beach CAP.

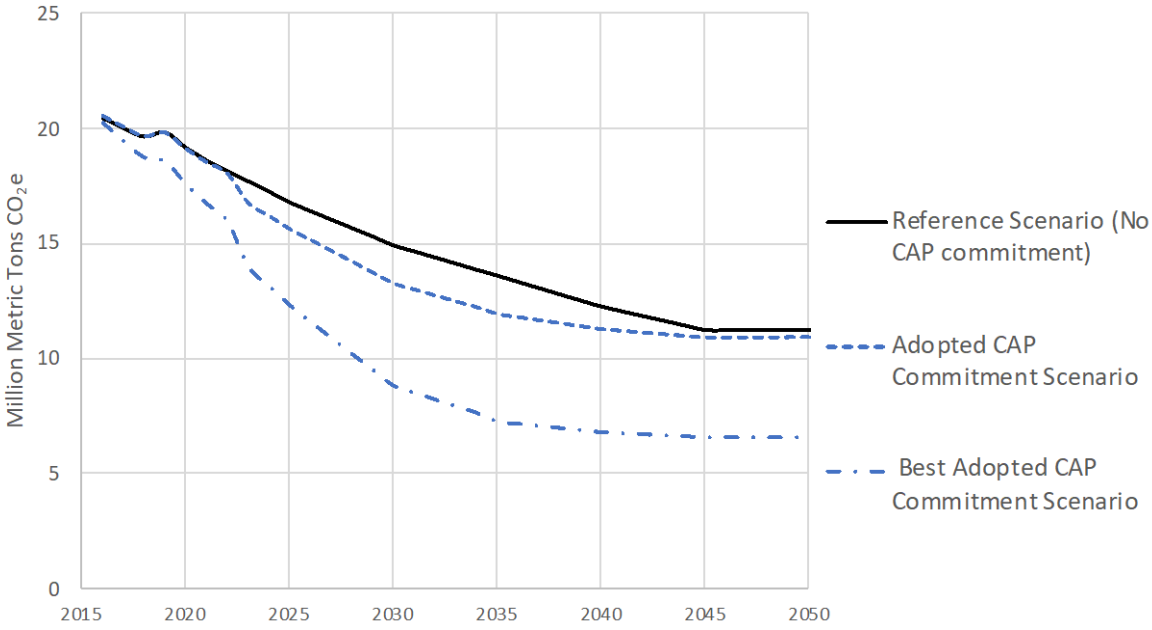
Once identified, we applied the most aggressive CAP policy to all jurisdictions in the region, regardless of whether it has an adopted or pending CAP. The result is the Best Adopted CAP Commitment Scenario. Using the Parking Reduction subcategory as an example, the 50% parking reduction near light rail transit is applied to all housing units in the 2021 SANDAG Regional Plan Mobility Hubs. The parking reduction leads to household VMT reductions and associated GHG emissions.

The difference between the Adopted CAP Commitment Scenario and the Best Adopted CAP Commitment Scenario shows the GHG reductions that would result if all jurisdictions adopted the "best-in-class" approach. This gap helps to identify opportunities for further action by local jurisdictions. It is important to recognize that not all jurisdictions may be able to achieve the most aggressive level of activity for structural reasons, like land use and settlement patterns. Nonetheless, this approach provides an upper limit of what could be achieved with current policies in CAPs.

8.4.3 Results of Scenario Analysis

Figure 8.8 presents the estimated projected GHG emissions in each scenario. The top thick black line represents the regionwide Reference Scenario without CAP commitments, which includes the impacts of state and federal policies in place in 2021 but does not include the GHG impact of local CAP measures.

The upper blue dashed line represents the level of regional emissions after the impacts of adopted CAP commitments are considered. The bottom blue dashed line represents the Best Adopted CAP Commitment Scenario. The GHG reductions from existing CAP commitments are relatively small, about 1.9 MMT CO_2e in 2035. The smaller impact over time is in part because CAPs typically have a planning horizon to 2030 or 2035 and also because of the impact of California's carbon-free electricity requirement. Even accounting for the GHG impacts of the Best Adopted CAP Commitment Scenario, approximately 7 MMT CO_2e would remain in 2035.



This chart does not include all GHG emitting activities in San Diego Region, or potential new local, state, and federal actions that could be adopted in the future.
Energy Policy Initiatives Center, 2022

Figure 8.8 Projected Total GHG Emissions in Each Scenario of the Adopted CAP Scenario Analysis

Figure 8.9 shows the GHG impacts of CAP commitments for each decarbonization pathway in both scenarios. In the Adopted CAP Commitment Scenario, decarbonizing the electricity supply, mainly through committing to high (80%–100%) renewable and carbon-free electricity, provides the most GHG reduction among the four pathways. The impact of the Decarbonize Electricity Supply Pathway increases in the short run but is zero after 2045 because all electric service providers must provide 100% renewable or carbon-free electricity in 2045. Achieving 100% renewable electricity earlier than 2045 would yield higher cumulative reductions from this pathway (i.e., area of the red wedge) but would not increase the reduction in 2045 (i.e., the height of the red wedge in 2045). While higher cumulative reductions do not necessarily help local jurisdictions attain annual CAP emissions targets, they can affect atmospheric warming. Measures related to electrifying buildings and carbon removal and storage were not often included in CAPs until recently; therefore, these Pathways have minimal impact in the Adopted CAP Commitment Scenario, suggesting a need for additional policies. In the Best Adopted CAP Commitment Scenario, in addition to the Decarbonize Electricity Supply Pathway, the Decarbonize Transportation Pathway provides significant GHG reductions. Building decarbonization also reduces more GHG emissions, but still less than what would be needed to meet the level of building decarbonization contemplated in Chapter 4.

The total GHG emissions shown here include only the emissions from on-road transportation, electricity

and natural gas, not all GHG emitting activities in the region. Even with the Best Adopted CAP Commitment Scenario and carbon removal and storage, approximately 7 MMT CO_2e would remain. The remaining emissions are mainly from natural gas and HDV, as CAP measures generally focus on increasing renewable electricity and reducing miles driven LDVs. The remaining emissions in the San Diego region, including other GHG generating activities, after accounting for reductions in the Adopted CAP Commitment and Best Adopted CAP Commitment Scenarios are shown in Figure 8.10.

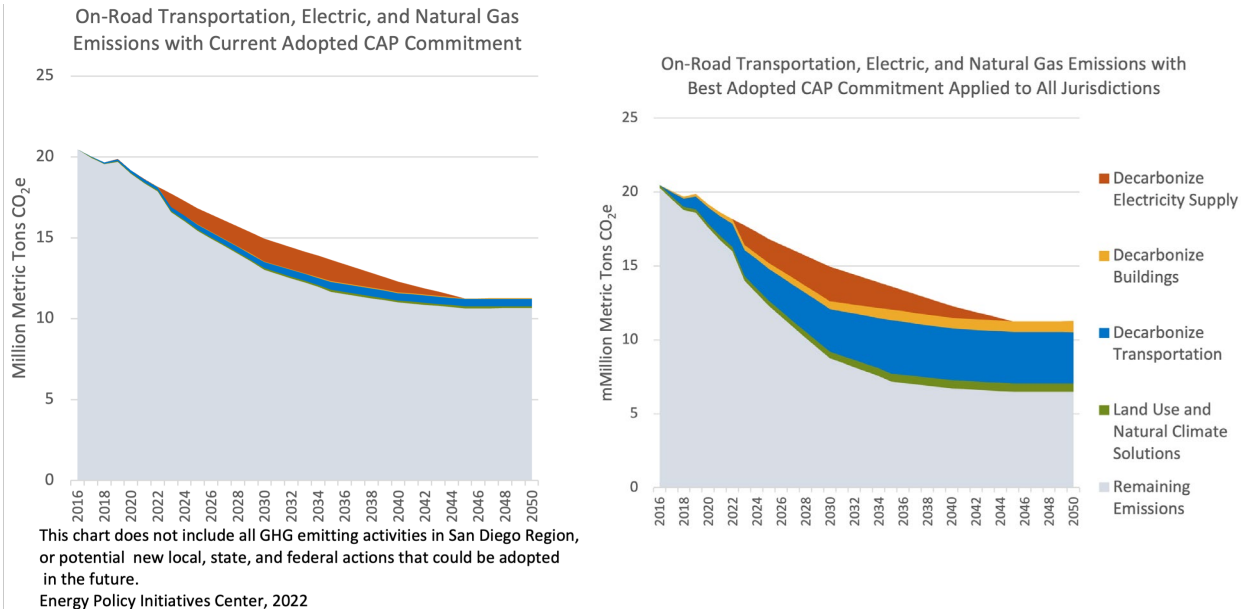


Figure 8.9 Emissions Reductions from Each Pathway under Adopted and Best Adopted CAP Commitment Scenarios

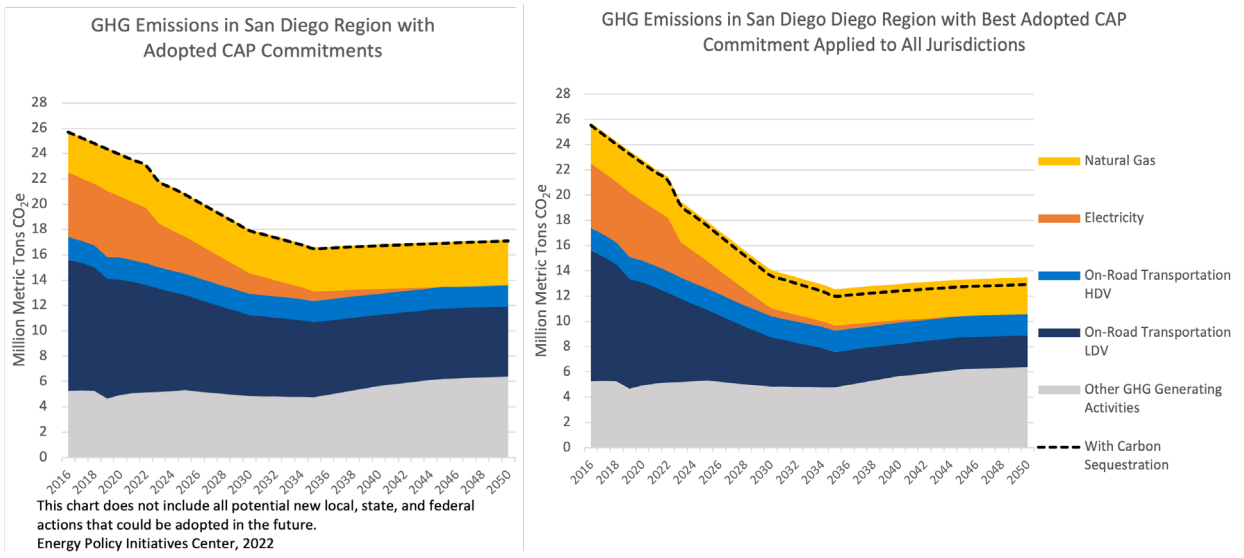


Figure 8.10 Emissions Breakdown under Adopted and Best Adopted CAP Commitment Scenarios

Scenario Analysis Results by Policy Subcategory

The impact of each category and subcategory under the Pathways in both scenarios are discussed in detail in Section 8.5 through Section 8.8. In summary, the impact of each scenario on GHG emitting activity level (electricity use, natural gas, and VMT) is shown in Table 8.7. For all decarbonization pathways, the Best Adopted CAP Commitment Scenario reduces significantly more GHG emissions than the Adopted CAP Commitment Scenario, indicating the potential for jurisdictions to expand CAP measures in the next round of CAP updates.

Table 8.7 GHG Emissions Impact of Adopted and Best Adopted CAP Commitment Scenarios

Activity	Pathway: Policy Category	Policy Subcategory	Reduction in Activity Level	
			Adopted CAP Commitment Scenario	Best Adopted CAP Commitment Scenario
Electricity Use	Decarbonize Buildings: Energy Efficiency	Residential Energy Retrofits	0.01%	5%
		Non-residential Energy Retrofits	0.01%	5%
		Residential Water Heater Retrofits	0.0003%	2%
		Non-residential Solar Water Heater Retrofits		0.02%
Natural Gas Use	Decarbonize Buildings: Electrification	Residential New-Construction Electrification	0.1%	5%
	Decarbonize Buildings: Energy Efficiency	Residential Energy Retrofits	0.5%	14%
		Non-residential Energy Retrofits	0.3%	7%
		Residential Water Heater Retrofits	0.5%	4%
		Non-residential Solar Water Heater Retrofits		3%
VMT	Decarbonize Transportation: VMT Reductions	Increase Commute by Biking	1%	1%
		Increase Commute by Walking	0.02%	0.3%
		Increase Safe Routes to School	0.001%	0.03%
		Complete Streets	0.01%	0.13%
		Increase Commute by Mass Transit + Intra-city Shuttle	3%	4%
		Reduce Parking	0.2%	13%
		Commute TDM Strategies	0.4%	4%
		Increase Commute by Vanpool	0.03%	19%

Under the Decarbonize Building Pathway, energy efficiency-related CAP measures mainly reduce natural gas use and associated GHG emissions, with residential and non-residential energy retrofit measures contributing the most. This is because the best adopted CAP commitment under residential and non-residential energy retrofits are from the City of Carlsbad CAP Measures D through F, which aim to reduce energy use by 50% in 30% of existing homes, and by 40% in 30% of existing commercial spaces.

Water heater retrofit measures provide 7% natural gas reduction under the Best Adopted CAP Commitment Scenario, but depending on the specific provisions, this type of measure can face federal

preemption issues and could be replaced by electrification measures or other measures to reduce natural gas use in existing buildings, as discussed in Section 8.6.

Under the Decarbonize Transportation Pathway, increasing commute by vanpool and reducing parking subcategory reduce the most VMT in the current and best adopted CAP commitment scenario, indicating the potential to expand these measures in CAPs. For reduced parking measures, the best adopted CAP commitment is from Lemon Grove's CAP Measure T-11, which aims to reduce residential parking requirements near trolley stations by 50%. Applying this requirement to all units in the SANDAG 2021 Regional Plan Mobility Hub would lead to an estimated 13% VMT reduction regionwide. For increasing commute by vanpool subcategory, the best adopted CAP commitment is from Solana Beach CAP Measure T-2, which aims to have an additional 19% of the labor force vanpool to work.

The VMT reduction from increasing commute by active transportation modes (i.e., walking and bicycling) and increasing the Safe Routes to School program are limited in both existing and best adopted CAP commitment scenarios. This could be because the miles avoided from walking or bicycling to work are low (average 1 mile per one-way trip for walking and 5 miles per one-way trip for bicycling), or existing CAPs have not captured all opportunities with the jurisdictions to improve pedestrian and bicycling infrastructure. The VMT reduction from increasing commute by mass transit and intra-city shuttle in both scenarios is similar. The opportunity for intra-city shuttles is only limited to jurisdictions without a robust public transit system.

8.4.4 Limitations of Adopted CAP Scenario Analysis

Only GHG Emitting Activities Related to Decarbonization Pathways are Considered

This analysis is limited to the GHG emissions and CAP measures related to four decarbonization pathways included in the other chapters of the report. CAP measures to reduce emissions from solid waste, which can be significant, are not included. Additional analysis would be needed to determine the GHG impacts of adopted CAP commitments and the application of best adopted CAP commitments in other GHG emissions categories (e.g., solid waste).

All Jurisdictions May Not Be Able to Achieve the Best Adopted CAP Commitment

It is important to recognize that not all jurisdictions may be able to achieve the most aggressive level of activity included in the Best Adopted CAP Commitment Scenario due to structural reasons, like land use and building patterns, and political acceptance. Nonetheless, this approach provides an estimate of the upper limit of GHG reductions from measures in adopted CAPs in the region. Also, because levels of remaining emissions after accounting for the best adopted CAP commitments are significant, this scenario helps to put into perspective the level of activity that would be needed to reach deep decarbonization targets.

The Best Adopted CAP Commitment Scenario is Not a Best-Case Scenario

The Best Adopted CAP Commitment Scenario presented here is not a best-case scenario analysis because we limited our review to CAP commitments. As such, we did not consider other local policies with GHG reduction potential not included in CAPs. Also, we did not compare either the resulting emissions from the Adopted CAP Commitment or Best Adopted CAP Commitment Scenario to the results of the Evolved Energy modeling effort due to their different approaches. Also, the level of activity that results from the Best Adopted CAP Commitment Scenario is less than what would be needed to achieve the deep decarbonization contemplated in the modeling and other chapters of the report.

Building Electrification and Carbon Removal and Storage Measures are limited in Adopted CAPs

Even in the Best Adopted CAP Commitment Scenario, the impact of electrification and natural climate solutions is minimal, because only CAPs adopted in recent two to three years have considered and incorporated related strategies. For example, we included the City of San Diego's 2015 CAP in the analysis, which has limited building decarbonization measures. The City of San Diego's draft 2022 CAP update, released in November 2021 and expected to be adopted in Summer 2022, which is not included in this analysis, has a measure to phase-out 90% of natural gas citywide through building decarbonization. The impacts of applying this approach regionwide can be seen in the alternative scenario presented in Section 8.4.5.

Analysis Does not Estimate Impact of Future State and Federal Policies

For this analysis, we created a Regionwide Reference Scenario without CAP Commitments, which is a projection of future emissions that includes the impacts of state and federal policies in place as of 2021. It also considers forecasts of activities like the expected increase in rooftop solar systems. However, this projection does not consider future changes in state or federal policies, which may lower projected emissions in the region. Additional analysis would be needed to develop a future State and federal policy scenario.

CAP Measures May Not Represent What is Implemented

CAPs are plans, and the measures included may not represent what is actually implemented over time. Nonetheless, CAPs represent the reasonable and feasible commitments that local jurisdictions are willing to commit to. So the Adopted CAP Commitment Scenario can be seen as the level of GHG reductions that regional leaders are currently willing to commit to. The Best Adopted CAP Scenario can be seen as an idealized version of regional CAP commitments. Implementation is a key part of the climate action planning cycle, but our analysis shows that even the Best Adopted CAP Commitment Scenario for the four decarbonization pathways included here would still result in significant remaining emissions.

CAPs are typically monitored regularly, sometimes annually, and updated typically every five years. This process provides opportunities to evaluate implementation status. While our analysis does not include a systematic review of what has been implemented or of specific levels of activity (e.g., vehicle miles traveled or percentage renewable electricity supply), where possible we included information about policies and measures that are being implemented.

8.4.5 Alternative Scenarios with the City of San Diego Draft 2022 CAP Update

The City of San Diego draft CAP 2022 update, which was released for public review in November 2021 and is anticipated to be adopted in Summer 2022, is the only draft CAP pending adoption in the region as of July 2022. The City of San Diego draft CAP update has an ambitious overall target of net-zero emissions by 2035 and ambitious measures, including phasing out of 45% of natural gas usage from existing buildings by 2030 and 90% by 2035, and achieving a 50% walking, cycling, and transit mode share of all San Diego resident trips.

Due to the scale of potential impact on GHG reductions in the region from the draft City of San Diego 2022 CAP update, two additional alternative scenarios were developed beyond the scenarios described above: (1) a CAP Commitment Scenario with the Draft City of San Diego 2022 CAP, which includes all

adopted CAPs and replaces the CAP measures from the adopted San Diego 2015 CAP with the measures from draft City of San Diego 2022 CAP update; and (2) a Best CAP Commitment Scenario with the Draft City of San Diego 2022 CAP, which re-evaluates the best commitments to include the those in the City of San Diego draft CAP.

Results of Alternative Scenarios

The results from two alternative scenarios are shown below in Figure 8.11 along with those from the analysis presented above. The solid green line represents the CAP Commitment Scenario with the City of San Diego draft 2022 CAP update; and the dashed green line represents the Best CAP Commitment Scenario with the draft City of San Diego 2022 CAP.

The GHG reductions from CAP commitments that include the draft City of San Diego 2022 CAP would be about 5.2 MMT CO_2e in 2035 (solid green line), compared with the 1.9 MMT CO_2e reduction from the Adopted CAP Commitment Scenario (with the 2015 adopted City of San Diego CAP) (solid blue line). The additional reduction is mainly due to the new and more aggressive building decarbonization and VMT reduction measures in the draft City of San Diego 2022 CAP. On building decarbonization, the draft 2022 CAP commits to decarbonize both new and existing buildings, and municipal operations. Measure 1.1 Decarbonize Existing Buildings, alone seeks to phase out 90% of natural gas use from existing buildings in the City of San Diego, equivalent to phasing out 54% of natural gas use regionwide. The total GHG reductions from building sector measures is more than 2 MMT CO_2e. On VMT reduction, the draft City of San Diego 2022 CAP commits to achieve 50% walking, cycling, and transit mode share of all San Diego resident trips, climate-focused land use, and the Walk from Anywhere initiative to reduce citywide residents' VMT. Under the CAP Commitment Scenario with the Draft San Diego 2022 CAP, these VMT reduction measures result in 4.3 billion miles avoided (93% of all miles avoided under the VMT reduction sub-category in this scenario), equivalent to 1.7 MMT CO_2e.

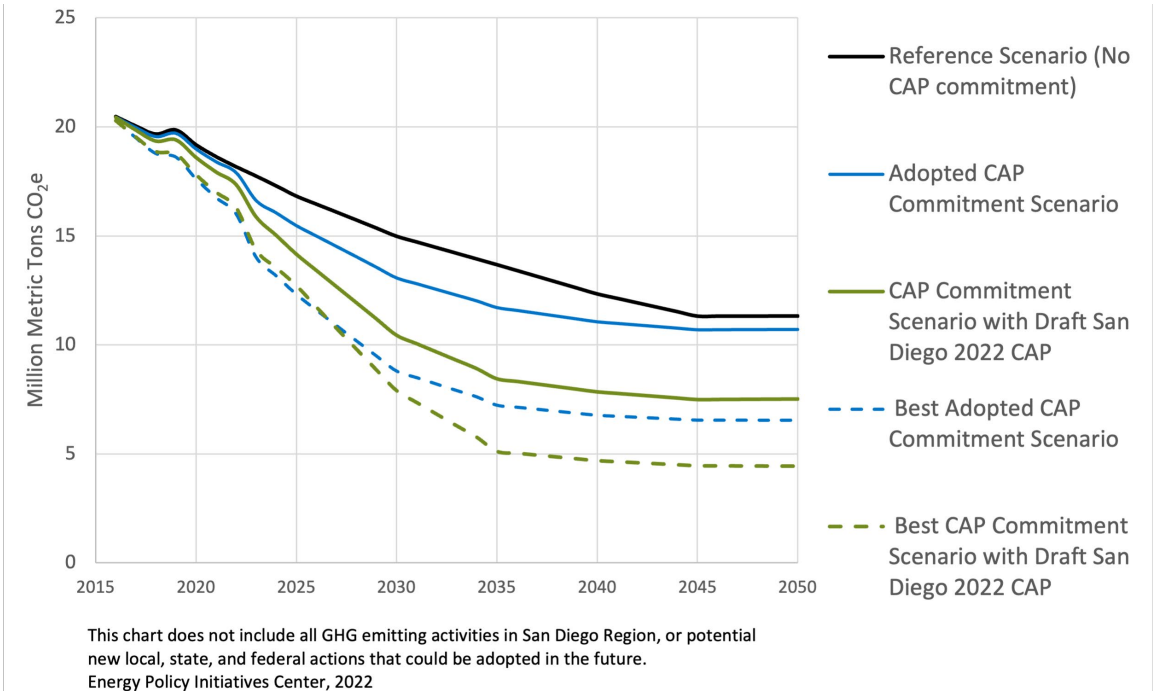


Figure 8.11 Emissions Breakdown under Alternative Scenarios with Draft 2022 San Diego CAP

Taking into consideration the measures in the City of San Diego draft CAP 2022 update, under the Best CAP Commitment Scenario, approximately 5 MMT CO_2e would remain in 2035, compared to the MMT 7 MMT CO_2e that would remain under the Best Adopted CAP Commitment Scenario.

Despite the aggressive measures in the draft City of San Diego 2022 CAP, many of the measures determined to be the most aggressive in the region are attributed to other cities. For example, under the Increase Citywide Electric Vehicle Miles Driven subcategory, the best commitment is still from both the Del Mar CAP Goal 16 and the Solana Beach CAP Measure T-1, increasing citywide electric vehicle miles driven to 30% of total miles. The 2015 San Diego CAP does not have a measure under this subcategory, and in the draft 2022 CAP, the 2035 target for Measure 2.3 Increase Electric Vehicle Adoption is to reach 25% e-VMT of all light-duty VMT. In this case, the commitments from Del Mar and Solana Beach are still the most aggressive under this subcategory.

For VMT measures, some commitments by other cities included in the Best Adopted CAP Commitment Scenario are replaced by commitments from the draft 2022 San Diego CAP, due to the way the draft City of San Diego 2022 CAP is structured. For example, instead of focusing on shifting commuter mode share to walking, biking, and mass transit, the draft 2022 CAP takes a different approach to shift mode share for all trips citywide, both commute and non-commuter trips. As a result, the previous best commitments under the Increase Commute by Biking, Walking and Mass Transit subcategories from the Imperial Beach and San Marcos CAPs are replaced by Measure 3.1 and 3.2 of the draft San Diego 2022 CAP. Measures from the City of San Diego draft 2022 CAP update are considered the best CAP commitments in several other policy subcategories, including smart growth development and parking reduction; commute TDM strategies; alternative fuel vehicles in municipal fleet; electrify new nonresidential buildings; decarbonize existing buildings; and, retrofit/decarbonize municipal buildings. A complete list of best CAP measures is provided in Appendix 8.A.

8.5 Decarbonize Transportation

On-road transportation accounts for about 47% of 2016 regional GHG emissions, more than any other category. While the modeling completed for the Regional Decarbonization Framework Technical Report focuses on accelerated adoption of ZEVs, there are other ways to reduce transportation-related emissions. In particular, both CAPs and SANDAG's 2021 Regional Plan (RP2021) include measures to reduce VMT.[i] Our analysis of CAP transportation decarbonization measures includes VMT reduction, system fuel use reduction, and increased alternative fuel use, including ZEV. Table 8.8 summarizes the key takeaways from our analyses on the Decarbonizing Transportation Pathway.

[i] VMT reduction is also discussed in Chapter 3 of this report.

Table 8.8 Summary of Key Takeaways for the Decarbonize Transportation Pathway

Policy Category	Key Takeaways
VMT Reduction	All adopted and pending CAPs have related measures; moderate GHG contribution; opportunity for more urbanized cities (e.g., higher densities, parking management) to increase access to basic services from increased transit uptake; opportunity for more aggressive walk and bike actions; opportunities across all jurisdictions to prioritize related social equity projects; significant opportunity to coordinate and cooperate as a region.
Fuel Use Reduction	Half the adopted and pending CAPs have related measures; relatively low GHG contribution because of the low activity levels; opportunity for increased fuel use reduction through system efficiencies within jurisdictions and across the region, for example, improved traffic management coordination across the region.
Alternative Fuel Vehicles & Equipment	All adopted and pending CAPs have related measures, including ZEV actions; moderate GHG contribution due to low local uptake levels; opportunity for more local action contingent on more local ZEV funding beyond state-based funding; opportunity for more municipal uptake of other low carbon fuels such as renewable diesel.

8.5.1 Summary of Findings

Key Findings of Analysis

The following are key findings from the review of legal authority to act, from the review of CAPs, and the scenario analyses of combined GHG impacts from CAPs, which include the impacts of the SANDAG RP2021.

- Local Jurisdictions Have Broad Legal Authority to Regulate Transportation Emissions – Local authority over transportation is rooted in land use authority over planning and development and does not rely on delegated general law of the state or federal government. As shown in Section 8.2, cities and counties also have delegated and derived powers, taxation powers, and police powers[i] which can be limited by state and federal laws, but can provide significant broad authority. To this end, local jurisdictions act to establish climate change policies and regulations to reduce GHGs from transportation in GPs, CAPs, zoning, transit-oriented development regulations, require infrastructure for fuel switching in buildings (e.g., electric vehicle charging equipment), build supporting infrastructure in public right of ways or on public land, and support alternative fuel production and infrastructure such as hydrogen. However, regulation of fuels and tailpipe emissions is largely preempted by state and federal law. Local jurisdictions have clear procurement authority over their own fleets and with authority to regulate indirect transportation emissions to maintain attainment or to correct nonattainment of federal and state air quality standards. State statutes and regulations create an opportunity to align local action to decrease costs for implementation by bringing state funded projects, particularly in communities of concern, to the region and deploying technology developed by state or federal funding.
- On-Road Transportation Remains the Largest Source of GHG Emissions through 2035 – In 2016, on-road transportation emitted more than 12 MMT CO_2e, about 47% of regional emissions. In 2035, emissions from on-road transportation are projected to account for about 7.5 MMT CO_2e out of a regional total of about 19 MMT CO_2e, about 41% of the total projected emissions. This includes market-based ZEV adoption, but does not include the impact of CAP measures. In 2035, on-road transportation emissions reductions from adopted CAP measures are projected to be about 0.5 MMT CO_2e in year 2035. This would reduce on-road transportation emissions to about 7 MMT CO_2e in 2035.

[i] Police power is generally understood to be the regulatory authority to protect public health, safety, and welfare.

- VMT Reduction is the Main Source of Transportation-Related Emission Reduction in CAPs – Based on the assessment of quantified CAP measures in the adopted CAP scenario analysis, in 2035, 56% of the transportation-related GHG reductions are expected to be achieved through VMT reduction measures, 42% from alternative fuel vehicles avoiding fossil fuel use, including ZEVs, and 2% from measures that reduce fuel use. Public transportation plays the largest role in reducing VMT according to adopted CAPs. Based on language in CAP measures, local jurisdictions rely heavily on SANDAG to help achieve their transportation GHG reductions.
- CAP Measures are Insufficient to Achieve State-Aligned Regional ZEV Goals – Without significantly increased support from the state or federal governments, neither SANDAG's RP2021 commitments for ZEV uptake, nor SANDAG RP2021 ZEV commitments in combination with adopted CAP ZEV measures, which are expected to add about 63,000 ZEVs, for a total of over 500,000 ZEVs, can achieve the regional share of ZEVs (771,000 ZEVs) needed to meet the state goal under Executive Order N-79-20 that calls for all new passenger vehicles sold to be zero emissions by 2035.
- Differences Exist Between Model-based Decarbonization Needs and CAP Commitments – There is a fundamental difference in the actions developed in CAPs to reduce on-road transportation emissions and Evolved Energy modeling that suggests focusing on achieving technology-based solutions and ZEV uptake. CAPs rely on VMT reduction over ZEV uptake. More study would be needed to determine how CAP VMT commitments align with SANDAG RP2021 mass transit development in specific communities, and how VMT reduction measures, if implemented as included in adopted CAPs, affect regional ZEV goals.

Summary of Opportunities for Further Local Action

The following summarizes key opportunities for further action to reduce GHG emissions from transportation based on the legal authority analysis, the CAP GHG analysis, MPO actions, review of CCA actions on decarbonizing transportation, and a literature review of social equity in transportation.

- Assess Local Legal Authority to Reduce Transportation GHG Emissions – Jurisdictions appear to have more legal authority through land use, transportation infrastructure siting, police powers, delegated authority, and taxation powers to reduce transportation GHGs, than represented by commitments in CAPs. Additional work by local jurisdictions would be needed to assess the limits of their authority to increase on-road transportation GHG reductions.
- Promote Mass Transit Use – All adopted and pending CAPs identify mass transit as the single most important measure to achieve GHG reductions through VMT reduction. Even while recognizing the significant role of regional cooperation for these measures, local jurisdictions still have multiple opportunities to promote this mode to reduce VMT. As an example, the option to provide school bus service through public buses can be assessed.
- Increase Bike and Walk Infrastructure to Increase Access to Basic Needs and Avoid VMT – An opportunity exists for local jurisdictions to make active transportation plans a requirement of new developments and evaluate the locational potential for additional active transportation in their borders. Local jurisdictions also could increase cooperation and coordination with regional walk and bike implementation projects by SANDAG and prioritize walk and bike projects in communities of concern.
- Increase Connectivity through Land Use Changes to Avoid VMT – Fewer than half the adopted and pending CAPs have addressed smart growth, and only one has addressed parking regulations. Opportunities exist for local jurisdictions to increase density, eliminate parking minimums, and permit zoning changes to promote mixed-use developments, which reduce

distances to basic needs and promote VMT reduction. Opportunities to increase density in in-fill areas have been identified in Chapter 3.[i]

- Manage Transportation Demand – Jurisdictions have the opportunity to implement Transportation Demand Management (TDM) policies together with employers. Demand management can be effective through a series of different approaches, such as density bonuses for reduced parking, trip reduction programs through the employer such as mandatory and incentivized or voluntary commute trip reduction, cash-out parking programs where employers pay workers to not drive, and employer and publicly supported vanpools.[ii]
- Assess Fuel use Reduction Potential through Improved System Efficiencies – Jurisdictions have an opportunity to identify areas for traffic calming measures, anti-idling requirements, especially around school, and provide driver behavior incentives.
- Accelerate Vehicle Retirement – CAPs generally do not address vehicle retirement, which is an opportunity to replace inefficient with cleaner alternatives, including ZEVs. Vehicle retirement can be prioritized in communities of concern, which can have older less fuel-efficient vehicles. Replacing inefficient vehicles would lead to significant air pollution reduction with associated health benefits for all.
- Increase Use of Alternative Fuel Vehicles in Municipal Fleets – *M*ore local governments can increase use of alternative, low-carbon fleet fuels in addition to ZEVs, particularly for medium- and heavy-duty vehicles. Jurisdictions can leverage and implement the existing fleet greening studies and plans. Cities could work with school districts to obtain funding for a regionwide school bus transition.
- Assess the Social Equity Trade-offs between ZEVs and Mass Transit – There is an opportunity for local jurisdictions to collaborate to assess the equity impacts of ZEV use versus increasing use of mass transit in various communities, and to align regional transportation equity analysis (e.g., SANDAG) with CAP equity analyses (e.g., City of San Diego).
- Assess the Use of LCFS Funding to Promote Transition to Lower Carbon Fuels – There may be opportunities to use cap and trade funds through the Low-Carbon Fuel Standard (LCFS) to aid in fleet electrification or transition to a lower carbon fuel as clean vehicle rebates decrease.
- Multiple Opportunities for Regional Collaboration and Coordination – On-road transportation is especially suited to regional action over local jurisdictional action because interconnections are needed between jurisdictions to serve basic needs. VMT reduction through improved connectivity and mass transit, ZEV uptake, and social equity integration may be more effective through a regional approach rather than through individual local actions as represented in CAPs. Regional projects such as assessing the use of LCFS for funding the transportation decarbonization or availability of biofuels are examples of such collaborative opportunities.
- Explore Acceleration of Transportation Decarbonization through Mechanisms such as Joint Powers Agreements – CCAs provide an example of a local mechanism, usually through Joint Powers Agreements (JPA), that can support transportation electrification by developing programs to locally incentivize EV uptake beyond state and federal programs. Similarly, other regional decarbonize transportation mechanisms may be identified which can promote local funds for transportation decarbonization.

[i] Areas in the region which meet infill definitions are provided in Chapter 3 of this report, page 70 ff.

[ii] Carlson, D. and Howard, Z. Impacts of VMT reduction strategies on selected areas and groups, Evans School of Public Affairs, Washington State Transportation Center, prepared for the State of Washington, December 20201, available at https://www.wsdot.wa.gov/research/reports/fullreports/751.1.pdf.

8.5.2 Summary of Authority in the Decarbonize Transportation Pathway

Transportation emissions may be reduced by changing land use patterns to reduce the distances needed to be traveled (e.g., reducing VMT and/or providing alternative transportation modes to single-occupant vehicles), by designing communities to reduce system inefficiencies such as those caused by transportation congestion (e.g., synchronized traffic lights), and by regulating direct (e.g., tailpipe) emissions from vehicles, including by switching to low-carbon fuels such as clean electricity. The legal authority to regulate each type of transportation emissions is summarized below.

Land Use Authority

Local authority over transportation is rooted in police power that creates land use authority over planning and development that determines where residents live and work. Because it is a police power, city and county land use authority does not rely on delegated general law of the state or federal government. Instead, state and federal laws act as limitations on a city's or county's exercise of its police power.[i] To this end, local jurisdictions act with both police power and delegated authority to establish climate changes policies and regulations to reduce GHGs from transportation in GPs, CAPs, zoning, and transit-oriented development regulations. Land use authority is subject to the vested rights doctrine[ii] and the Subdivision Map Act[iii] that limit how a subsequent change in local law or the authority to impose conditions apply to a particular improvement to land or a vesting tentative map for subdivisions.

There is limited federal preemption with regard to local land use. Certain transportation land use actions that include congestion pricing and low emission zones are means to reduce VMT and must be evaluated for potential federal preemption under the Energy Policy Conservation Act (EPCA), Clean Air Act (CAA), and Federal Aviation Administration Authorization Act.[iv,v] State law creates planning requirements that do not preempt local land use authority. These requirements inform local land use decision makers by:

- Directing local jurisdictions to identify and mitigate GHG emissions that are found to have significant environmental impacts under CEQA for projects or general plans;
- Addressing infill to reduce VMT under SB 743 (Steinberg, Chapter 386, Statutes of 2013);
- Providing CEQA streamlining benefits for implementing sustainable community strategies (SCS) to achieve regional GHG reduction targets under SB 375 (Steinberg, Chapter 728, Statues of 2008).

It is important to understand and distinguish the limited amount of federal and state preemption over local land use authority compared to the express and definitive federal and state preemption that exists over emissions from mobile sources (e.g., vehicles). These distinctions are important in understanding the extent that a local jurisdiction may act.

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[i] *DeVita v. County of Napa,* 9 Cal. App. 4th 763, 782 (1995); *Candid Enters., Inc. v. Grossmont Union High Sch. Dist.,* 39 Cal. 3d 878, 885 (1985).

[ii] *Avco Community Developers v. South Coast Reg'l Comm'n,* 17 Cal. 3d 785, 791 (1976), superseded by statute as stated in *Santa Margarita Area Residents Together v. San Luis Obispo County Bd. of Supervisors,* 84 Cal. App. 4th 221, 229 (2000).

[iii] See Government Code §§ 66410–66499.38; Govt Code § 66474.2 & 66498.1(b).

[iv] 49 U.S.C.A. §§ 14501(c)(1) & (c)(2)(A).

[v] Turner, Amy E. and Burger, Michael, "Cities Climate Law: A Legal Framework for Local Action in the U.S." (2021). Sabin Center for Climate Change Law. p. 37: https://scholarship.law.columbia.edu/sabin_climate_change/2

Indirect Regulation of Transportation Emissions

The San Diego County Air Pollution Control District (SD APCD) may regulate indirect emissions to reduce emissions from transportation and areawide emission sources to achieve and maintain state ambient air quality standards.[i] However, there is uncertainty over jurisdiction and how to interpret this authority for indirect emissions.[ii] Existing authority has been used by other air districts to create a voluntary GHG reduction credit generation and certification program to help address GHG emissions of this type through CO_2 reductions. There are examples of voluntary programs for transportation emission reductions that may be applicable to SD APCD.[iii] Transportation emissions may also be regulated indirectly through pricing mechanisms, such as congestion or toll pricing, however, these measures may require compliance and/or approval from state and/or federal governments (See Appendix B, Section B.1.)

Concurrent authority may allow a local jurisdiction to further regulate air quality under its police power,[iv] although local jurisdictions would need to develop internal technical expertise by hiring staff and avoid state and federal preemption. It should be noted that there is no statutory power granted to SD APCD to infringe on the existing local government authority over land use with regards to air quality regulation (e.g., zoning).[v]

Regulation of Direct Emissions from Vehicles

Federal and state law and regulation preempt local jurisdictions from regulating GHG emissions directly from on-road and off-road mobile sources under the EPCA and CAA. It is unclear whether local jurisdiction police power or delegated permit, fees, rules, and regulations under California Public Utilities Code § 5371.4 (f)–(g) related to city and counties may allow for the acceleration of the reduction targets and goals for transportation network companies (TNCs). Local authority may exist to regulate certain small off-road engines, but further research is required. California continues to invest heavily in reducing emissions from all transportation sources through its state agencies and programs, particularly CARB and the California Energy Commission (CEC). Aligning local actions and policies with state policy and funding may accelerate local implementation and decrease costs.

Fuels and Infrastructure

State preemption exists in the form of the CARB administered LCFS, which regulates the carbon intensity of transportation fuels in California.[vi] State preemption exists over types of reformed fuels that are sold in California, including the Low Emission Diesel and Standards for Diesel Fuel regulations,[vii] as well as the

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[i] Health & Safety Code §§ 40910, 40716–40717

[ii] Health & Safety Code §§ 42300–42339; See Health & Safety Code §§ 40716(b) & 41015 (sometimes interpreted as not prohibiting parallel permitting systems for indirect sources); See 76 Ops Call Atty Gen 11 (1993) (Attorney General opinion that authority of an APCD or AQMD does not extend to requiring permits for indirect sources; Note: Attorney General opinions are nonbinding).

[iii] See Sacramento Metropolitan AQMD Rule 206 Mobile and Transportation Source Emission Reduction Credits (Adopted December 15, 1992; Amended December 5, 1996): http://www.airquality.org/ProgramCoordination/Documents/rule206.pdf.

[iv] See Health & Safety Code §§ 39002, 39037, & 41508.

[v] See Health & Safety Code §§ 40716(b) & 41015.

[vi] See 17 C.C.R. §§ 95480–95503; See also Executive Order N-79-20, Order No. 9 (September 23, 2020): https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.

[vii] See 13 C.C.R. §§ 2281–2285, 2299–2299.5; 17 C.C.R. §§ 93114, 93117, 93118, 93118.2, 93118.3, 93118.5; 13 C.C.R. §§ 2281–2285 & 2299–2299.5.

development and commercialization of alternative diesel fuels for sale in California.[i] CPUC regulation does not automatically extend over compressed natural gas and hydrogen fueling stations[ii] like intrastate pipelines for natural gas and hydrogen where entities meet the public utility definition. There is uncertainty as to whether the Federal Energy Regulatory Commission (FERC) acts with authority over interstate hydrogen pipelines under the Natural Gas Act.[iii]

Local jurisdictions may:

- Exercise police and land use authority to prohibit zoning for new gas stations or support alternative fuel infrastructure through zoning and expediting permitting for renewable natural gas fueling stations, hydrogen fueling stations, and electric vehicle charging equipment (EVSE);
- Require installation or pre-wiring for EVSE in the public right of way, on new residential and/or nonresidential buildings, or when additions or alterations to existing residential and/or non-residential buildings occur[iv]; and
- Consider state assessments of infrastructure need and funding to inform the exercise of their own authority to develop and help fund fuels and infrastructure.

New Vehicle Sales and Fleet Procurement

Local jurisdictions act with clear authority to procure fleets for their operations with limited federal preemption under the "market participant exception" of the Dormant Commerce Clause.[v] Local jurisdictions have been prohibited from mandating the purchase of the certain type of clean technology vehicles for private classes of vehicles, such as taxis.[vi] Local jurisdictions act with clear authority to procure fleets for their operations with limited preemption by the state.[vii]

8.5.3 GHG Impacts of CAP Measures in the Decarbonize Transportation Pathway

In general, the decarbonization of transportation in CAPs is achieved by (1) reducing VMT; (2) accelerating uptake of alternative fuels, including ZEVs; and (3) reducing fuel use by increasing the efficiency of the transportation system such as through traffic calming measures. This section complements Chapter 3 by summarizing the GHG impacts from CAP measures related to decarbonizing transportation, including those from the review of CAPs (Section 8.3) and the scenario analysis of GHG Impacts (Section 8.4).

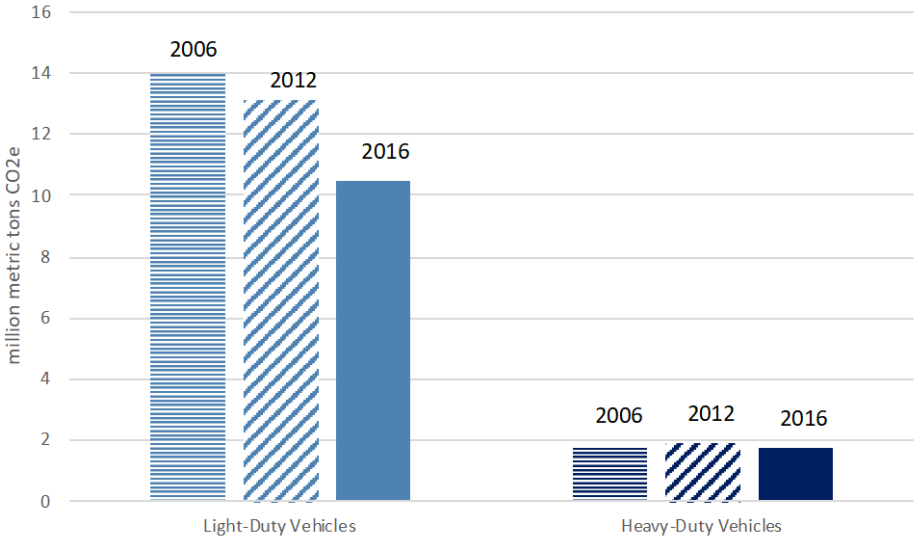
Historical and Projected Emissions from On-road Transportation

Regional 2016 GHG Inventory and Historical Emissions

In 2016, on-road transportation (LDVs and HDVs) emitted more than 12 MMT CO_2e, or about 47% of

[i] 13 C.C.R. §§ 2293–2293.9.
[ii] California Public Utilities Code § 216 (f).
[iii] See 14 U.S.C.A § 717a (5).
[iv] See 12 C.C.R. Part 11 (2021); See Health & Safety Code §§ 17958.5, 17958.7 & 18941.5(b).
[v] 49 U.S.C.A § 32919(c); See *Engine Mfrs. Ass'n v. South Coast Air Quality Mgmt. Dist.,* 498 F.3d 1031, 1040 (9th Cir. 2007); *Tocher v. City of Santa Ana*, 219 F.3d 1040, 1049 (9th Cir. 2000); See also *City of Columbus v. Ours Garage & Wrecker Serv., Inc.*, 536 U.S. 424, 431 (2002).
[vi] *Metro. Taxicab Bd. of Trade v. City of New York*, 615 F.3d 152, 157 (2d Cir. 2010), *cert. denied*, 562 U.S. 1264 (2011); *Ophir v. City of Boston*, 647 F. Supp. 2d 86, 94 (D. Mass. 2009).
[vii] See 13 C.C.R. §§ 2023 et seq; See 13 C.C.R. §§ 1963; 1963.1,1963.2,1963.3,1963.4,1963.5,2012,2012.1, & 2012.2; See 17 CCR §§ 95690.1, 95690.2, 95690.3, 95690.4, 95690.5, 95690.6, 95690.7, and 95690.8.

regional emissions. Based on SANDAG's modeled regional GHG emissions estimates in 2006, 2012, and 2016, on-road transportation emissions have decreased 33% during this period, and the contribution of emissions from LDVs, which include passenger vehicles and SUVs, has decreased from 90% to 85% (Figure 8.12). The contribution of HDVs to GHG emissions increased about 9% during 2012 to 2016. However, LDVs continue to comprise the largest portion of all regional emissions, about 40%, and similar to state proportions.



Source: San Diego County 2006 Greenhosue Gas Inventory (EPIC, 2008)
2015 Regional Plan (SANDAG, 2015)
2021 Regional Plan (SANDAG, 2021)

Figure 8.12 Historical on-road transportation emissions, San Diego County.

Projected On-road Transportation Emissions

In 2035, SANDAG's 2021 Regional Plan estimates a regional total of GHG emissions from all sources to be about 19 MMT CO_2e in 2035, of which nearly 8 MMT CO_2e will be from on-road transportation before CAP measure reductions. On-road GHG emissions are projected to remain the largest source of GHG emissions in 2035, about 41% of the total projected emissions in 2035, including the impacts of market-based ZEV adoption. However, LDV contribution to GHGs decreases to 32% in 2035 compared with 41% in 2016, while HDV emissions contribute relatively more (9%) in 2035 than in 2016 (Figure 8.13).

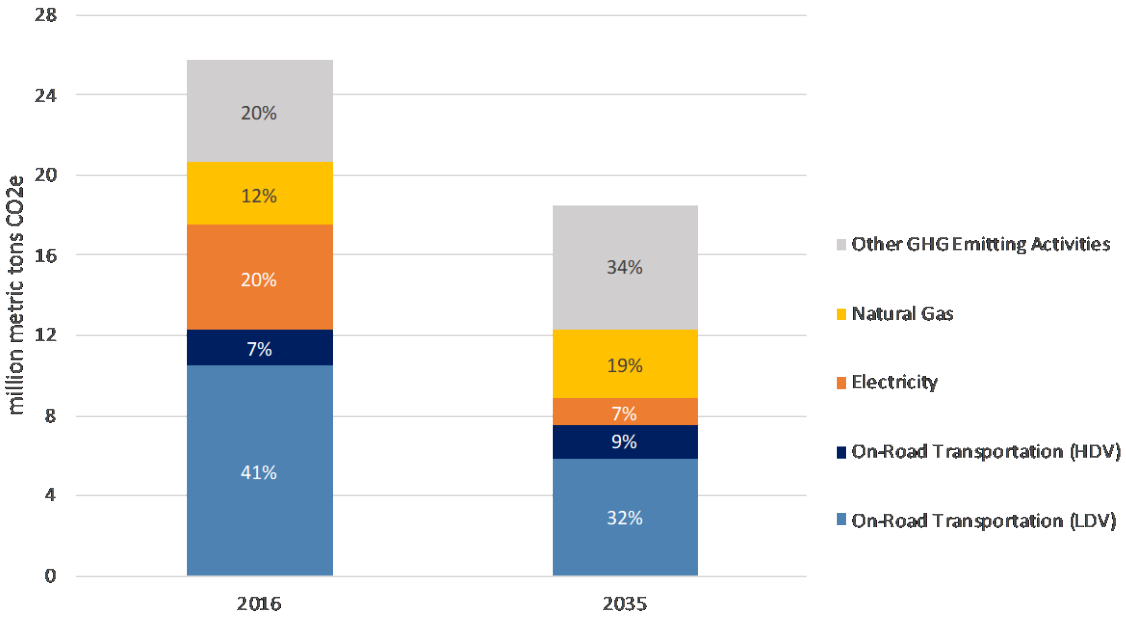


Figure 8.13 Regional 2016 GHG Inventory and 2035 Projection. Other GHG emitting categories include industrial, off-road transportation, waste, water, aviation, etc. Source: SANDAG 2021 Regional Plan, Appendix X.

The on-road transportation emissions in 2035 of nearly 8 MMT CO_2e include the estimated impacts of Federal and State measures on fuel efficiency, and an assumed 8% ZEVs in the fleet. On top of those reductions, SANDAG is expected to achieve an additional 0.41 MMT CO_2e reduction in 2035 from regionally-funded ZEVs and infrastructure EVCS and TDM measures for an estimated 7.5 MMT CO_2e emissions from on-road transportation in 2035.

SANDAG's regional measures are able to achieve about another 5% decrease in the on-road emissions in 2035. The 38% drop in on-road emissions from 2016 to 2035 translates to per capita CO_2e reduction from 3.7 MT CO_2e in 2016 to 2.1 MT CO_2e in 2035, despite a projected increase of 2% VMT during 2016-2035.[i] The remaining on-road emissions of about 7.5 MMT CO_2e in 2035 is equivalent to more 17 million barrels of oil or enough energy for nearly 1 million homes today.[ii] To put this into context, if using natural climate solutions, this would require planting more than 124 million tree seedlings grown for 10 years, according to EPA estimates.[iii]

The reductions above do not include what is available from local jurisdiction CAP actions, which will be discussed in the following sections.

Review of CAP On-Road Transportation Policies

For this analysis, we show GHG impacts of the decarbonization pathways to the GHG reduction from all local measures in adopted and pending CAPs, including the City of San Diego draft 2022 CAP update. Based on this analysis, CAP measures in the Decarbonize Transportation Pathway account for between 7% and 51% of all local CAP reductions, with an average across all CAPs of 30% (Figure 8.14).

[i] SANDAG 2021 Regional Plan Appendix X.
[ii] EPA https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.
[iii] Id. at note 152.

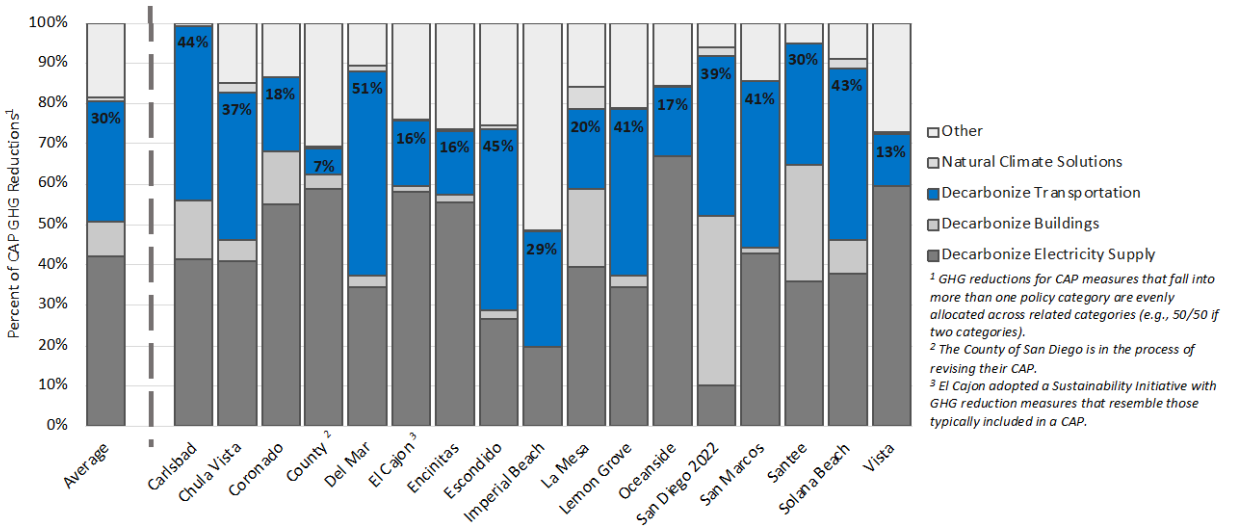


Figure 8.14 Contribution of Measures to Decarbonize Transportation in Adopted and Pending CAPs

A further breakdown of CAP measures to decarbonize transportation from the review of CAPs shows that nearly all adopted and pending CAPs have measures related to all three policy category approaches — VMT reduction, fuel use reduction through system efficiencies, and alternative fuel vehicles and infrastructure (Figure 8.15).[i] CAP measures related to alternative fuel vehicles, including electric vehicles, contribute between less than 1% to nearly 50% of the reductions within a CAP, with an average reduction of 16%. Those related to VMT reduction range from less than 1% to 30%, with an average of 12%. While most CAPs have measures related to fuel use reduction, its average contribution to local GHG reductions is minimal (approximately 1%).

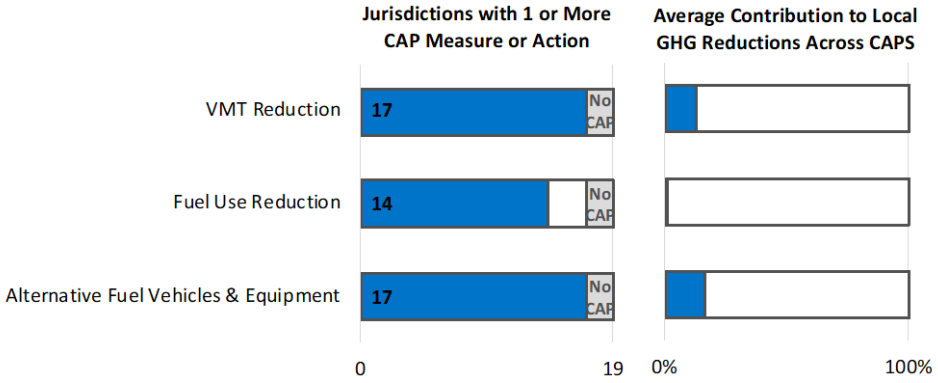


Figure 8.15 Number of CAPs with Main Approaches to Reduce on-Road Transportation Emissions.

More details from the review of CAPs for each policy category and related subcategories, and from the existing CAP commitments will be provided in the following sections. As described above in Section 8.3.3, we did not estimate the contribution of the policy subcategories to local GHG reductions across CAPs.

Scenario Analysis of GHG Impacts from Adopted CAP Commitments

In contrast to the review of CAPs, which considers measures in all emissions categories and does not consider the combined impact of measures, the scenario analysis evaluates emission reductions from the three main emission categories — on-road transportation, electricity, and natural gas, and estimates

[i] Note: the Alternative Fuel category does contain a minor number of off-road policies.

the GHG impact of all related CAP measures. Results of the analysis of emissions associated with decarbonizing transportation are presented here. The emission reduction from each policy category within the Decarbonize Transportation Pathway only shows quantified policies as shown in Figure 8.16 as not all policies relating to each policy category are quantified in CAPs.

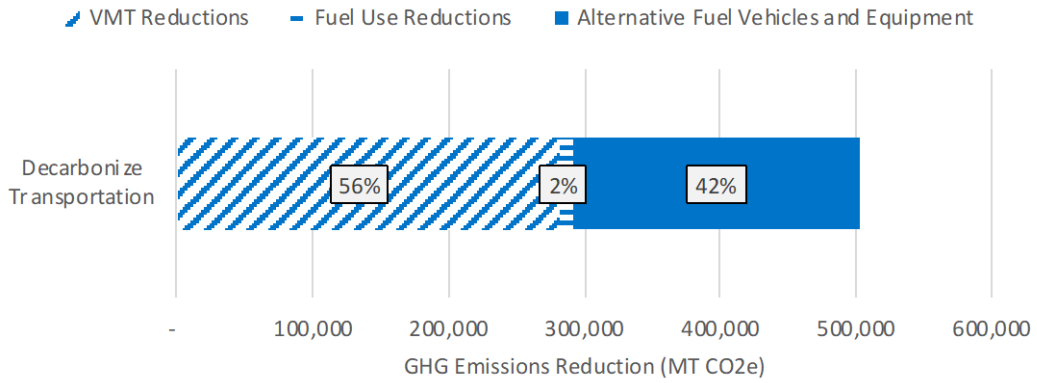


Figure 8.16 Projected Baseline Impact of Adopted CAP Policy Commitments to Reduce On-Road Transportation GHG Emissions, 2035.

Based on the Adopted CAP Commitment Scenario, GHG reduction from on-road transportation measures in CAPs are about 0.5 MMT CO_2e in 2035. Of this total, 56% comes from VMT reduction and 42% from alternative fuels, including electricity. This reduction from the 17 CAPs combined is greater than the 0.41 MMT CO_2e reductions achieved by SANDAG VMT actions in 2035. The impact of reduction from CAP on-road transportation commitments on the projected 2035 regional inventory is shown in Figure 8.17.

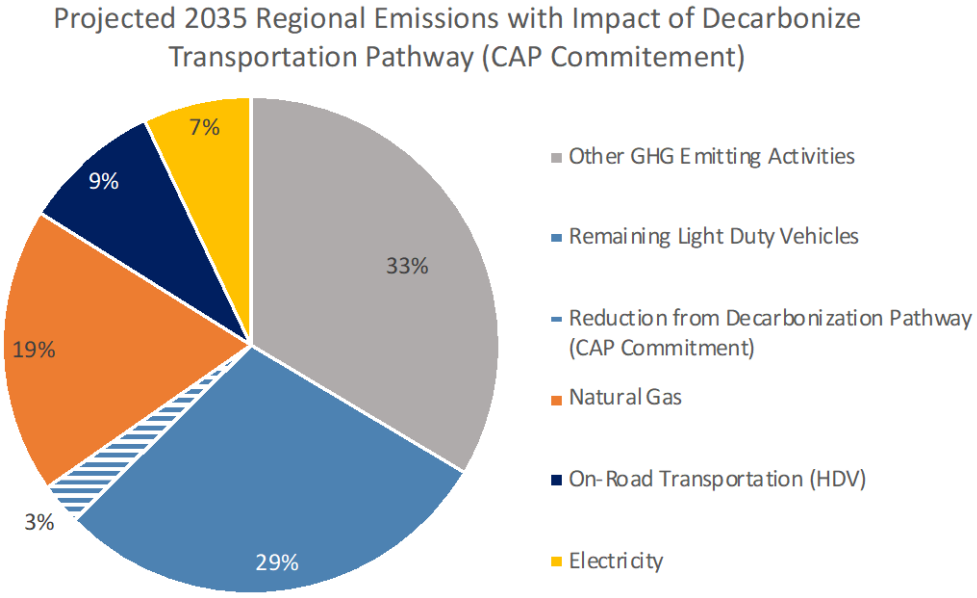


Figure 8.17 Impact of Reduction from CAPs on the Projected 2035 Regional Inventory

The GHG reductions from the Adopted CAP Commitment Scenario for the three policy categories are shown in Table 8.9. Within the VMT Reduction policy category, mass transit plays the largest role; within alternative fuels, ZEVs play the largest role; and reducing fuel use by improving transportation system efficiencies plays only a minimal role.

Table 8.9 Adopted CAP Commitments and GHG Reductions, 2035.

Decarbonization Pathway	Policy Category	Policy Subcategory	GHG Emissions Reduced in 2035	
			MT CO_2e	Distribution within Pathway
Decarbonize Transportation	VMT Reductions	Increase Commute by Biking	42,896	9%
		Increase Commute by Walking	1,221	0.2%
		Increase Safe Routes to School	79	0.02%
		Complete Street	650	0.1%
		Increase Commute by Mass Transit + Intra-city Shuttle	200,963	40%
		Reduce Parking	9,781	2%
		Commute TDM Strategies	24,140	5%
		Increase Commute by Vanpool	2,065	0.4%
	Fuel Use Reductions	Traffic Signal Synchronization	3,893	1%
		Install Roundabouts	5,623	1%
		Vehicle Retirement	446	0.1%
	Alternative Fuel Vehicles and Equipment	Increase City-wide electric vehicle miles	187,364	37%
		Increase alternative fuel vehicles in municipal fleet	23,269	5%
		Total:	**502,389**	**100%**

Best Adopted CAP Commitment Scenario

We estimate the GHG impacts if all jurisdictions were to implement the most ambitious commitment (Appendix 8.A) in any adopted CAP across the region in 2035. If all CAPs implement the most ambitious commitment in any CAP for 2035, on-road transportation measures would provide the largest reduction of the categories included in the analysis, about 3.5 MMT CO_2e, with VMT reduction providing the largest amount followed by ZEVs (Figure 8.18). This reflects the fact that adopted CAPs expect to achieve the most on-road transportation reductions through VMT policies, especially mass transit. It does not imply that all jurisdictions should or can apply the currently most ambitious policies, but provides an upper limit of what could be achieved with current policies in CAPs.

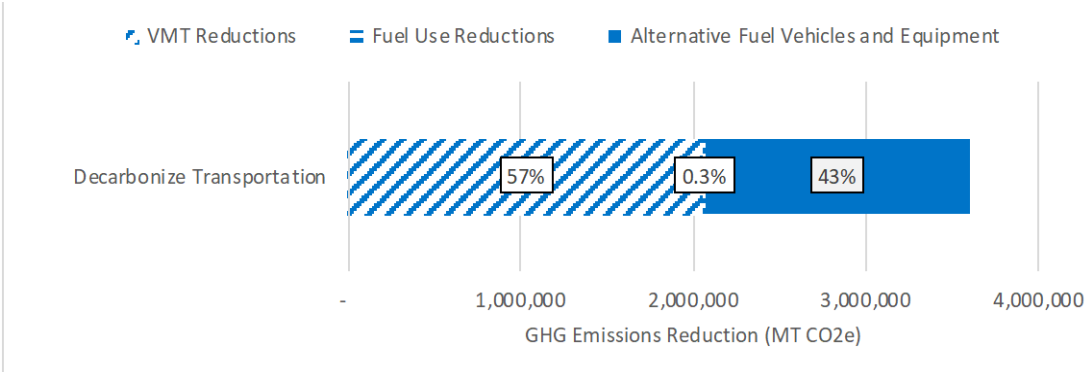


Figure 8.18 Impact of Best Adopted CAP Commitments Applied to All Jurisdictions, 2035.

Figure 8.19 shows the portion of the total GHG reduction attributed to measures to decarbonize transportation. In the Best Adopted CAP Commitment Scenario, these measures represent a significant

portion of total GHG reductions in 2035 through 2050. However, even with the most ambitious adopted CAP commitment applied all jurisdictions; the region fails to get much closer to zero emissions.

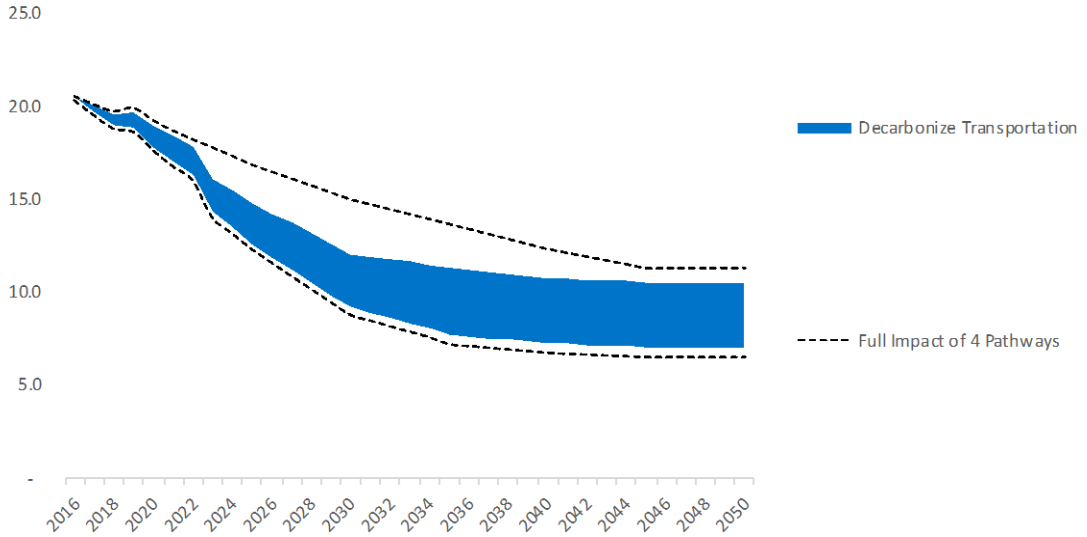


Figure 8.19 Regional Impact of Best Adopted CAP Commitments to Decarbonize Transportation.

The best Adopted CAP commitment GHG reductions and associated activity levels are shown in Table 8.9. In this scenario, within the transportation reductions, there would be a 43% reduction in VMT across the region in 2035, within which vanpools, parking strategies, transit commute and commute TDM policies play the largest roles, in that order. However, the ZEV uptake would contribute a similar amount of reductions. As mentioned, even if the most ambitious policies were implemented by all jurisdictions, significant transportation emissions remain to be removed in 2035.

Table 8.10 GHG Reduction by Policy Category and Subcategory (Best Adopted CAP Commitment Scenario).

Decarbonization Pathway	Policy Category	Policy Subcategory	GHG Emissions Reduced in 2035	
			(MT CO_2e)	Distribution within Pathway
Decarbonize Transportation	VMT Reductions	Increase Commute by Biking	30,416	1%
		Increase Commute by Walking	14,833	0.4%
		Increase Safe Routes to School	1,440	0.04%
		Complete Street	6,387	0.2%
		Increase Commute by Mass Transit + Intra-city Shuttle	213,231	6%
		Reduce Parking	647,937	18%
		Commute TDM Strategies	215,248	6%
		Increase Commute by Vanpool	927,567	26%
	Fuel Use Reductions	Fuel Reduction from Traffic Calming	12,283	0.3%
		Vehicle Retirement	2,973	0.1%
	Alternative Fuel Vehicles and Equipment	Increase City-wide electric vehicle miles	1,502,651	42%
		Increase alternative fuel vehicles in municipal fleet	24,066	1%
		Total:	**3,599,034**	**100%**

8.5.4 VMT Reduction

In general, increasing accessibility to basic needs and mobility while reducing VMT is the aim of this policy and requires a shift from single-occupant passenger vehicle use into alternative modes that are more energy efficient than single occupant vehicles.

Currently, most trips in the region are made by single occupant vehicles (Figure 8.20). Implementation of SANDAG's RP2021 is projected to lead to a 20% decrease in per capita VMT by 2035 as required under SB375.[i] There is projected to be some change in mode share across the region, but this increase in mode share 2016–2035 is overtaken by net absolute VMT growth of 2% based on SANDAG's ABM2+ model.[ii]

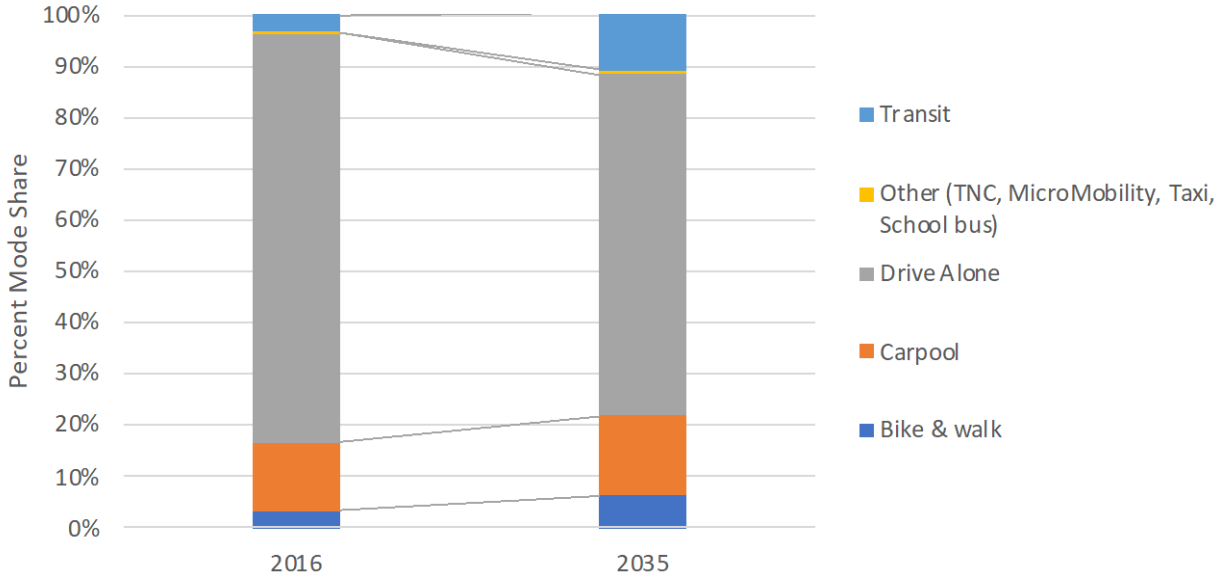


Figure 8.20 Percentage of Passengers by Mode, 2016 and expected in 2035, from the SANDAG RP2021. Source: SANDAT RP 2021, Appendix T

VMT Reduction Measures in Adopted and Pending CAPs

Results from the review of adopted and pending CAP measures to reduce VMT are summarized by policy subcategory (down) and implementation mechanism (across) (Figure 8.21). Most CAPs have measures related to education and outreach, plans or programs, and capital improvement and infrastructure. There are relatively few CAPs with measures to require or provided incentives for VMT reduction activities.

Results from the adopted CAP scenario analysis for VMT reduction policies is summarized in Figure 8.22. Within VMT reduction policies, the largest impacts come from mass transit followed as a distant second by bike, walk and complete street policy subcategories. Note that CAP VMT reduction measures would be additional to SANDAG RP2021 measures.

[i] SANDAG RP2021, Appendix T: Network Development and Performance, Table T6.2.
[ii] SANDAG RP2021, Appendix T: Network Development and Performance, Table T6.1.

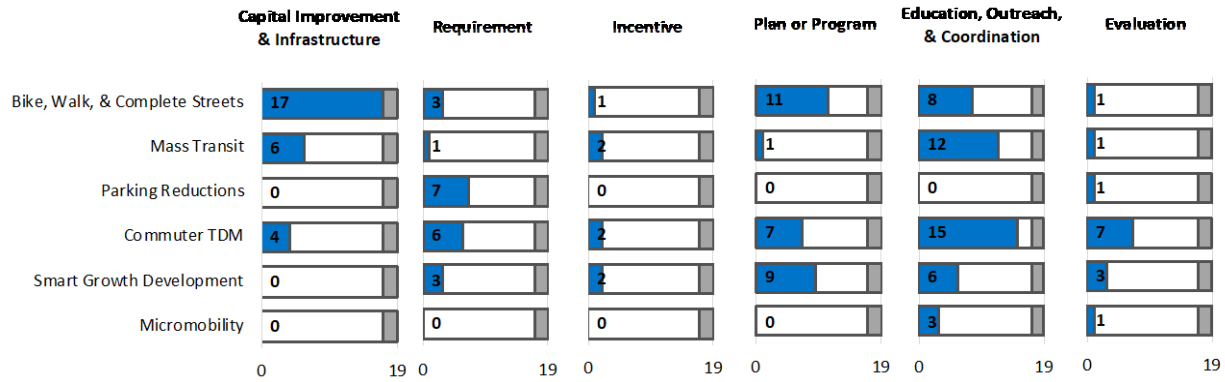


Figure 8.21 Number of Adopted and Pending CAPs with Measures Related to VMT Reduction

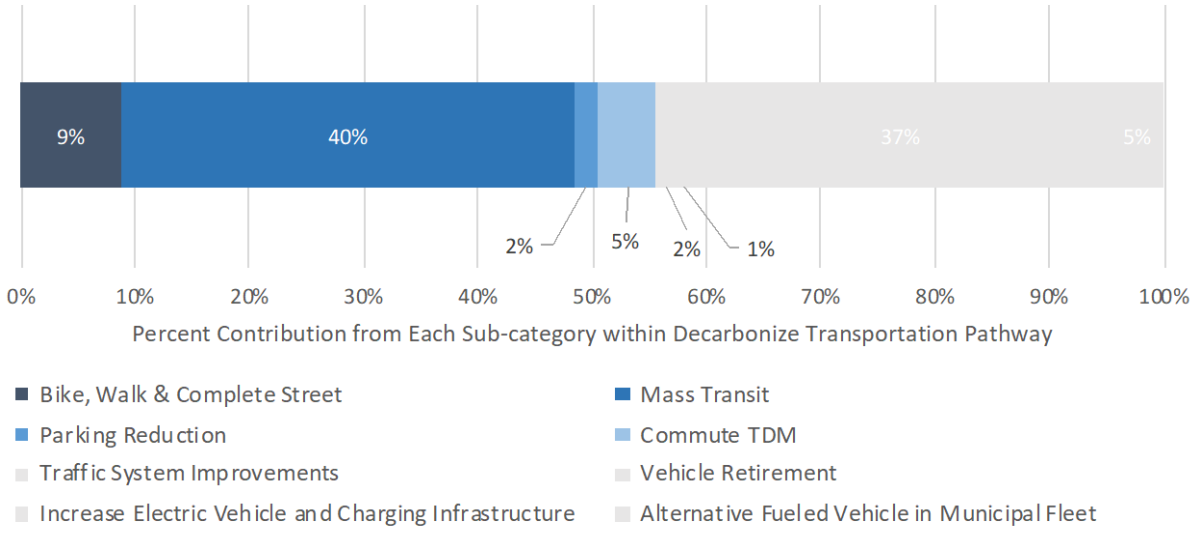


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Figure 8.22 Emissions Reduced from Measures to Reduce VMT in Adopted CAPs in the San Diego Region

Mass Transit

Mass transit accounts for the most GHG reductions from VMT reductions in CAPs (40%, Figure 8.22). Most associated measures in CAPs (Figure 8.21) relate to education and outreach; the focus on education and outreach may suggest the legal and/or capacity limitations of jurisdictional authority over mass transit. The educational policies for mass transit as written in CAPs also demonstrate a high reliance on regional collaboration with SANDAG and regional transit agencies such as MTS and NCTD. Given this dependence, it is unclear whether the GHG reduction commitment potential for mass transit (40%) as identified in the Adopted CAP Commitment Scenario would in fact be achievable without regional collaboration and funding. From the review of CAPs, it appears that individual jurisdictions' capital projects mechanism relates to relatively minor mass transit infrastructure projects, such as installation of bus shelters. These do not in themselves lead to the large VMT reduction commitments in the CAPs, though they are necessary additions to a transit network.

Other general implementation mechanisms for mass transit measures in CAPs are provided in Figure 8.10. Mandating new developments to provide connections to the mass transit network is given only in one CAP.

Table 8.11 General CAP Policies – Mass Transit Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Install mass transit infrastructure (e.g., bus shelters) • Implement an intra-city shuttle system
Education, Outreach, & Coordination	• Partner with and encourage transit providers for improved/enhanced service • Advocate for improved transit infrastructure • Participate in regional transit planning programs • Pursue partnerships and grant opportunities for funding • Partner with neighboring jurisdictions to identify opportunities to increase transit ridership • Partner with school districts to increase school bus ridership
Evaluation	• Evaluate transit routes and frequency
Incentives	• Provide subsidized or discounted transit fares
Plan or Program	• Develop an intra-city shuttle program • Develop a Safe Routes program to provide access to mass transit network
Requirement(s)	• Require new development to provide connections to mass transit network

Even if local government actions as reflected in CAPs are necessary to implement effective mass transit uptake, the ultimate funding and construction of a transit network requires significant cooperation, coordination and support at SANDAG, and among member jurisdictions. SANDAG is subject to both federal law and state law in its planning and construction of projects. SANDAG serves as the regional federally designated metropolitan planning organization (MPO), regional transportation planning agency, congestion management agency, and council of governments for San Diego County. For transit, it is a "consolidated agency" that combines the responsibilities and powers of the SANDAG, the San Diego Metropolitan Transit Development Board, and the North San Diego County Transit Development Board for long-term transit planning, funding, and construction.[i] In particular however, before projects can be implemented, these must be approved and supported by SANDAG board members, as well as funded, or funding raised, to plan and construct. This process often requires years or decades to move from proposal to completion, proving a considerable hurdle for large-scale infrastructure projects such as transit.

Bike, Walk, and Complete Streets

This shows that of the VMT reduction policy subcategories, more CAPs have the bike, walk and complete streets subcategory than any other policy subcategory although these provide only 9% of the reductions in the Adopted CAP Commitment Scenario. All CAPs have at least one related measure implemented through the capital improvement and infrastructure mechanism, followed by measures to develop a plan or program and conduct education and outreach. Only two CAPs have measures to mandate actions related to bike, walk, and complete streets and only one includes evaluation of the impact of bike, walk and complete street projects as part of the CAP itself. None of the CAPs commit to encourage bike, walk and complete streets through financial incentives.

Except for the County, other CAPs quantify only bike and walk policies. The County CAP quantifies the GHG reductions from a complete streets measure as a combination of incentives, improved street

[i] See SB 1702 (Peace, Chapter 743, Statutes of 2002), available at: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200120020SB1703.

connectivity and bike and walk improvements which would fall under the capital improvement and infrastructure mechanism. General policies in CAPs to address the bike, walk and complete streets policy subcategory, by implementation type, are shown in Table 8.12.

Table 8.12 VMT Reduction in CAPs: General CAP Policies in the Bike, Walk & Complete Streets Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Install bike and pedestrian projects and facilities • Improve existing bicycle and pedestrian facilities • Complete streetscape improvements for safety and accessibility • Implement complete streets policies • Implement active transportation master plan • Purchase e-bikes for municipal employee use • Expand bicycle parking facilities • Install sharrows on bike routes • Improve connectivity between mass transit and active transportation networks
Education, Outreach, & Coordination	• Promote bicycle use and safety • Facilitate bike-sharing services • Encourage installation of bike and pedestrian facilities at nonresidential developments • Develop partnerships to promote active transportation safety • Coordinate efforts with SANDAG • Pursue partnerships and grant opportunities for funding
Evaluation	• Monitor bicycle lane usage
Incentives	NA
Plan or Program	• Develop a Complete Streets policy • Develop an Active Transportation Plan or Similar (e.g., Bike or Pedestrian) • Update existing Active Transportation Plans or Similar (e.g., Bike or Pedestrian) • Develop a bicycle sharing program
Requirement(s)	• Require new development to provide connections to active transportation network • Require increased bicycle parking facilities at certain nonresidential locations

Jurisdictions have a certain amount of authority on their own roadways. The limits of this authority for pricing mechanisms are not known (See Appendix B, Section B.1). The adoption and implementation of CAP measures such as ATPs may be restricted to local roads or need coordination with the regional planning agency.

Parking Reductions

Parking reductions are addressed in adopted CAPs largely as a requirement in 7of 17 CAPs, but provide only 1.9% of the GHG reductions, based on the Adopted CAP Commitment Scenario, due to the small number of projects included. Examples of policies include removing parking minimums or evaluating the potential by conducting parking surveys in certain areas (e.g., near mass transit, developing a parking plan for urban areas, and requiring certain new developments to reduce off-street parking requirements).

Parking types range from on-street, off-street to surface lots and structures. Especially parking structures are expensive, with the median construction cost for a new parking structure in 2019 at $21,500 per space or $64.66 per square foot due to land costs, construction and operating costs and

indirect service costs.[i] Many cities in California have recently approved parking removal policies: Sacramento in January 2021 approved abolishing parking minimums[ii] and are assessing parking maximums; Berkeley in January 2021 eliminated off-street parking for new developments with some exceptions for fire and narrow streets, and implemented parking maximums where transit is plentiful[iii]; San Francisco in 2018 eliminated parking by ordinance and parking is not required for any new developments in the city[iv]; the City of San Diego's 2022 Ordinance O-21041 eliminated minimum parking requirements for many businesses and multifamily developments in Transit Priority Areas so that these spaces may now be used for other purposes and reduces costs for developments.[v] These policies may occur outside of CAPs.

Commuter Transportation Demand Management (TDM)

Commuter TDM measures in adopted CAPs relate mostly to education and outreach, encouraging employers and employees to manage transportation demand, and assessing demand management. Seven CAPs commit to develop TDM plans or programs to that can motivate demand reduction, and three CAPs have relatively weak actions to reduce demand, such as on-line permitting. Plans, programs and incentives being more voluntary, provide fewer GHG reductions[vi] than mandatory TDM measures. Five jurisdictions, including the County, address commuter TDM through a TDM ordinance as well as educational outreach. Commuter TDM provides 5% of the CAP reductions in 2035 in the Adopted CAP Commitment Scenario.

[i] RMM, More California cities eliminate parking minimums to promote low carbon transportation and affordable housing. See also Victoria Transport Policy Institute, Transportation cost and Benefit Analysis II – Parking Costs, at www.vtpi.org, p 5.4-1.

[ii] Parking Requirements, available at https://www.munistandards.com/ca/sacramento/parking-requirements/.

[iii] Berkeley City Council ends parking requirements for new housing, available at https://www.dailycal.org/2021/01/29/berkeley-city-council-ends-parking-requirements-for-new-housing/.

[iv] Ordinance No 277-18, 10/22/2018 available at https://sfgov.legistar.com/View.ashx?M=F&ID=6797067&GUID=F6DB5973-9768-48AD-B217-F8E46FF0C86ASan.

[v] San Diego City Council votes to repeal minimum parking requirements for new housing, available at https://timesofsandiego.com/politics/2019/03/04/san-diego-city-council-votes-to-repeal-minimum-parking-requirements-for-new-housing/.

[vi] P.89, Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity *Designed for Local Governments, Communities, and Project Developers, Public Draft August 2021.* Henceforth: CAPCOA Handbook 2021. Voluntary TDM measures can provide up to 4% GHG reduction from a project's employee commute VMT reduction while a mandatory measure can reduce up to 26% from a project.

Table 8.13 General CAP Policies – Commuter TDM Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Launch and transition to an online municipal permitting system
Education, Outreach, & Coordination	• Facilitate first-mile/last-mile transportation options (e.g., bike- and car-sharing) • Collaborate with SANDAG on regional TDM plans • Promote use of alternative transportation modes (e.g., vanpool, carpool) • Connect employers with TDM resources • Promote regional TDM programs • Encourage employers to develop and participate in TDM programs • Develop partnerships to promote TDM programs and strategies • Encourage municipal employees to use a TDM commute method (e.g., vanpool, carpool)
Evaluation	• Conduct a transportation demand management study • Review SANDAG's TDM KPIs annually • Conduct surveys to determine TDM usage rates
Incentives	• Provide incentives to municipal employees who use alternative transportation • Provide incentives to businesses with TDM strategies in place
Plan or Program	• Develop a citywide TDM plan • Develop a TDM plan for municipal employees • Develop an incentive program for municipal employees to use alternative transportation
Requirement(s)	• Require new nonresidential projects and certain retrofits to adopt a TDM plan/strategies • Require carpool and vanpool parking in new development

Smart Growth Development

As mentioned previously, not all VMT reduction measures are quantified in CAPs as local actions, and are therefore not represented in Figure 8.21 and Figure 8.22. Measures not quantified as local actions but included as policies in CAPs are smart growth plans or programs. General implementation mechanisms for these policies are shown in Table 8.14.

Smart growth development generally means zoning changes and density increases in new developments. The CAPCOA Handbook for Analyzing Greenhouse Gases[i] includes these as land use changes, such as increased residential density, increased job density, providing transit-oriented development, and improving street connectivity. These developments are considered to be part of the legislatively-adjusted BAU but if identified as specific projects in CAPs could have long-term VMT reduction potential by planning for focused new development in mobility hubs, for example. CAPs generally do not estimate reductions from plans and programs, even if they have the potential for long-term efficient development. Plans or programs (e.g., zoning changes to accommodate density increase) may be supported at a later stage by incentives (e.g., for example, density bonuses), and at an even later stage may become requirements for new development (e.g., minimum number of multifamily units), at which point they could be quantified for GHG reduction in CAPs. Therefore, where jurisdictions can identify new future developments that are not yet included in the BAU regional projection, CAPs can be used as the tool to estimate GHG reductions.

[i] p. 137, CAPCOA Handbook 2021.

Table 8.14 General CAP Policies – Smart Growth Development Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	NA
Education, Outreach, & Coordination	• Encourage higher density and mixed-use development • Develop partnerships to identify barriers to higher-density development • Develop partnerships to expand transit service near new development sites • Encourage participation in easement programs for natural and working lands
Evaluation	• Identify areas that can support increased population or employment
Incentives	• Provide smart growth incentives to new development
Plan or Program	• Develop smart growth related plans, policies, or strategies (e.g., Transit District Specific Plan) • Update General Plan
Requirement(s)	• Establish standards for new development projects

Micromobility

Micromobility measures, for example, e-bike programs, are not quantified in adopted CAPs. Micromobility is included in 3 CAPs as an educational opportunity and 1 CAP for evaluation. These measures are not identified as a project that could assist in transit use, or otherwise shift to non-car community uses. CAPCOA estimates that up to 0.06% of GHG emissions reduction can be had from a community with this type of program.[i]

8.5.5 Reduce Fuel Use

Making the transportation system more efficient, thus using less fuel, includes traffic calming measures, and encouraging efficient driving behaviors. CAP commitments that have been quantified are mostly in the form of potential capital improvement projects. Based on the review of adopted and pending CAPs, half the CAPs use these actions (Figure 8.23), but because of the relatively few projects within each jurisdiction, the GHG reduction estimate from the Adopted CAP Commitment Scenario for these projects is only 3% of the total on-road GHG reduction amount (Figure 8.24). It is not possible to assess the potential magnitude of reduction from increasing the number of such actions across the region without significant coordination and cooperation in the region.

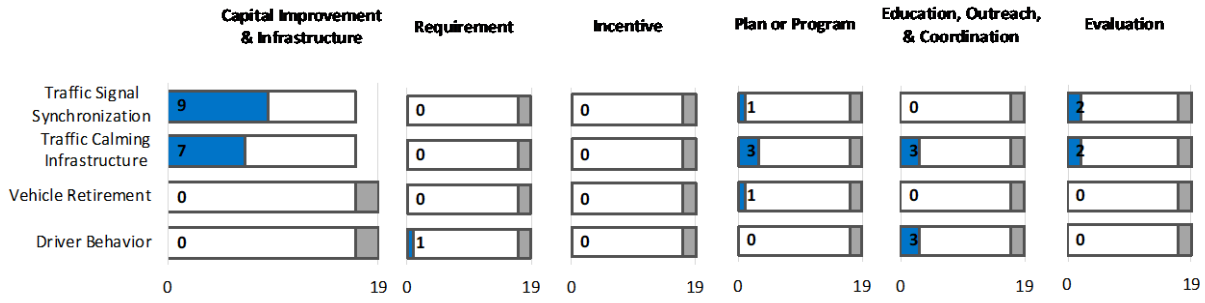

Figure 8.23 Number of Adopted and Pending CAPs with Measures Related to Reducing Fuel Use

[i] Id. at 154.

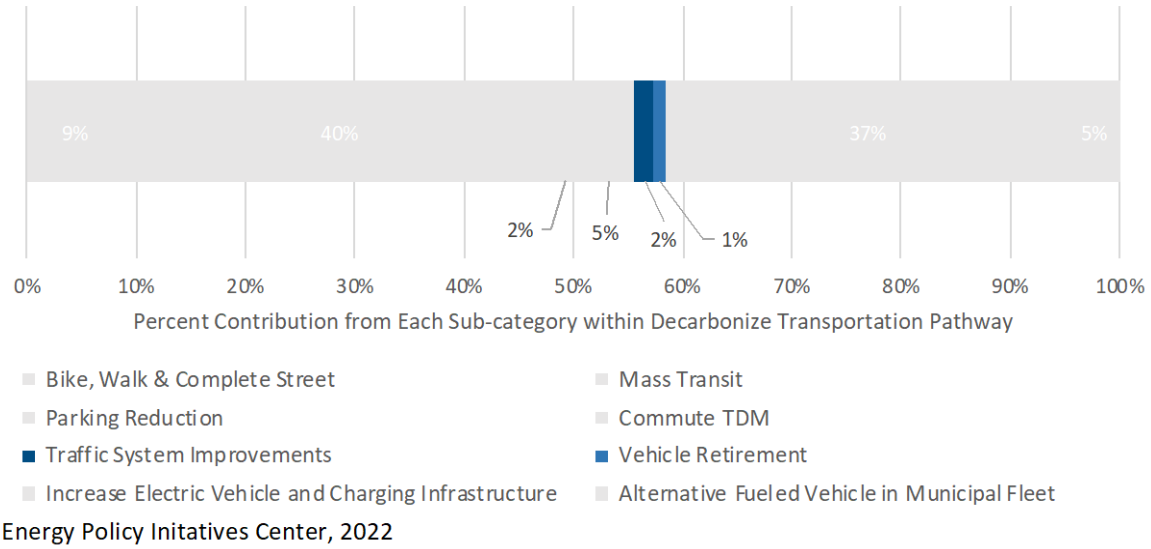

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Figure 8.24 Estimated GHG Reductions from Fuel Use Reduction in 2035 in Adopted CAPs

General policies related to these policies are shown in Table 8.15 and Table 8.16. Driver behavior, included in 3 CAPs as an education measure and one CAP as a requirement, can also affect the efficiency of fuel use but has not been quantified for GHG reductions in CAPs. Examples of CAP measures include promoting fuel efficient driving behaviors, working with school districts to improve idling time during student pick up and drop off times, and limiting construction vehicle equipment and idling, through ordinances. These measures not only reduce fuel waste and GHG emissions, but also reduce emissions of criteria pollutants. California anti-idling regulations prohibit diesel trucks and buses, including from school buses, from idling for more than 5 minutes, with fines of $300-$1,000 per day. Local peace officers can enforce and the SD APCD actively enforces these regulations under a memorandum of understanding (MOU) with CARB.[i] There are no similar regulations for LDVs; however, such actions would be within the authority of a school district or jurisdiction to adopt and enforce.

Table 8.15 General CAP Policies – Traffic Signal Synchronization Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Synchronize traffic signals at select intersections • Upgrade traffic signal controllers to smart controllers
Education, Outreach, & Coordination	NA
Evaluation	• Conduct traffic studies • Monitor and evaluate intersections for future synchronization
Incentives	NA
Plan or Program	• Develop a traffic signal master plan • Update traffic-flow related planning documents (e.g., General Plan Mobility or Circulation Elements)
Requirement(s)	NA

[i] See Memorandum of Understanding Between The California Air Resources Board and San Diego County Air Pollution Control District Regarding Enforcement of Selected Air Resources Board Regulations, August 16, 2017, available at https://www.sdapcd.org/content/dam/sdapcd/documents/compliance/MOU_2017108.pdf; see also SD APCD Mobile Source Program: https://www.sdapcd.org/content/sdapcd/compliance/compliance-requirements/mobile-source-program.html.

Table 8.16 General CAP Policies – Traffic Calming Infrastructure Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Install roundabouts
Education, Outreach, & Coordination	• Pursue partnerships and grant opportunities for funding
Evaluation	• Monitor and evaluate potential locations for future roundabouts
Incentives	NA
Plan or Program	• Update traffic-flow related planning documents (e.g., General Plan Mobility or Circulation Elements)
Requirement(s)	NA

8.5.6 Increase Use of Alternative Fuels Vehicles and Equipment

Alternative fuels are mostly ZEVs but also include renewable natural gas and renewable biofuels. Renewable natural gas and renewable biodiesel are considered zero emissions.

Most CAPs use the capital improvement and infrastructure and the education, outreach and coordination mechanisms to address ZEVs and EVCS (Figure 8.25). About half the CAPs address other low carbon fuels and infrastructure. However, the largest transportation-related reductions come from ZEVs (37%).

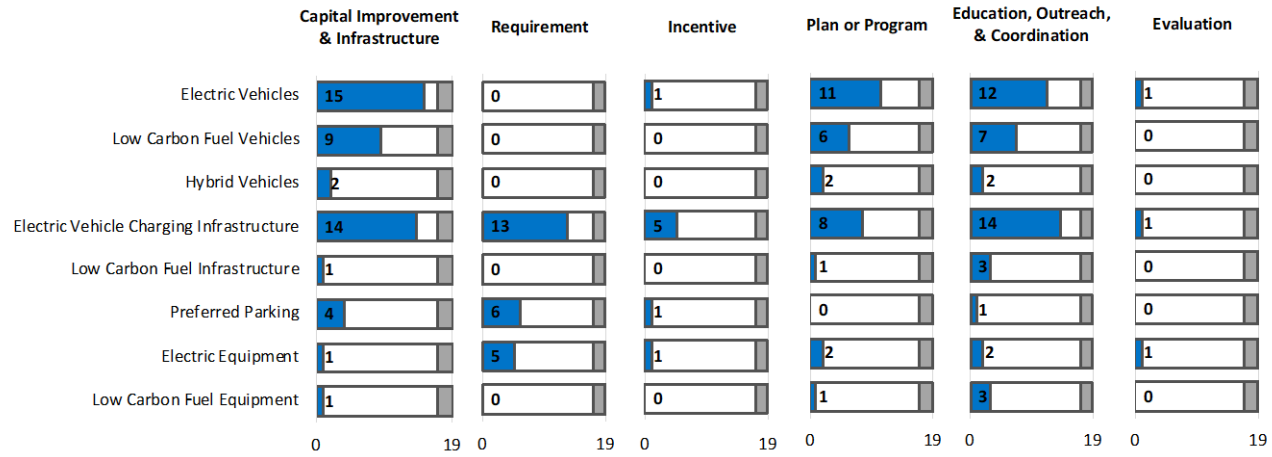

Figure 8.25 Number of Adopted and Pending CAPs with Measures Related to Alternative Fuels and Vehicles

Electric Vehicles and Charging Infrastructure

Nearly all adopted and the pending City of San Diego Draft 2022 CAP address ZEVs and EVCS within the capital improvement mechanism, requirements for EV charging in developments, and education policies for both EVs and EVCS, in that order (Figure 8.25). EV capital improvement projects include parking EVCS policies are equally represented as requirements, capital improvement, where capital improvement includes installing charging stations, and education. General policies under ZEVs and other alternative fuels are shown in Tables 8.17 to 8.20.

Electrification of off-road equipment, including construction equipment and residential outdoor equipment, may provide additional reductions but are not part of the Decarbonize Transportation Pathway and are not quantified in CAPs generally.

Table 8.17 General CAP Policies – Electric Vehicles Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Transition municipal fleet from gas to alternative fuels • Convert school bus fleet to electric
Education, Outreach, & Coordination	• Partner with waste hauler to use alternative fuel waste trucks • Promote regional incentive and rebate programs supporting electric vehicles • Pursue partnerships and grant opportunities for funding • Work with municipal departments to develop policies and programs • Partner with waste hauler to convert vehicles • Partner with transit service provider to convert vehicles • Develop partnerships to design municipal plans and policies • Promote use of EVs • Work with regional partners to develop a regional EV plan • Advocate for an EV carsharing network
Evaluation	NA
Incentives	• Provide incentives to city residents to increase use of EVs
Plan or Program	• Develop a municipal fleet management program or plan • Update vehicle fleet assessment • Develop a municipal alternative fuels policy • Integrate low- and zero-emissions vehicles into municipal purchasing policy • Develop an electric vehicle carshare program
Requirement(s)	NA

Table 8.18 General CAP Policies – EV Charging Infrastructure Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Install public EV chargers at municipal facilities and sites
Education, Outreach, & Coordination	• Map locations of publicly available fueling infrastructure • Develop regional partnerships to increase public refueling infrastructure • Participate in regional programs focused on infrastructure development • Support development of public and private sector infrastructure • Encourage installation of EV chargers in new developments • Pursue partnerships and grant opportunities for funding • Create guidance documents for property owners with regional partners • Promote regional programs supporting EV charging infrastructure
Evaluation	• Conduct a pilot program at a municipal site to evaluate feasibility for municipal fleet
Incentives	• Provide permit fee waivers for new construction with EV charging infrastructure • Incentivize installation at gas stations and other retail locations • Provide grants to residents and businesses
Plan or Program	• Develop an EV charging station master plan or similar
Requirement(s)	• Require new residential and/or nonresidential development to be EV ready • Require new multi-family and/or nonresidential development to install a certain number of EV chargers • Require multi-family and/or nonresidential properties undergoing major renovations to install a certain number of EV chargers • Require residential solar PV installs to prewire for an EV charger

Low-Carbon Fuel Vehicles, Infrastructure, and Equipment

As provided in adopted CAPs, low carbon alternative fuels are most important for municipal fleets and provide 5% (Figure 8.26) of the CAP on-road transportation reductions in 2035, based on the Adopted CAP Commitment Scenario. While the GHG reduction potential may be low depending on the size of the municipal fleet, every municipality could implement a fleet conversion program based on studies initiated through SANDAG in the years 2012–2018.[i] Jurisdictions can leverage and implement the existing fleet greening studies and plans within their CAPs. Conversion of municipal fleet to ZEVs will fully eliminate those GHGs. According to CAPCOA, using cleaner-fuel vehicles would also increase transportation resilience by diversifying fuel sources. Alternative low carbon fuel sources can provide health and equity benefits by generally eliminating or lowering criteria air pollutants, although biodiesel may increase NOx emissions and lower PM emissions compared with regular diesel.[ii]

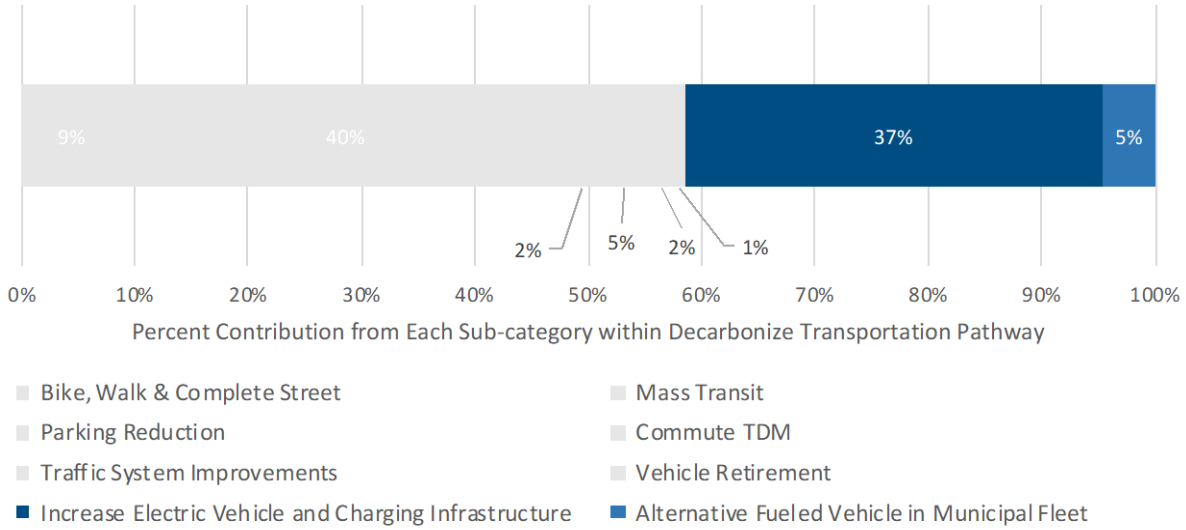

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Figure 8.26 GHG Reductions from Alternative Fuels, Including ZEVs, as Estimated for 2035 in CAPs.

[i] The SANDAG Energy Roadmap Program provided free energy assessments and development of energy roadmaps including for municipal fleets and facilities, if and as requested by jurisdictions. Specific reduction potentials for greening the fleet were estimated, with associated fuel savings and GHG reductions. See https://www.sandag.org/index.asp?projectid=373&fuseaction=projects.detail.

[ii] P. 187, CAPCOA Handbook 2021.

Table 8.19 General CAP Policies – Low Carbon Fuel Vehicles Policy Subcategory.

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Transition municipal fleet from gas to alternative fuels • Install a public CNG fueling station at a municipal facility
Education, Outreach, & Coordination	• Partner with waste hauler to use alternative fuel waste trucks • Promote regional incentive and rebate programs supporting low carbon fuel vehicles • Pursue partnerships and grant opportunities for funding • Work with municipal departments to develop policies and programs • Partner with waste hauler to convert vehicles • Partner with transit service provide to convert vehicles
Evaluation	NA
Incentives	NA
Plan or Program	• Develop a municipal fleet management program or plan • Update vehicle fleet assessment • Develop a municipal alternative fuels policy • Integrate low- and zero-emissions vehicles into municipal purchasing policy
Requirement(s)	NA

Table 8.20 General CAP Policies – Low Carbon Fuel Infrastructure Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	NA
Education, Outreach, & Coordination	• Map locations of publicly available fueling infrastructure • Develop regional partnerships to increase public refueling infrastructure • Participate in regional programs focused on infrastructure development • Support development of public and private sector infrastructure • Partner with waste hauler to use alternative fuel waste trucks
Evaluation	NA
Incentives	NA
Plan or Program	• Develop an integrated transportation strategy, including infrastructure needs
Requirement(s)	NA

Preferred Parking

Several CAP actions that would support the acceleration of ZEVs have not been quantified, including preferred parking actions for alternative fuel vehicles. Even without quantification, most local jurisdictions can adopt preferred parking requirements in new developments, parking lots operated by private entities for public use, city-owned public spaces, and provide incentives for businesses to do so.

Table 8.21 General CAP Policies – Preferred Parking Policy Subcategory

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Provide designated parking for EVs and AFVs at municipal facilities and public parking lots • Designate a percentage of street parking spaces in certain areas for EVs and AFVs
Education, Outreach, & Coordination	• Encourage conversion of private parking spaces to EV and AFV preferred parking
Evaluation	NA
Incentives	• Provide incentives to businesses that designate EV and AFV preferred parking spaces
Plan or Program	NA
Requirement(s)	• Require EV and AFV preferred parking at new nonresidential developments

8.5.7 Opportunities for Additional Local Action to Decarbonize Transportation

Based on the analysis presented above on the authority of local jurisdictions to act, review of CAPs, and scenario analysis of impact of commitments from CAPs in 2035, this section presents opportunities for local jurisdictions to take further action to decarbonize transportation. In general, opportunities exist for more jurisdictions to adopt and implement existing CAP measures and more aggressive measures like the best adopted CAP commitments.

VMT Reduction

California has two laws relating to VMT reduction — SB 375 and SB 743.[i] SB 375 requires per capita VMT reductions applicable to the regional transportation agency and SB 743 requires transportation environmental impacts to be assessed based on VMT rather than the previous Level of Service (LOC) criteria. Together, these indicate a shift from purely mobility-based planning to accessibility planning where a multitude of modes are available for different users. The following local policy opportunities can be viewed within this context.

Promote Mass Transit Use

CAPs identify mass transit as the single most important measure to achieve GHG reductions through VMT reduction. Even while recognizing the significant role for regional cooperation for these measures, jurisdictions still have significant opportunities to promote this mode to reduce VMT. Among these are requirements are for new developments and existing developments to improve connectivity, increase residential and job density. Studies have shown that for every 1% residential population density increase, there can be a 0.22% decrease in VMT. CAPCOA estimates that up to 30% of GHG emissions from new developments could be avoided through such actions.[ii]

Within their local jurisdiction, improved transit support infrastructure such as stations, bus depots, bus shelters can promote mass transit use. A 2018 study by the Utah Transit Authority (UTA) compared

[i] California is not alone in adopting this approach. The state of Washington also has targets to reduce VMT per capita by target years while exempting vehicles over 10,000 pounds, which are mostly freight and commercial vehicles. This law in Washington also aims to reduce on-road GHGs from transportation which is also there, the largest single source of GHGs.

[ii] P.69, CAPCOA Handbook 2021.

ridership and paratransit demand from before and after bus shelter improvements with a control group. It found that improved bus stops are associated with a statistically significant increase in overall ridership and a decrease in paratransit demand. The study concluded that between 2013 and 2016, there was a 92% increase in ridership due to improved bus stops than at the control group stops, and a 94% decrease in ADA paratransit demand.[i]

Increasing network coverage and hours, increasing the frequency of service, reducing transit fares are additional policies that may not be amenable to individual jurisdictional application. However, CAPCOA estimates that increasing service hours can provide up to 4.6% GHG reductions within a community, while increasing frequency can mitigate up to 11% GHG emissions from a community.[ii] Reducing transit fares also has the potential to increase uptake and reduce GHGs by about 1.7% within a community.[iii] However, implementing such changes may require collaboration with transit agencies and regional transportation agencies. Therefore the likelihood that the GHG reductions estimated for mass transit in CAPs becomes reality is heavily dependent on collaboration with regional agencies.

If mass transit is to be a regionally significant path forward to transportation decarbonization through VMT reduction, then electrifying all equipment and transit vehicles would lead to additional reductions.[iv]

Mass transit also has a significant associated equity component in that it often serves those who have the least ability to own a vehicle, or even when they do, has huge cost burdens imposed. Sections below further evaluate the equity components of on-road transportation. A study by Washington state[v] on the differential impacts of mass transit on different types of rural versus urban populations showed that small businesses relying on long-distance workers, low income rural and low-income urban, agricultural workers, very low density land areas would benefit less from mass transit than in urbanized areas. For these areas other approaches such as vanpools, destination oriented alternative modes, providing digital access to reduce the need to travel, ride-sharing programs are options to reduce VMT. SANDAG's most recent RP2021 appears to represent these findings.

Increase Bike and Walk Infrastructure to Increase Access to Basic Needs and Avoid VMT

There are opportunities for local jurisdictions to require alternative mode infrastructure to serve local access and mobility needs from new developments, make active transportation plans a requirement of new developments and evaluate the potential for additional active transportation (AT) in their city, and assess the potential for ATs in parts of their jurisdiction. Local jurisdictions could increase cooperation and coordination with neighboring jurisdictions and with regional walk and bike implementation projects by SANDAG and prioritize walk and bike projects in communities of concern.

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[i] Impacts of Bus Stop Improvements, Report No. UT-18-04, KY Kim et al, University of Utah, available at http://mrc.cap.utah.edu/wp-content/uploads/sites/8/2015/12/UT-18.04-Impacts-of-Bus-Stop-Improvements.pdf.

[ii] P. 169, CAPCOA Handbook, 2021.

[iii] Id. at p. 183.

[iv] Electrifying the Nations' Mass Transit Bus Fleets, available at https://info.burnsmcd.com/white-paper/electric-bus-fleets. Also see the Road to Net-Zero Is Paved By Electric Buses, by Paola Massoli, May 19, 2020, available at https://blog.greenenergyconsumers.org/blog/why-electric-buses-make-sense-now, citing a study by the Union of Concerned Scientists at https://www.ucsusa.org/sites/default/files/attach/2019/04/Electric-Utility-Investment-Truck-Bus-Charging.pdf that the average 40-foot diesel bus emits 2,680 grams of CO_2 per mile (g/mi), an electric bus charged on the average U.S. energy mix emits 1,078 g/mi, nearly 50% less.

[v] Carlson, D. and Howard, Z. Impacts of VMT reduction strategies on selected areas and groups, Evans School of Public Affairs, Washington State Transportation Center, prepared for the State of Washington, December 20201, available at https://www.wsdot.wa.gov/research/reports/fullreports/751.1.pdf.

The bike, walk and complete streets policy subcategory is the single most frequent policy used in CAPs and is likely consistent with local jurisdiction legal authority over land use and roads. The County is the only jurisdiction to quantify a complete streets policy while all other adopted CAPs only quantify bike and walk policies. There remains opportunity for more jurisdictions to incentivize bike, walk and complete streets, develop plans and programs, and increase education and outreach. More jurisdictions could increase evaluation of the impact of bike, walk and complete street to assess effectiveness and determine the type of improvements that can be made.

Even while the overall GHG reduction potential of this policy subcategory is relatively low, bike, walk and complete streets policies can be used to address long standing inequities, such as lack of access to basic local needs (e.g., food, recreation, potentially employment), poor infrastructure, and there are multiple health and safety benefits of active transportation to all residents and visitors.

Therefore opportunities exist for local jurisdictions to make this policy subcategory a requirement for new developments and also to assess areas where active transportation plans would lead to increased uptake of alternative modes for local access and mobility. An example of a recent active transportation plan comes from the City of Encinitas.[i] Local jurisdictions could increase cooperation and coordination with neighboring jurisdictions and with regional walk and bike implementation projects by SANDAG and prioritize walk and bike projects in communities of concern.

Increase Connectivity through Land Use Changes to Avoid VMT

There are opportunities for local jurisdictions to increase connectivity by increasing residential or job density, eliminating parking minimums, and permitting zoning changes to promote mixed-use developments, which reduce distances to basic needs and promote VMT reduction. Opportunities to increase density in specific in-fill areas have been identified in Chapter 3.[ii] According to CAPCOA, GHG reductions from these actions can lead to GHG reductions of up to 30% in the project area, similar to the promotion of mass transit described above.[iii]

Manage Transportation Demand

The literature suggests that demand management can be effective through a series of different approaches, such as density bonuses for reduced parking, trip reduction programs through the employer, such as mandatory and incentivized or voluntary commute trip reduction, cash-out parking programs where employers pay workers to not drive, and employer and publicly supported vanpools.[iv] Jurisdictions have the opportunity to implement Transportation Demand Management (TDM) policies together with employers. SANDAG includes some of these programs within its TDM support programs. Coordination with SANDAG can help identify additional opportunities for increased TDM uptake especially with large private employers. Voluntary employer programs provide fewer GHG reductions than mandatory programs, with a range reported by CAPCOA from 4% to 26% per employee, depending

[i] City of Encinitas Active Transportation Plan, August 22, 2018, available at https://encinitasca.gov/Portals/0/City%20Documents/Documents/Development%20Services/Planning/Advanced%20Planning/CMLS/ATP%20Council%20PPT%20Presentation%2008222018.pdf.

[ii] Areas in the region which meet infill definitions are provided in Chapter 3 of this report, page 70 ff.

[iii] P.123, CAPCOA Handbook 2021.

[iv] Carlson, D. and Howard, Z. Impacts of VMT reduction strategies on selected areas and groups, Evans School of Public Affairs, Washington State Transportation Center, prepared for the State of Washington, December 20201, available at https://www.wsdot.wa.gov/research/reports/fullreports/751.1.pdf.

on the commute distances.[i]

Pricing policies such as road fees increased vehicle ownership fees also achieve VMT reduction but may require regional coordination and cooperation. Peak period road and peak period parking pricing are effective at reducing commute congestion but may also require regional cooperation. The extent of local authority for congestion or other road pricing policies within their jurisdiction can be assessed.

Reduce Fuel Use through Efficiency

The following sections summarize opportunities for further action by local jurisdictions in the reduce fuel use policy subcategory.

Improve Transportation System Efficiency

Because of the relatively few measures and actions within each CAP, the GHG reduction potential of projects to improve efficiency of the overall transportation system is currently low. It is not possible to assess the potential magnitude of reduction from increasing the number of such actions across the region without significant coordination and cooperation in the region. As such, an opportunity exists to increase regional cooperation and coordination to assess and implement regionwide traffic calming measures, including traffic signal retiming (see regional cooperation section below).

While not quantified in CAPs, jurisdictions have opportunities to improve system efficiencies by improving driver behavior actions, including to reduce vehicle idling. Examples of CAP measures would be to promote fuel-efficient driving behaviors, work with school districts to improve idling time during student pick up and drop off times, and limit construction vehicle equipment and idling through ordinances and/or enforce such regulations where they already exist. These measures not only reduce fuel waste and GHG emissions, but also criteria pollutants, which have local air quality and public health benefit. California anti-idling regulations prohibit diesel trucks and buses, including school buses, from idling for more than 5 minutes, with fines of $300-$1,000 per day. Local peace officers and the SD APCD can enforce these regulations. There are no similar regulations for LDVs; however, such actions may be within the police powers of a local jurisdiction to adopt and enforce. It is unclear whether a school district may also regulate these types of emissions directly on their property.

Accelerate Vehicle Retirement

While the County has a program to advance vehicle retirement in their communities, CAPs generally do not address vehicle retirement. This is an opportunity to reduce inefficient vehicles and replace them with clean alternatives, including ZEVs. Vehicle retirement can be prioritized in Communities of Concern which tend to have older less fuel efficient vehicles. Replacing them would also lead to significant air pollution reduction with associated health benefits for all. California's Voluntary Accelerated Vehicle Retirement Program provides incentives to individuals to scrap their older more polluting vehicles and replace with newer ones. This program is administered by certain air pollution control districts. Jurisdictions have an opportunity to benefit from this program.

Alternative Fuels and Infrastructure

The following sections summarize opportunities for further action by local jurisdictions in the alternative fuels and infrastructure policy category.

[i] P. 76, CAPCOA Handbook 2021.

Increase Use of Alternative Fuel Vehicles in Municipal Fleets

There is an opportunity *for local governments to increase use of* alternative, low-carbon fleet fuels in addition to ZEVs, particularly for medium- and heavy-duty vehicles but regional study could assess the availability and funding requirements for non-electricity alternative fuels (see below, regional cooperation). More local jurisdictions could address both ZEVs, EVCS and non-electric fuels for their fleet. While the associated GHG reduction based on our scenario analysis may be low (currently 5%, Figure 8.26) depending on the size of the municipal fleet, every municipality can implement a fleet conversion program based on studies initiated through SANDAG in the years 2012-2018.[i] Jurisdictions could leverage and implement the existing fleet greening studies and plans within their CAPs.

The conversion of school buses to EVs is addressed in several CAPs. Cities could work with all school districts to obtain funding for a regionwide school bus transition. A larger question relating to school buses is to assess whether the school bus system can be part of the public transit system, as is common in European countries.[ii] College students in the San Diego region are already a large source of passengers to the public system, and including school-going passengers would increase the use of the public transit system in place of several scattered privately operated systems.

Assess the Social Equity trade-offs between ZEVs and Mass Transit

As discussed above, there is little or no integration of social equity in CAP on-road transportation measures. An opportunity exists for local jurisdictions to collaborate to assess the equity impacts of ZEV use versus increasing use of mass transit in all communities, and to align regional transportation equity analysis (e.g., SANDAG) with CAP equity analyses (e.g., City of San Diego).

Opportunities for Regional Collaboration and Coordination

On-road transportation is especially suited to regional action over local jurisdictional action because interconnections are needed between jurisdictions to serve basic needs. VMT reduction through improved connectivity and mass transit, ZEV uptake, and social equity integration could be more effective through a regional approach rather than through individual CAPs. A summary of opportunities is presented below.

Increase Regional Cooperation to Integrate Social Equity

Because transportation planning has significant long-term implications for social equity, it is important to coordinate and integrate equity-specific considerations into CAPs in coordination with other regional equity assessments. Although SANDAG has considered social equity in the 2021 Regional Plan in a much more significant manner than in previous versions, the City of San Diego has developed an equity index for guiding city-funded projects and integrated social equity into its 2021 CAP update, the City of Chula

[i] The SANDAG Energy Roadmap Program 2012–2018 provided free energy assessments and development of energy roadmaps including for municipal fleets and facilities. Specific reduction potentials for greening the fleet were estimated for jurisdictions, as desired, with associated fuel savings and GHG reductions. See https://www.sandag.org/index.asp?projectid=373&fuseaction=projects.detail.

[ii] See, The Existing school transportation framework in Greece — Barriers and problems comparing to other European countries, which provides the common practices among European countries. In Germany for example, certain routes are set up to serve schools at school times. The paper report that in Germany, about 40% of students aged 6 to 16 years are daily transferred either by public buses for two hours in the morning and two hours in the afternoon and where the schedule is adapted to schools' needs and some jurisdictions offering tickets at discounted rates for school children. Safety is implemented by flashing lights similar to California and federal law sets speed limits at 50 and 80 km/hr for urban and interurban areas respectively.

Vista has also developed an equity index related to climate action, all based on significant inclusive participation, an opportunity exists for increased coordination between these equity efforts and analyses.

Similar to our review of CAPs, a literature survey shows that there is no accepted definition of equity in transportation; however, without equitable distribution of resources in the transition to a low carbon economy, the benefits of the transition will be felt disproportionately by low income communities for reasons explained in the sections below.

SANDAG's equity analysis (App H SANDAG RP2021) considers three population groups that represent disadvantaged populations in the ABM transportation model: minorities, low-income populations, and seniors. Demographic thresholds were selected to determine the type of mobility needed for these groups and this section focuses on low income and seniors. The threshold for seniors was selected as 75 years of age, where mobility is still a concern, but would convert to transit rather than passenger vehicle. While there is significant regional variation, the low-income population was defined as having income at or below 200% of the 2016 federal poverty level, and this constituted 25% of the region's residents. In addition, 9.8% of the civilian population is classified as disabled, and this is also a group that needs access to basic needs through transit or special programs. Households with no vehicle available was also considered, which constituted 5.7% of all households in the region.

Therefore, according to SANDAG's analysis in its RP2021, more than 30% of the region's households would be good candidates for transit use. Figure 8.27 shows that more than 30% of households with less than $60,000 income walk and/or use transit for all trips data.

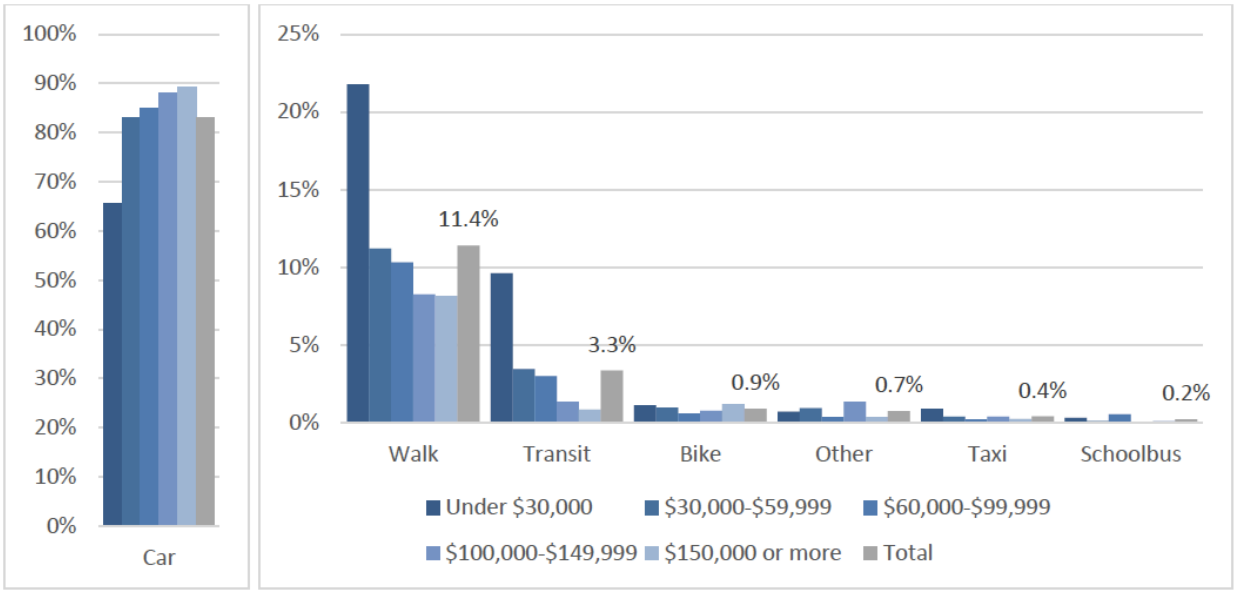

Figure 8.27 Household Income by Means of Transportation to Work (SANDAG 2016 Regional Transportation Study, Volume I, Figure 8.26).

The transportation cost burden of people living in the San Diego region (based on the City of San Diego as representative) are of the order 100 times greater than their household energy cost burden. The average transportation cost burden (transportation cost[i] as a % of median income adjusted for

[i] Transportation cost considers the costs associated with vehicle ownership and usage and use of public transportation.

household income) for a San Diego resident is 21%, while the energy cost burden (energy cost as % of median income adjusted for household income) is 2%. The transportation cost burden ranges from slightly less than 10% to nearly 60% of median income (adjusted for housing cost). Those spending more than the average 21% all have a median housing-adjusted income less than about $70,000 (Figure 8.28).

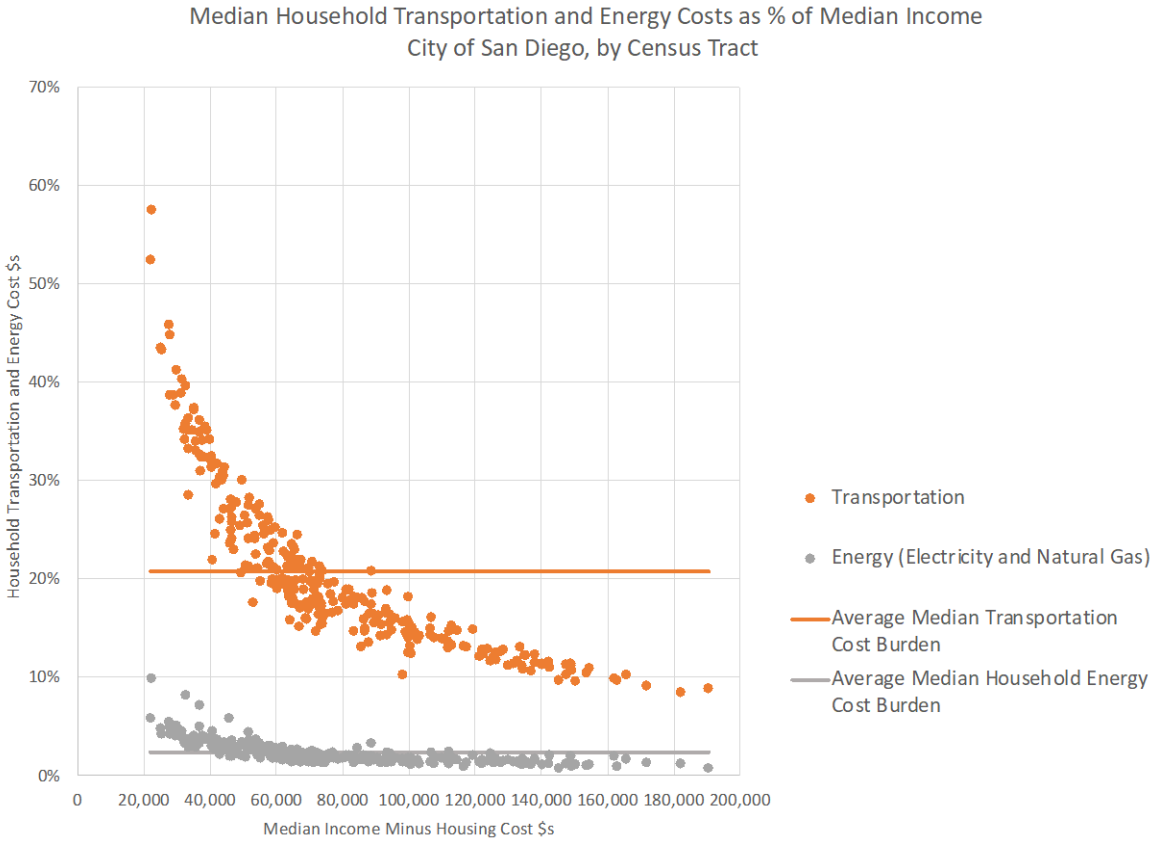

Figure 8.28 Transportation Cost Burden, City of San Diego 2010 Census Data, ACS Estimate for 2016.

This very high average transportation cost burden is much higher than the 13% average across the U.S., which in turn is considerably higher than any other developed country in the world. As quoted by the Institute for Transportation and Development Policy (ITDP), "[i]n the US, there is a narrative that if people work hard, then they can get out of poverty, but we have built cities that make this narrative impossible. For households making less than $20,000 per year, reliable cars are a pipe dream: a huge expense that they can't afford. Without adequate transit, they will remain stuck in place."[i] If this is still correct, for these populations, implementing the SANDAG RP2021 could provide an expanded, fast, clean, and reliable transit access system designed to result in out-of-pocket transportation costs decreasing from 5.1% in 2025 to 4.4% in 2050 if implemented.[ii]

Yet another indicator helps visualize the relatively obvious links between income and vehicle ownership. Though yet to be developed for San Diego County, for the United States, a recent report from the International Council on Clean Transportation (ICCT) shows that U.S. households earning less than $25,000 spend about 50% of their income on vehicle ownership and maintenance not including registration, financing, or parking costs. Figure 8.29 shows this relationship for the United States.

[i] Indicators for Sustainable Mobility, ITDP Report.
[ii] SANDAG RP 2021, Appendix H: Social Equity: Engagement and Analysis, p. H-54.

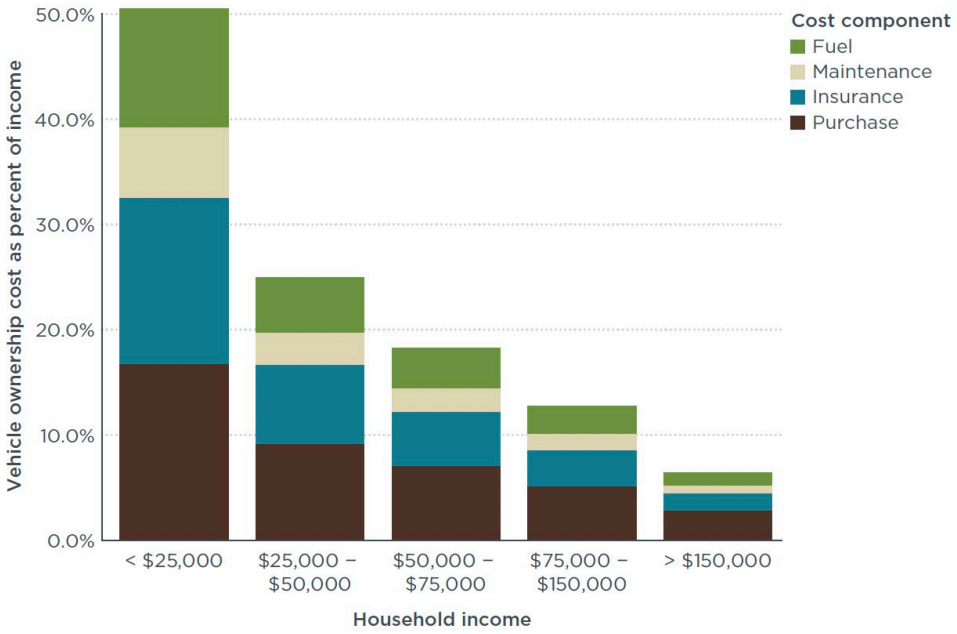

Figure 8.29 Vehicle Ownership and Transportation Equity[i]

In addition, even when low income households have vehicles, they tend to be older, more polluting, and require more maintenance, therefore have higher costs. In contrast, recent reports[ii] show that, when adjusted with federal EV incentives, and for all EVs analyzed, the lifetime ownership costs were much lower than all comparable internal combustion engine vehicles. In addition, the cost savings of 5- to 7-year-old used EVs was found to be two or three times larger on a percentage savings basis. A question arises whether the cost of owning an EV, used or not, over its lifetime, is more affordable especially for low-income households, than using mass transit. Either way, subsidies and initial capital costs would have to be provided.

The ICCT study on equity impacts of EV adoption also demonstrates that low income communities in cities that have relatively poor mass transit would benefit significantly from EV assistance uptake in terms of cost savings, apart from air pollution reduction.

In the San Diego region, the A2Z EV Gap Analysis identified about 290,000 PEVs or FCEVs needed for multifamily and single family households in communities of concern out of the total over 770,000 ZEVs needed to meet the region's share of EV goals. That report also recognizes that moderate and low income households will need support to purchase ZEVs. How these requirements match the SANDAG assumptions for increased access to transit has not been examined and could constitute a gap in the demand by 2030. A major barrier to ZEVs from this study is the "perceived and real cost premium of the vehicles," followed by insufficient ZEV public, workplace and multifamily households and the perception that ZEV fueling is "not affordable to most." Despite that, acceleration of EV adoption in communities of concern is a major issue often raised in CAP stakeholder meetings because ZEVs are seen as a way to improve air pollution and noise.

[i] Taken from Figure 1. Source: Gordon Bauer, Chih-Wei Hsu, and Nic Lutsey: When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption. International Council on Clean Transportation Working Paper 2021 -06, February 2021.

[ii] https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/.

Therefore, by identifying the communities of concern with low-income households in the region, and targeting transportation electrification in these areas provides an opportunity to mitigate GHGs for the future but also to address historical inequities. Along with this, local jurisdictions could assess the cost of increased ZEV access in communities of concern (short-term and lifetime costs per GHG avoided) compared to an electrified mass transit system (costs per unit of GHG emissions avoided over the lifetime of the system) both for the region and for low-income households.

Chapter 3 already identified areas with communities of concern which can be targeted and while prioritizing communities of concern for EVs does not provide additional GHG reductions. It does help to re-distribute the benefits, including reducing criteria pollutants.

An opportunity exists to assess the reduction in air pollutants from conversion to electric transportation, including in school buses. In a follow-up to a Harvard Six Cities Study, which examined the relationship between improvements in ambient PM2.5 and city-level mortality, a comparison of the 1974–1989 period with a follow-up period, 1990–1998, showed that every 10-mg improvement in city-level average annual PM2.5 was associated with a 27% improvement in the relative risk of death.

Because transportation planning has significant long-term implications for social equity, there is an opportunity to integrate equity-specific considerations into CAP and to coordinate with regional approaches, including SANDAG's equity assessments. Although SANDAG has considered social equity in the 2021 Regional Plan more than in previous versions, and the City of San Diego has developed an equity index for guiding city-funded projects, there is room for increased coordination between SANDAG's equity analysis, local equity policies, and climate action planning. Another option is for cities to coordinate and cooperate through SANDAG to integrate social equity into all future transportation projects supported by funding.

Increase Regional Collaboration to Increase Transportation System Efficiency

Traffic calming measures have ripple effect across boundaries, and regional cooperation could help to assess opportunities for regionwide fuel use reduction actions. Installing roundabouts in one jurisdiction could cause back-ups along the same arterial in another jurisdiction. An example of a regional roundabout study is one done for Monterey County, where 26 area intersections as proposed by cities and county were used to identify a prioritized list (Figure 8.30) to help guide roundabout investment regionally, but also by jurisdiction.

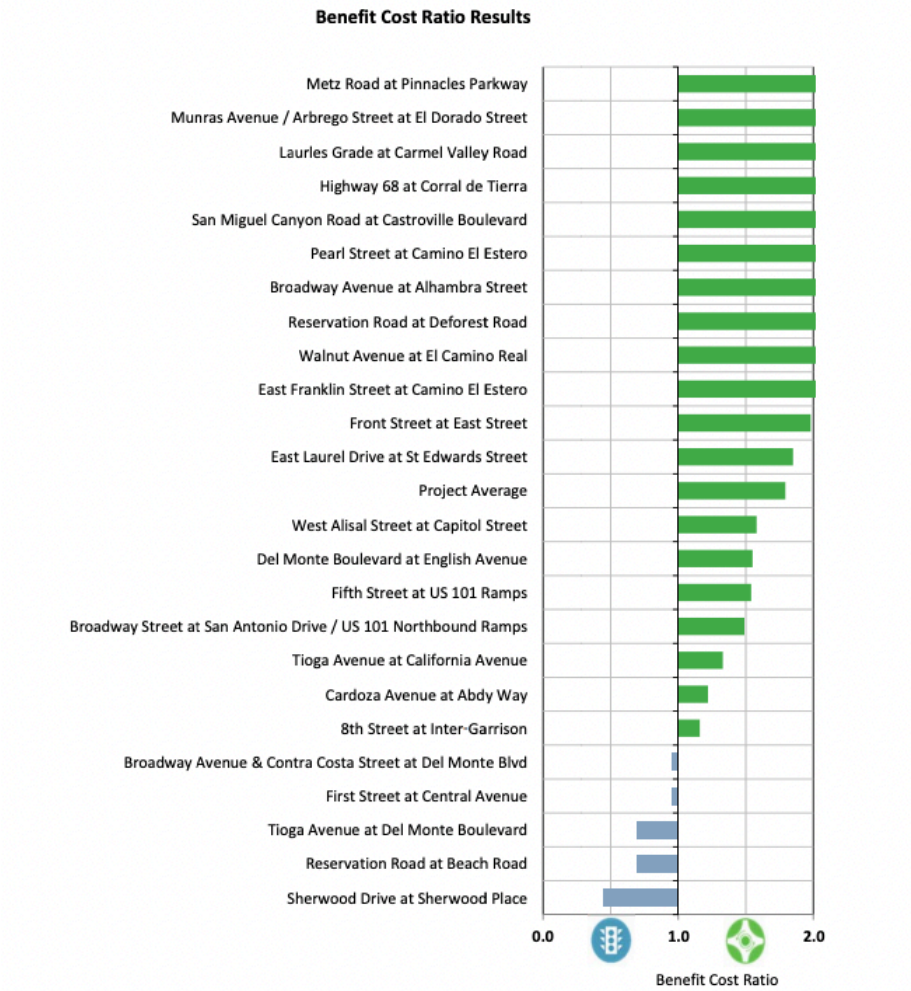

Figure 8.30 Example Results of a Regional Roundabout Study, Monterey County, 2016. Green symbols represent roundabouts with a positive Benefit-Cost Ratio.

Develop a Regional ZEV Implementation Plan to Meet State Targets

Neither SANDAG incentives for ZEVs nor the additional CAP-based ZEV uptake appear able to reach the 2035 targets for ZEVs for the region estimated in Chapter 3. The opportunity to assess this gap and develop an implementation plan following the A2Z Gap Analysis report has just started. Coordinating with CAP measures when updating, including when adopting electric vehicle infrastructure ordinances for new and significant retrofit construction, could improve regional approaches to increasing ZEV uptake.

Regional Action Could Lead to Additional GHG Emissions from On-road Transportation

VMT reduction through improved connectivity and mass transit, ZEV uptake, and social equity integration could be more effective through a regional approach rather than through individual CAPs. An opportunity exists to coordinate between the regional planning process and the local climate action planning process to accelerate GHG reduction from on-road transportation. Working with private sector employers can also help achieve the state goals for GHG reduction.

Assess availability of biofuels for use in fleets

The availability of biofuels for municipal fleets could be assessed especially as more cost-effective short-

and medium-term solutions emerge for heavy-duty vehicle conversion. U.S. production of renewable diesel, for example, is expected to increase significantly through 2024 and it receives favorable scores under the LCFS, which incentivizes its use.[i] Similarly, biodiesel is in high demand for heavy-duty trucks, although its crop-based needs create a limitation.[ii] A regional assessment of the benefits and challenges of using these fuels and their availability and price could help municipalities decide on short-term low-carbon options for their immediate fleet turnover needs while waiting for more mass availability of electric or hydrogen-fueled HDTs.

Assess the use of LCFS funding to promote transition to lower carbon fuels

There may be an opportunity to use cap and trade funds through the LCFS to aid in fleet electrification or transition to a lower carbon fuel. While clean vehicle rebates and incentive programs are phasing out, the LCFS requires reduction of carbon intensity of fuels over time, and there is market for buying and selling LCFS credits which can assist in the transition. For example, owners of public EVCS can generate and sell credits for EV charging. ICCT has shown how the LCFS can support transport electrification, including the potential for a small revenue stream from home charging that can reduce the cost of individual EV ownership.[iii]

Increase regional program development

Providing program development and implementation resources for local measures, including shared, reduced, or alternative fuel vehicle preferred parking standards; transportation demand management plans; pedestrian and bicycle infrastructure; improved traffic flow projects; and smart growth development could help increase awareness and availability of current regional programs and funding opportunities to increase current participation levels.

Through its ReCAP, SANDAG has provided services to most cities in the region to support climate action planning activities, including developing and providing templates for methods and monitoring, applying them to the development of CAPs, and monitoring metrics related to GHG mitigation measures, and providing results in the form of annual ReCAP Snapshots. SANDAG has developed and hosts the CAP data through a publicly available Climate Action Data Portal. The ReCAP program has led to some level of consistency in CAPs across the region, allows the tracking of CAP measure progress over time, and the monitoring of overall GHG reduction activities in the region.

Such programs could be expanded and new programs and funding mechanisms could be identified to fill gaps where it appears goals are not being met. Improving the coordination between CAP data gathering and metric tracking and those that SANDAG must track by regulation, especially under SB 375, can potentially identify new programs and funding mechanisms to accelerate the achievement of the State and regional climate and energy goals.

Increase Sub-regional Collaboration

Apart from increased cooperation with the MPO, jurisdictions can work directly with transit agencies to identify gaps in service, prioritizing communities of concern, and identifying funding for its increased local policy adoption and implementation.

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[i] U.S. renewable diesel capacity could increase due to announced and developing projects, U.S. Energy Information Administration, July 29, 2021, at https://www.eia.gov/todayinenergy/detail.php?id=48916.

[ii] Biodiesel is booming. At https://www.npr.org/2021/10/28/1043413986/biodiesel-is-booming-it-may-help-the-climate-but-theres-a-big-environmental-risk.

[iii] Kelly, C. Blog, How low-carbon fuel standards cab support transport electrification, August 6, 2020, at https://theicct.org/how-low-carbon-fuel-standards-can-support-transport-electrification/.

Accelerate EV Adoption through Joint Powers Agreements

CCA programs in the region represent a local mechanism, usually through JPAs, which can support transportation electrification by developing programs to incentivize EV uptake beyond state and federal programs. Examples of local CCA programs that will accelerate EV adoption are summarized in Table 8.22. Once launched, a CCA is completely funded by revenues and not taxpayer dollars. As a result, surplus funds generated by the CCA can, and often are, used to fund projects to reduce GHGs. It remains to be seen whether the multiple CCAs currently being formed in San Diego County will follow the examples given below.

Table 8.22 CCA Programs to Accelerate Transportation

Community Choice Aggregator	Number of Customers (Accounts)	Transportation Electrification Program - On-going or Planned	Collaboration Needs	Addresses Equity?
Clean Power Alliance	1 million	**Public EV Charging:** incentives to non-residential customers to install electric vehicle (EV) chargers that are available for public use **Pilot Program:** EV Chargers: Available to commercial customers with at least three Level 2 EV chargers, this program asks participants to allow their EV chargers to operate at a reduced rate of charge during peak events	**Collaborate with CALeVIP and local air resource boards** to expand funding and expedite implementation of EV infrastructure incentives for CPA customers.	-
Central Coast Community Energy	350,000	**Electrify Your Ride:** designed to provide CCCE customers with a "one-stop-shop" process to apply for post purchase incentives for one or more of the following four (4) rebates: EVs, EV Chargers, EV Readiness and Electric Bikes making this program the single largest energy program budget to date. Funds exhausted. **Electrifying our community's school buses** for a cleaner, healthier and safer Central Coast. Central Coast Community Energy is funding up to $200,000 per bus for public school districts throughout our service area. 50% matching funds requirement to complete the bus purchase after the CCCE incentive.	**South Central Coast Incentive Project:** with CALeVIP ($1.75 million) **Central Coast Incentive Project:** with CALeVIP (CEC and CCSE) and Monterey Bay Community Power ($7 million), for non-residential, multi-family, non-profits and LGs EV chargers in 3 counties $295,000 given in rebates, funds exhausted **Collaborate with Monterey Bay Air Resource District:** will replace 6 school buses, fund exhausted	Yes, based on Tier 1 and Tier 2 income classification CCCE contributed $1.75 million of $12 mi from CALeVIP, 50% for DACs
Marin Clean Energy	450,000	**EV rebates** for new, used and leased vehicles, up to $3,500; Website pointing to multiple state rebates, CVRP, BAAQMD, PG&E incentives, and federal tax incentives.	-	Yes, income qualified

Community Choice Aggregator	Number of Customers (Accounts)	Transportation Electrification Program - On-going or Planned	Collaboration Needs	Addresses Equity?
Peninsula Clean Energy	295,000	**EV rebates** for used and new plug-in hybrid and battery EVs up to $4,000; also for rentals **EV Ready Program:** $28 million funded by CCA for 3,500 EVCS in county in 4 years	-	Yes, increased rebates for income-qualified residents
Redwood Coast Energy Authority	62,000	RCEA customers are eligible for a rebate totaling 50% of whatever incentive amount they received from the CVRP. Applicants can only apply for RCEA's rebate if they have already been approved by the state CVRP program, total available $50,000 **Residential EV Charging Equipment Rebate** $500, $24,000 available **E-bike rebate** $500 ($41,500, funds exhausted)	-	-
San Jose Clean Energy	350,000	**Park for free** at all City of San Jose parking meters Website pointing to multiple state rebates, CVRP, BAAQMD, PG&E incentives, and federal tax incentives.	**Partnership with CEC** to offer light-duty fleet vehicles rebates on Level 2 chargers.	-
Santa Barbara Clean Energy		**EV cash-back:** customers are eligible for $1,500 cash back on Chevy Bolt EV and EUV and $1,000 cash back on any used BEV and PHEV; e-bicycle membership 20% cost share	-	-
Silicon Valley Clean Energy	270,000	Website pointing to the multiple state rebates – CA vehicle retirement program, CA HOV exemption, AC Clean Fuel Reward for new or lease, CVRP, Beneficial State Bank <8% interest loans, PG&E rate plans, Community Housing Dec Corp grants, BAAQMD incentives including toll discounts on bridges, and federal tax incentives.	-	-
Sonoma Clean Power	224,000	**EV rebates:** $12,500 to non-profits which purchase or lease an EV or plug-in hybrid with range at least 25 mile	-	-
Valley Clean Energy	55,000	Website pointing to multiple state rebates, CVRP, BAAQMD, PG&E incentives, and federal tax incentives.	-	-

8.6 Decarbonize Buildings

In the San Diego region, about 8 MMT CO_2e of GHG emissions is associated with electricity and natural gas end use, much of which is associated with energy use in buildings. GHG emissions associated with buildings come from the electricity to serve the building and the fuel (e.g., natural gas) combusted in the building for various end uses. This section focuses on reducing energy used in buildings and switching from natural gas and other fossil fuels to electricity for building equipment. Decarbonizing the electricity supply, which is sometimes considered part of building decarbonization, is addressed in Section 8.7.

In general, there are three main methods to reduce GHG emissions from buildings: (1) reducing energy use through increased efficiency, (2) electrifying building appliances, and (3) increasing use of low-carbon fuels. Implicit in this is the decarbonization of the electricity supply. Supplying clean or zero emissions electricity to all-electric appliances not only reduces emissions at the power plant but also in the building. There are no CAP measures related to use of low-carbon fuels in buildings; therefore, we provide only limited analysis of this policy category.

The policy categories and subcategories related to decarbonize buildings will be the organizing framework for the following sections (Figure 8.31). We evaluate various aspects of each of these, including the legal authority of local jurisdictions to act; existing local commitments in CAPs, including analysis on the frequency and distribution of measures across all adopted and pending CAPs and the relative GHG contribution of measures; opportunities for additional local action; and opportunities for regional collaboration.

Policy Category	Policy Subcategory
Electrification	Electrify Select End-Uses
	All-Electric
Energy Efficiency	Audit, Benchmarking, Disclosure
	Implement Efficiency Improvement(s)
Low Carbon Fuels	TBD

Figure 8.31 Policy Categories within the Decarbonize Buildings Pathway

8.6.1 Summary of Findings

Table 8.23 presents a summary of key takeaways for the decarbonizing buildings pathway.

Table 8.23 Summary of Key Takeaways for the Decarbonize Buildings Pathway

Policy Category	Key Takeaways
Energy Efficiency	All adopted and pending CAPs have related measures; relatively low GHG reductions in CAPs; least regret opportunity for more jurisdictions to exercise existing authority to adopt reach codes for new construction, alteration, and addition projects; need to reduce energy use in existing buildings; GHG impact of energy efficiency declines as the electricity supply approaches 100% carbon free and appliances are electrified; full authority to act is not exercised in the region.
Electrification	Relatively few CAPs with measures to electrify buildings; low GHG impacts in CAPs; least regret opportunity for reach codes for new construction, alteration, and addition projects; need to electrify existing buildings; existing authority provides multiple paths to electrify new and existing buildings; full authority to act is not exercised in the region.
Low Carbon Fuels	No CAP measures use low-carbon fuels in buildings; limited analysis completed; additional research needed; there is existing authority to act in this regard but uncertainty exists; the extent of authority is untested and legal risk is dependent on action taken; full authority to act is not exercised in the region.

Key Findings of Analysis

This section summarizes results of the review of authority to act, the review of CAPs, and scenario analysis of the aggregated impact of CAPs.

- Authority Exists to Regulate GHG Emissions from Building End-Uses – The police power and delegated authority to regulate energy end-uses are primary means of implementing building decarbonization. Police power may be exercised to prohibit natural gas plumbing in new buildings, require energy benchmarking outside of Title 20, and/or encourage fuel switching to low- or zero-emission fuels (e.g., renewable natural gas or green hydrogen) through GHG emission performance standards based on energy benchmarking information. Local jurisdictions also act with delegated authority over the built environment to require more stringent Title 24, Part 6 Energy Codes and Part 11 CalGreen Codes, directly regulate criteria pollutant emissions from buildings, or use their procurement authority, including sole source procurement authority for energy conservation, cogeneration, and alternative energy supply projects on public buildings. CEQA also may allow a lead agency to set a GHG-based threshold of significance for all projects (e.g., carbon neutral or net zero) that decrease building emissions. Local governments are preempted from establishing energy efficiency appliance standards, regulating natural gas supply, transmission, and storage, and high global warming potential refrigerants (e.g., HFCs).
- CAPs Have Relatively Few Measures to Electrify Buildings – Only seven CAPs include measures related to building electrification. By contrast, all adopted and pending CAPs have measures related to energy efficiency. Most building electrification measures focus on new construction projects, with the exception of two CAPs which have measures related to electrifying existing buildings, which focus on electrifying water heating appliances. As noted above in Section 8.2, depending on the policy approach related to water heating, federal pre-emption concerns may exist. Based on the relative lack of CAP measures to electrify buildings and the GHG implications as presented in the scenario analysis, the current commitment to electrification in CAPs is insufficient to achieve the level of building equipment electrification contemplated in Chapter 4.
- GHG Impact of Building Decarbonization Measures in CAPs is Relatively Low – GHG reductions in CAPs associated with efficiency and electrification are relatively low. Based on our review of CAPs, measures related to efficiency contributed about 8% on average to the local CAP reduction, while electrification contributed about 4%. Based on our scenario analysis, applying the most aggressive adopted CAP policy to every jurisdiction in the region would increase

estimated GHG reductions in 2035 from about 40,000 MT CO_2e to over 720,000 MT CO_2e. The increase would be due mostly to an increase in energy efficiency retrofits. Including the City of San Diego draft 2022 CAP update measures related to building decarbonization would increase these GHG reduction values (Section 8.4.5). By contrast, a similar application of the best renewable electricity supply policy would reduce GHG emissions by about 1.6 MMT CO_2e. It is important to note that GHG reductions from efficiency improvements in electric appliances decline over time as the electric supply approaches 100% carbon-free and more appliances are electrified. However, California is developing dynamic time-dependent electric rates and energy efficiency programs that balance supply and demand to integrate renewable energy and decrease marginal carbon emissions.

- Policies for the Existing Building Stock are Key to Decarbonize Buildings – Decarbonizing existing buildings is an important step in reaching regional emissions targets. Buildings that exist in 2021 will represent more than 80% of the buildings that will exist in 2050. State building energy codes regulate alterations and additions to certain existing buildings, but local policies could further encourage or require energy efficiency and electrification in many other existing buildings. There are many examples in the San Diego region and California of policies to increase energy efficiency in existing buildings, including those to require energy assessments, benchmarking and disclosure of energy use, efficiency improvements, and retro-commissioning or building tune-ups. By contrast, there are few policies in California to electrify existing buildings. Most existing policies focus on new construction, alterations, and additions. Consequently, there are almost no policies at the local level to require existing building electrification, though efficiency policies potentially can provide the blueprint for policy development in this area. There are, however, some market barriers to electrification in the existing building stock, including consumer preferences and awareness, upfront cost hurdles, and workforce development needs that would have to be overcome to achieve widespread electrification. Key elements of an integrated strategy to decarbonize existing buildings include education and outreach, financial incentive and financing, and requirements.

Opportunities for Further Action

The following summarizes key opportunities for further action.

- Decarbonize New Buildings – Local jurisdictions have the authority to adopt local building codes, including reach codes to encourage or require energy efficiency and electrification. Because only four CAPs include at least one measure to require energy efficiency improvements in new buildings and only four have measures related to electrifying new buildings, there is opportunity for more local jurisdictions in the San Diego region to adopt these policies. California has a history of local governments adopting local ordinances to improve energy efficiency, and numerous examples exist in the San Diego region and around California. Ordinances to require electrification are relatively new, though an increasing number of local jurisdictions have adopted local building electrification requirements that go beyond state requirements or have used their police powers to adopt a moratorium on natural gas infrastructure. Given authority to act, the numerous examples around California, and existing support to develop and implement such policies, adopting reach codes is a least regret policy; however, this opportunity may be limited in its potential to reduce GHG emissions due to regular updates to the State building energy code.
- Local Governments Can Decarbonize Municipal Facilities – Just over half of CAPs have measures to improve efficiency at municipal facilities, and none have measures to electrify these facilities. The federal government has recently adopted a commitment to achieve net zero emissions in federal facilities. This is a least regret policy as implementing cost effective measures helps

reduce operating costs and can model the type of actions local governments may encourage homes and businesses to do.

- Regional Collaboration to Support Building Decarbonization – Given the clear, existing authority that local governments have to adopt local building codes (e.g., reach codes) for new buildings and the existing knowledge and experience in the region and statewide, developing a regional approach to support reach code development, adoption, and implementation is a least regret approach. A similar program could be developed to support efforts to decarbonize the existing building stock, including analyzing existing building stock, convening an existing building decarbonization task force, developing a regional strategy to decarbonize the existing building stock, and a policy development support program similar to the reach code example.
- Assess Social Equity Considerations of Building Decarbonization Policies – In the context of building decarbonization, there are several aspects of equity to consider, including the high proportion of renters in communities of concern, the relative lack of data and analysis related to equity and building-related policies, and potential cost implications of building decarbonization policies, particularly electrification. Additional work would be needed to develop the capacity and tools to understand and address the equity implications of building and other decarbonization policies in the San Diego region.

8.6.2 Summary of Authority in the Decarbonize Buildings Pathway

At the local level, the police power and delegated authority to regulate energy end-uses are the primary means of implementing building decarbonization actions. Local jurisdictions may use their police power to prohibit the installation of natural gas plumbing in new buildings,[i] identify buildings or neighborhoods that are in need of natural gas infrastructure replacement to electrify (e.g., natural gas infrastructure pruning), require energy benchmarking for buildings not covered by Title 20 Benchmarking requirements,[ii] and/or encourage fuel switching to low- or zero-emission fuels (e.g., renewable natural gas or green hydrogen) through GHG emission performance standards based on energy benchmarking information and disclosure. Local jurisdictions can act with delegated authority to require more stringent Title 24, Part 6 Energy Codes, Part 11 CALGreen Codes, and procurement authority, including sole source procurement authority for energy conservation, cogeneration, and alternative energy supply projects on public buildings.[iii] Local governments could evaluate how to align local requirements and actions with state policy and programs to decrease costs related to building decarbonization.

Energy Efficiency and Building Material Conservation and Resource Efficiency

Using delegated authority, local jurisdictions may adopt more stringent building code standards that address energy efficiency, water conservation, building material conservation, or resource efficiency based on GHG requirements (e.g., material carbon intensity). Where the requirement addresses energy consumption, the adopted local code (e.g., all-electric reach codes or building performance standards) must be at least as energy efficient as the state codes, cost-effective,[iv] and submitted to the CEC to

[i] Note: the City of Berkeley's prohibition is currently on appeal to the Ninth Circuit Court of Appeals (*CRA v. City of Berkeley*, No. 21-16278, (9th Cir.), filed August 5, 2021); See *CRA v. City of Berkeley*, Docket No. 4:19-cv-07668, Judgment, Document 76 (N.D. Cal. Nov. 21, 2019) which dismissed with prejudice cause of action for EPCA preemption and dismissed without prejudice California state law preemption cause of action.

[ii] See AB 802 (Williams, Chapter 590, Statutes of 2015); 20 C.C.R. § 1680 et seq. (2021); see also City of San Diego Building Benchmarking Ordinance adopted pursuant to 20 C.C.R. § 1684 (2021).

[iii] See Government Code § 4217.10 et seq.

[iv] See to Public Resources Code § 25402.1(h)(2) and Health & Safety Code §§ 17958.5 & 17958.7.

review for compliance with state law.[i] In all cases where Title 24 is amended, the standards must be submitted to the Building Standards Commission with the findings for local climatic, geological, or topical conditions that authorize the change to Title 24. In terms of police authority, the full extent of local jurisdiction police authority is unknown and largely untested. Additional research is required to vet other local actions.

Federal preemption exists over setting energy efficiency standards for covered products[ii] (e.g., appliances) under EPCA with limited exception for new construction.[iii] Local jurisdictions are subject to state preemption in the form of Title 20 appliance standards that regulate many appliances not preempted by the EPCA and the triennially updated Title 24 building standards that the CEC adopts.

CEQA Environmental Impact Mitigation Authority

CEQA offers another means to address emissions from the built environment. A lead agency acts with discretion to determine whether an adverse environmental effect identified in an environmental impact report (EIR) should be classified as "significant" or "less than significant."[iv] A lead agency may adopt and publish a threshold of significance that sets a high threshold for GHG emissions, which could include requiring all projects to be carbon neutral or zero net carbon,[v] and must be based on scientific and factual data to the extent possible[vi] to meet the substantial evidence standard.[vii] This is limited by existing implied or expressed authority to impose mitigation measures on a project.[viii] Mitigation measures cannot be legally infeasible[ix] — meaning that they may not be beyond the power conferred on lead and responsible agencies — and are also subject to express limitations, including limits on reducing housing units.[x]

Direct Regulation of Building GHG Emissions

Direct regulation of GHG emissions, not currently regulated by Cap-and-Trade, may provide additional means to reduce emissions, but uncertainty exists around authority.[xi] It may be possible to create GHG performance standards for buildings.[xii] Under existing authority, it may be possible to directly regulate building and appliance oxides of nitrogen (NOx) emissions from natural gas.[xiii] Finally, it is uncertain whether existing tax or fee authority may be used to regulate GHGs.[xiv]

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[i] See Public Resources Code § 25402.1 (h)(2); see Title 24, Part 6, Section 10-106 (2021).
[ii] 42 U.S.C. § 6295; See also 10 CFR Parts 430, 431, & 429.
[iii] 42 U.S.C. §§ 6297(c) & 6297(f)(3); See also 42 U.S.C. §§ 6291 et seq. (Part A-Energy Conservation Program for Consumer Products Other Than Automobiles); 42 U.S.C. §§ 6311 et seq. (Part A-1-Certain Industrial Equipment).
[iv] 14 C.C.R. § 15064(b)(1) (2021).
[v] 14 C.C.R. § 15064.7(b) (2021); see also definition of “threshold of significance” under 14 CCR § 15064.7(a) (2021).
[vi] 14 C.C.R. § 15064(b)(1) (2021).
[vii] *Mission Bay Alliance v. Office of Community Inv. & Infrastructure*, 6 Cal. App. 5th 160, 206 (2016).
[viii] See 14 C.C.R. § 15040(d)–(d).
[ix] See Public Resources Code § 21004; See 14 C.C.R. § 15040.
[x] See Public Resources Code § 21159.26; See 14 C.C.R. § 15092(c).
[xi] 17 C.C.R. §§ 95811 (a)–(b) & 95812(c).
[xii] See Health & Safety Code §§ 17958.5, 17958.7, and 18941.5(b); See California Public Resources Code § 25402.10 (d)(2)(F) & 20 C.C.R. § 1684; See City of Berkeley Municipal Code 19.81 – the Building Energy Savings Ordinance (BESO) (2021).
[xiii] See Health & Safety Code §§ 39002, 39013, 39037, and 41508.
[xiv] See Cal. Const. art. XIII C & D.

Fuel Switching and Emissions related to End-Uses

Police power authority may be used to require fuel switching to low or zero-carbon sources through prohibitions on the installation of certain energy infrastructure (e.g., natural gas plumbing) in buildings. Police power may take the form of adopting an ordinance that expressly prohibits natural gas plumbing without either amending Title 24, Part 6, changing minimum efficiency standards for covered products under the EPCA, or requiring the installation of specific appliances or systems as a condition of approval.[i] There is currently an effort to preempt local jurisdiction police power under the EPCA. The City of Berkeley's Ordinance No. 7,672-N.S. adopted on July 16, 2019, used police power without amending Title 24 to prohibit natural gas plumbing in new construction. This ordinance survived the preemption challenge in federal district court and is now on appeal in the Ninth Circuit.[ii]

Local jurisdictions also act with authority to develop local hydrogen production and infrastructure through land use, constitutional authority to provide municipal services under California Constitution Article XI, § 9, franchise agreement authority, and police power authority. The CPUC would regulate intrastate hydrogen pipelines as a public utility if not owned by a municipal-owned utility.[iii] End-uses that depend on ozone-depleting substances (ODS) and ODS substitutes with high-GWP gases, particularly HFC refrigerants, are subject to federal and state regulations that ban, limit or phase out the regulated substance offering an opportunity to act locally to accelerate and augment these regulations.[iv] Finally, there is an opportunity to engage in the legislative[v] and regulatory (CPUC) process on the future of natural gas infrastructure.[vi]

8.6.3 GHG Impacts of CAP Measures in the Decarbonize Buildings Pathway

This section summarizes the GHG impacts from CAP measures related to building decarbonization, including those from the review of CAPs and the scenario analysis of GHG Impacts.

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[i] See City of Berkeley Ordinance No. 7,672-N.S. (Adopted July 16, 2019), City of Morgan Hill Ordinance No. 5906 (adopted October 23, 2019), City of San Jose Ordinance No. 30330 (adopted September 17, 2019), and City of Santa Cruz Ordinance No. 2020-06 (adopted April 14, 2020).

[ii] See *California Restaurant Ass. v. City of Berkeley,* Order Granting in Part and Denying in Part Motion to Dismiss, Document 75, Case No. 4:19-cv-07668-YGR (N.D. Cal. July 6, 2021); See See *California Restaurant Ass. v. City of Berkeley*, Case No. 21-16278 (9th Cir.), filed Aug. 5, 2021.

[iii] See Public Utilities Code § 216.

[iv] See 40 CFR Part 82; See 17 C.C.R. §§ 95380–95398; See 17 C.C.R. §§ 95371–95377; See California Air Resources Board, Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Chillers, Aerosols-Propellants, and Foam End-Uses Regulation, Last Visited January 5, 2022: https://ww2.arb.ca.gov/rulemaking/2020/hfc2020.

[v] AB 2313 (Williams, Chapter 571, Statutes of 2016); SB 1440 (Hueso, Chapter 739, Statutes of 2018); see also AB 1900 (Gatto, Chapter 602, Statutes of 2012); See also SB 1440 (Hueso, Chapter 739, Statutes of 2018); AB 3163 (Salas, Chapter 358, Statutes of 2020); See AB 1496 (Thurmond, Chapter 604, Statutes of 2015), SB 1371 (Leno, Chapter 525, Statutes of 2014) and SB 887 (Pavley, Chapter 673, Statutes of 2016), SB 605 (Lara, Chapter 523, Statutes of 2014), SB 1383 (Lara, Chapter 395, Statutes of 2016), and AB 1496 (Thurmond, Chapter 604, Statutes of 2015); See SB 1371 (Leno, Chapter 525, Statutes of 2014).

[vi] See CPUC Rulemaking R.18-04-019, Order Institution Rulemaking to Consider Strategies and Guidance for Climate Change Adaptation; See CPUC Rulemaking R.18-12-005, Order Instituting Rulemaking to Examine Electric Utility De-Energization of Power Lines in Dangerous Conditions; See CPUC Rulemaking R. 18-10-007, Order Instituting Rulemaking too Implement Electric Utility Wildfire Mitigation Plans Pursuant to SB 901 (2018); See CPUC Rulemaking R. 20-01-007, Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Safe and Reliable Gas Systems in California and Perform Long-Term Gas System Planning.

Review of Decarbonize Buildings Pathway Policies

For this analysis, we compare GHG impacts across CAPs. Based on the review of CAPs, measures in the Decarbonize Buildings Pathway account for between 0% and 42% of local reductions, with an average across all CAPs of about 9% (Figure 8.32).

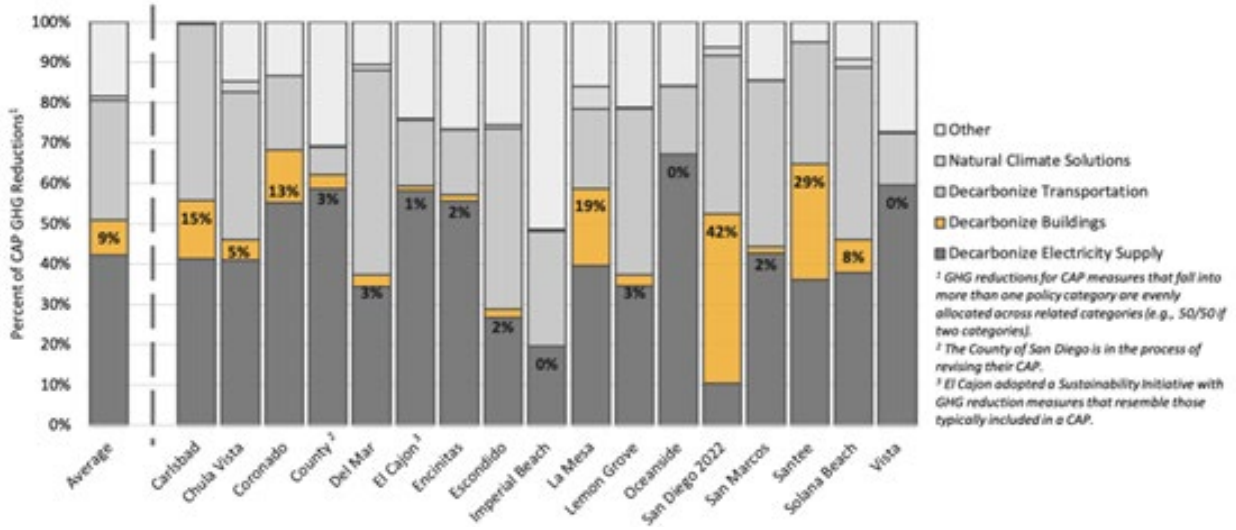


Figure 8.32 Contribution of Measures to Decarbonize Buildings in Adopted and Pending CAPs

A further breakdown of CAP building decarbonization measures from the review of CAPs shows the number of jurisdictions with one or more CAP measures or supporting action related to each of the three-building decarbonization policy categories and the associated average GHG contribution to the local CAP GHG reduction (Figure 8.33). The entire pathway contributes about 9% to local reductions, with most coming from energy efficiency measures. All CAPs have measures related to energy efficiency, and they account for between less than 1% to almost 29% of the GHG reductions from local measures in CAPs, with an average of about 8%. Only seven CAPs have building electrification measures, with an average contribution of about 4% to local GHG reductions. No CAPs in the San Diego region have measures related to increasing use of low-carbon fuels in buildings; therefore, we do not provide a detailed assessment of this policy category.

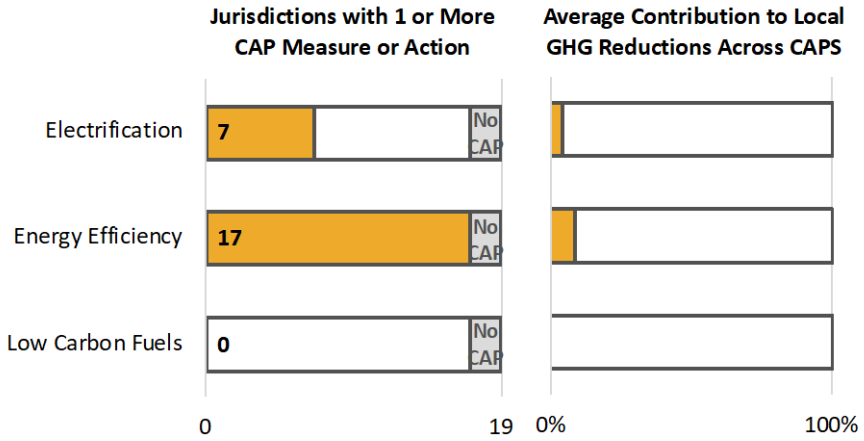


Figure 8.33 Number of Jurisdictions with Related CAP Measures and Associated GHG Impacts

Additional results about the number of CAPs that include related measures will be provided in the following sections that focus on the policy categories and subcategories of building decarbonization. As

described above in Section 8.3.3, we did not estimate the contribution of the policy subcategories to local GHG reductions across CAPs.

Scenario Analysis of GHG Impacts for the Decarbonize Buildings Pathway

In contrast to the review of CAPs, which considers measures in all emissions categories and does not consider the combined impact of measures, the scenario analysis only evaluates emissions from on-road transportation, electricity, and natural gas, and estimates the GHG impact of all related CAP measures. To assess the combined impact of all adopted CAPs in the region, we summed the activity level in CAP measures and recalculated a regional GHG impact value. One important factor to consider when evaluating the GHG emissions impacts of electric energy efficiency is California's increasing supply of renewable electricity. As the amount of carbon-free electricity increases and as more appliances are converted to electric, the potential for GHG reductions from efficiency decreases. Nonetheless, as noted above, efficiency is important during the transition to electrified buildings both from GHG impact and cost perspectives.[i]

Figure 8.34 shows the GHG reduction from the building decarbonization measures included in the Adopted CAP Commitment Scenario. The overall GHG impact is relatively small, about 0.05 MMT CO_2e. Over 90% of the reductions would result from energy efficiency measures and 6% from building electrification. Note that the City of San Diego draft 2022 CAP update is not included in these results. Section 8.4.5 provides an estimate of the GHG impacts of the draft City of San Diego CAP to the scenario analysis of adopted CAPs.

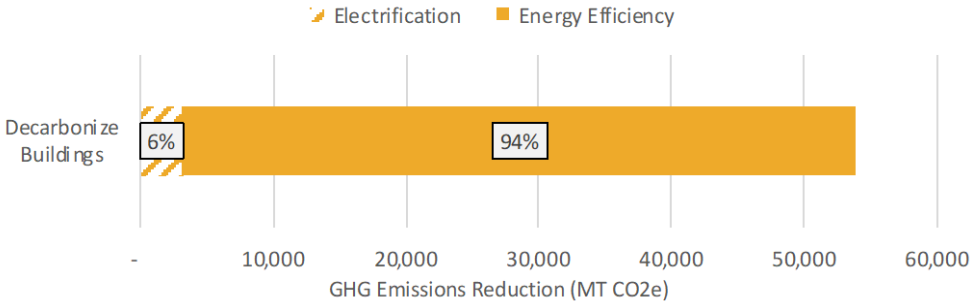


Figure 8.34 Emissions Reduced from Decarbonize Buildings Pathway Policies in Adopted CAPs in the San Diego Region

Table 8.24 provides a breakdown of the GHG reductions from energy efficiency based on the Adopted CAP Commitment Scenario. Energy efficiency improvements in existing nonresidential buildings represent 51% of the reductions in this pathway. Residential energy retrofits and water heater retrofits represent 16% and 25%, respectively. The relatively small impact of building electrification in Table 8.24 represents what would be expected from residential new construction measures in CAPs.

[i] Berg, W., E. Cooper, and M. Molina. 2021. Meeting State Climate Goals: Energy Efficiency Will Be Critical. Washington, DC: American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2104.

Table 8.24 Emissions Reduced from Decarbonize Buildings Pathway Adopted CAP Commitment Scenario

Decarbonization Pathway	Policy Category	Policy Subcategory	GHG Emissions Reduced in 2035	
			(MT CO_2e)	Distribution within Pathway
Decarbonize Buildings	Electrification	Residential New-Construction Electrification	3,207	8%
	Energy Efficiency	Residential Energy Retrofits	6,421	16%
		Non-residential Energy Retrofits	20,294	51%
		Water Heater Retrofits	9,758	25%
		Total:	**37,954**	**100%**

Best Adopted CAP Commitments Scenario for Building Decarbonization

The Best Adopted CAP Commitment Scenario applies the CAP measure with the highest impact to activity level and emissions to all jurisdictions in the region regardless of whether they have an adopted or pending CAP. The GHG reduction from measures related to building decarbonization in this scenario (0.7 MMT CO_2e) are significantly higher than what would result from the adopted CAP commitments (0.04 MMT CO_2e), though still relatively low when compared to other decarbonization pathways. For example, increasing grid supply of carbon-free electricity would reduce GHG emissions by 1.3 MMT CO_2e in the Adopted CAP Scenario and 1.6 MMT CO_2e in the Best Adopted CAP Commitment Scenario. The proportion of GHG reductions from energy efficiency would decline to 77%, and those from electrification would increase to 23% (Figure 8.35).

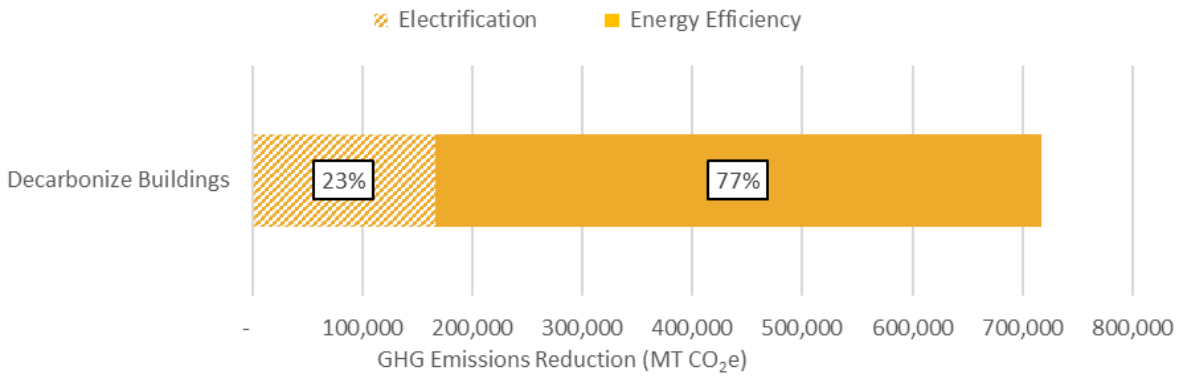


Figure 8.35 Emissions Reduced from Best Adopted CAP Building Decarbonization Policies Applied Regionwide

Table 8.25 provides a breakdown of the GHG reductions from energy efficiency by policy subcategory. Efficiency improvements in existing residential buildings represent 37% of the reductions in this pathway. Residential energy retrofits and water heater retrofits reduce emissions by 23% and 16%, respectively.

Table 8.25 Emissions Reduced from Best Building Decarbonization Policies in Adopted CAPS Applied Regionwide

Policy Group	Policy Category	Policy Subcategory	GHG Emissions Reduced in 2035	
			($MT CO_2e$)	Distribution within Pathway
Policy Group 2: Decarbonize Buildings	Electrification	Residential New-Construction Electrification	166,298	23%
	Energy Efficiency	Residential Energy Retrofits	269,074	37%
		Non-residential Energy Retrofits	164,672	23%
		Residential Water Heater Retrofits	116,645	16%
		Non-residential Solar Water Heater Retrofits	937	0.1%
Total:			**717,626**	**100%**

Table 8.26 compares the impact to regional electricity and natural gas use that commitment related to building decarbonization would have and those expected from the Best Adopted CAP Commitment Scenario. Overall, measures in adopted and pending CAPs included in this analysis would reduce regional electricity use by less than one percent and natural gas use by about one percent. The Best Adopted CAP Commitment Scenario would reduce electric use by 12% and natural gas use by 19%. By comparison, estimates in Chapter 4 under the central scenario, natural gas use associated with buildings should reduce by about 50% between 2019 and 2035. Based on this scenario, there would be a significant gap in the level of building decarbonization needed to be on track to achieve the levels contemplated in Chapter 4.

Table 8.26 Impact of Best Adopted CAP Commitment in Building Decarbonization on Regional Energy Use.

Activity	Policy Category	Policy Subcategory	Reduction in Activity Level[1]	
			Adopted CAP Commitment Scenario	Best Adopted CAP Commitment Scenario
Electricity Use	Energy Efficiency	Residential Energy Retrofits	0.01%	5%
		Non-residential Energy Retrofits	0.01%	5%
		Residential Water Heater Retrofits	0.0003%	2%
		Non-residential Solar Water Heater Retrofits		0.02%
Natural Gas Use	Electrification	Residential New-Construction Electrification	0.1%	5%
	Energy Efficiency	Residential Energy Retrofits	0.5%	14%
		Non-residential Energy Retrofits	0.3%	7%
		Residential Water Heater Retrofits	0.5%	4%
		Non-residential Solar Water Heater Retrofits		3%

[1] Reduction in activity level of electricity (KWh) and natural gas (Therms) demand, for year 2035.

8.6.4 Increase Energy Efficiency

Energy efficiency has been the foundation of California's energy policy since the 1970s. In the context of building decarbonization, energy efficiency can reduce **total energy needed** by improving building envelope performance (e.g., insulation, windows, weatherization, etc.) and appliance efficiency,

particularly natural gas appliances in the short run and electric appliances in the medium and long term; **GHG emissions** from fossil-fueled and electric appliances in the short run while electrification transition occurs (in the short-run the emissions rate of electricity is higher, so energy efficiency can have a short run impact on emissions); and, **energy costs**, which is important for communities of concern for whom energy costs can represent a higher portion of income.

CAP Measures Related to Energy Efficiency in the San Diego Region

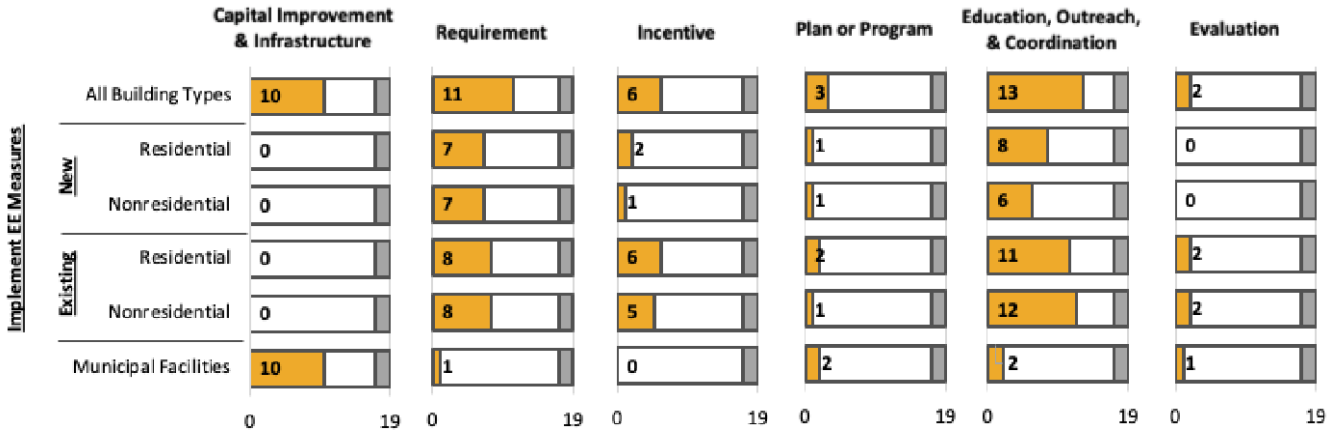
In the context of CAPs, energy efficiency related measures can be broken into two categories: (1) measures to encourage or require efficiency improvements, and (2) measures to encourage or require building owners to audit, benchmark, and disclose information about building energy use. Each of these can be broken down further by vintage (e.g., new) and building class (e.g., residential). We use the frequency of CAP measures and the overall GHG contribution to local reductions in CAPs to assess potential opportunities for additional local actions.

Much of the building decarbonization analysis in Chapter 4 focuses on electrification, though as noted above, energy efficiency can continue to play a role in cost containment, an important equity consideration. Also, building-related measures in CAPs focus mainly on efficiency and many of the same considerations for building energy efficiency policies are relevant to building electrification.

Policies to Encourage or Require Energy Efficiency Improvements

Based on our review of CAPs in the San Diego region, energy efficiency accounts for between about 1% and 29% of total local reductions in adopted and pending CAPs in 2035, with an average of about 8%. CAPs include a range of quantified measures and supporting efforts to increase energy efficiency in buildings. Table 8.27 summarizes the number of CAPs in the region that include at least one quantified measure related to implementing energy efficiency improvements. It shows which implementation mechanisms were used and distinguishes building (e.g., residential and nonresidential) and construction (e.g., new and existing) types. This view helps to understand how often related measures are included in CAPs across various categories, which can help assess whether there is an opportunity for further local action. Table 8.27 provides examples of the types of measures included in the implementation mechanisms.

Table 8.27 Number of Adopted and Pending CAPs with Measures to Implement Energy Efficiency



Implementation Mechanism

Viewing the results in Table 8.27 vertically can help understand the distribution of CAPs across implementation mechanisms. In this case, education, outreach, and coordination appear to be the

approach included in most CAPs, followed by requirements and incentives. In general, for nearly all policy categories associated with building decarbonization, the highest number of CAPs with related measures fall within these three implementation mechanisms.

Education and outreach measures include those to raise awareness about energy efficiency and to encourage a range of strategies, including water heater efficiency and cool roofs. Examples of measures related to incentives include expediting permits or waiving permit fees for increased energy efficiency, and providing financial incentives, and increasing financing opportunities. And energy efficiency measures also can require energy efficiency improvements at specified intervention points, like time of sale or major remodel.

Building and Construction Type

Viewing the table horizontally helps understand how the distribution occurs by building type and construction type. In this case, measures to increase energy efficiency in existing buildings occurred in the highest number of CAPs and were split about evenly between residential and non-residential. Most measures use education, outreach, and coordination to increase awareness of energy efficiency. Requirements represent the second-highest number of measures, followed by incentives.

Energy efficiency measures related to new buildings represent the second-highest number of measures distributed across implementation mechanisms similar to existing buildings. More than half of CAPs included measures related to municipal capital improvements and infrastructure related to energy efficiency projects in local jurisdiction buildings.

Example CAP Measures and Adopted Policies

Table 8.28 provides examples of the types of CAP measures related to implementing energy efficiency improvements for each of the implementation mechanisms.

Given the relatively small GHG reductions from existing building measures in adopted and pending CAPs and the potential for these measures to reduce GHG more than new construction, we focus here on policies to improve efficiency in existing buildings. Additional measures related to new construction are discussed in Section 8.6.6 below. The following summarizes several relevant policies in the region.

Table 8.28 Examples of CAP Measures to Implement Energy Efficiency Improvements

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Retrofit streetlights, traffic signals, and other outdoor public lighting • Implement energy efficiency recommendations through Energy Roadmap Program • Install solar water heating systems at municipal facilities • Install cool roofs on municipal buildings • Retrofit HVAC and water pump equipment
Education, Outreach, & Coordination	• Develop partnerships to promote energy efficiency upgrades • Develop partnerships to promote water heater upgrades • Promote energy efficiency upgrades • Promote water heater upgrades • Promote shade trees • Promote cool roofs
Evaluation	• Evaluate cost effectiveness of energy efficiency activities • Revisit municipal energy efficiency goals on a regular cycle • Evaluate feasibility of developing programs or policies • Track project data through permit applications
Incentives	• Expedited permitting for increased energy efficiency • Incentivize energy efficiency upgrades • Increase financing opportunities • Incentivize shade trees • Waive permit fees for increased energy efficiency
Plan or Program	• Develop an energy efficient lighting program for municipal facilities • Develop a municipal energy strategy • Include energy efficiency in municipal purchasing policies
Requirement(s)	• Require general energy efficiency upgrades at a specified intervention point • Require water heater upgrades at a specified intervention point • Require cool roofs at a specified intervention point • Increase energy efficiency standards for qualifying projects • Require shade trees

City of Carlsbad

The City of Carlsbad CAP includes three measures to improve energy efficiency in buildings. Measure D (Encourage Single-Family Residential Energy Efficiency Retrofits) and Measure E (Encourage Multi-Family Residential Efficiency Retrofits) seek to achieve a 50% energy reduction in 30% of single-family and multi-family homes. Measure F (Encourage Commercial and City Facility Efficiency Retrofits) seeks to achieve a 40% energy reduction in 30% of nonresidential buildings. To achieve these levels of energy reductions, these measures include several implementation mechanisms, including education and outreach, promoting existing incentive programs and requirements.

The City of Carlsbad has adopted two ordinances to implement these measures. Ordinance CS-347, in March 2019, requires single-family and multi-family buildings that undergo additions or alterations with a building permit valuation greater than $60,000 to complete specified energy efficiency improvements.[i] Compliance requirements are determined by the type (e.g., single-family) and building age and include

[i] California Energy Commission. Docket Number 16-BSTD-07, April 22, 2019. Local Ordinance Application – 2016 Standards. TN# 227821. Carlsbad Ordinance CS347 Full Text. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=227821&DocumentContentId=59197.

actions related to duct sealing, attic insulation, cool roofs, and lighting. Note the ordinance also includes provisions related to water heating in nonresidential buildings, which are included in the section below on building electrification.

City of Chula Vista

Objective 3.3 (Energy Efficiency Upgrades) of the City of Chula Vista CAP, specifically Strategy 3, seeks to require energy-savings retrofits in existing buildings at a specific point in time. To implement this measure, in March 2021, the City of Chula Vista adopted Ordinance No. 3498 to require benchmarking and energy efficiency improvements in certain multi-family and non-residential buildings.[i] More information on the Benchmarking and Disclosure portion of the ordinance is in the section below on this topic.

Starting 2023 for buildings with a gross floor area (GFA) of at least 50,000 SF and 2026 for buildings with GFA 20,000 – 49,999 SF, the ordinance also requires certain multi-family and nonresidential buildings to meet building performance standards every five years. Buildings that do not meet the standard must achieve performance targets based on Energy Star scores or the site's weather normalized energy use intensity (EUI-WN) or to complete both minimum building energy improvements every 10 years based on Energy Star scores or EUI-WN and a building audit and retro-commissioning. Multi-family buildings constructed before 2006 for rental tenant spaces where the tenant bears utility costs also have to complete the minimum number of prescriptive measures.

City of Encinitas

The City of Encinitas CAP includes two measures related to building energy efficiency: BE-1 (Adopt a Residential Energy Efficiency Ordinance) and BE-3 (Adopt Higher Energy Efficiency Standards for Commercial Buildings). To implement these measures, the City of Encinitas adopted a comprehensive Green Building Ordinance 2021-13.[ii] Several provisions require energy efficiency improvements.

Residential buildings undergoing additions or alterations with a permit valuation of $50,000 or higher are required to complete specified energy efficiency improvements. Similar to the City of Carlsbad's ordinance, compliance requirements depend on building type (e.g., single-family) and age of the building and include actions related to duct sealing, attic insulation, cool roofs, lighting, and water heating.

Existing non-residential, certain multi-family residential, and hotel/motel building additions of 1,000 square feet or alterations with a permit valuation of at least $200,000 are required to complete energy improvements related to outdoor lighting, water heating, and daylighting.

Audit, Benchmark, and Disclosure Policies

Policies to encourage or require energy audits, benchmarking, and disclosure policies are intended to provide data about energy use to raise awareness and to help develop and implement energy efficiency improvements. Auditing policies encourage building owners to complete comprehensive energy

[i] City of Chula Vista, Building Energy saving Ordinance webpage. Available at https://www.chulavistaca.gov/departments/clean/benchmarking.

[ii] City of Encinitas. Green Building Ordinances webpage. Available at https://encinitasca.gov/Government/Departments/City-Manager/Environmental-Services/Climate-Action-Plan/Green-Building-Ordinances.

assessments that identify opportunities to improve energy and water efficiency.[i] Benchmarking is a process of reporting energy use, typically through the ENERGY STAR Portfolio Manager site.[ii] Once collected, building energy usage data can be disclosed, either publicly through a governmental website or directly to prospective tenants or buyers. In general, the goal of these policies is to increase the amount and availability of information and data about building energy consumption to form the basis for further action.

Table 8.29 presents the number of CAPs that have at least one measure related to audit, benchmark, and disclosure policies. Relatively few CAPs include measures related to these policies, and nearly all of them are associated with existing buildings. While new buildings can disclose estimated energy use through energy ratings similar to fuel efficiency ratings on new cars, it is more common in existing buildings, particularly nonresidential buildings.

Based on the information presented in Table 8.29, there appears to be an opportunity to increase the number of CAP measures related to audit, benchmark, and disclosure policies in existing buildings. Also, while municipal buildings represent a small portion of energy use and emissions in a local jurisdiction, action to improve efficiency can provide an opportunity to model actions that could be needed in the private sector. There is also a potential opportunity for local jurisdictions to assess energy use at municipal facilities. As with policies to implement energy efficiency improvements, many aspects of policies to encourage or related to audit, benchmark, and disclosure can be transferred to building electrification strategies.

Table 8.29 Number of Adopted and Pending CAPs with Measures Related to Energy Audit, Benchmark, and Disclosure

Information Disclosusre		Capital Improvement & Infrastructure	Requirement	Incentive	Plan or Program	Education, Outreach, & Coordination	Evaluation
	All Building Types	1	5	1	0	6	0
New	Residential	0	0	0	0	0	0
New	Nonresidential	0	0	0	0	0	0
Existing	Residential	0	4	1	0	6	0
Existing	Nonresidential	0	5	1	0	5	0
	Municipal Facilities	1	0	0	0	0	0

<u>GHG impact of CAP Measures</u>

Audit, benchmark, and disclosure policies can be considered a foundational step in the efficiency process but alone may not result in notable energy reductions. As such, associated GHG reductions are likely relatively low. Evaluation of previous policies shows general energy impacts of these policies. For example, a comprehensive review of nonresidential benchmarking and transparency policies in 2017 found “3 to 8 percent reductions in gross energy consumption or energy use intensity over a two- to

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[i] Pacific Northwest National Laboratory. September 2011. A guide to Energy Audits. Available at https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20956.pdf.

[ii] U.S. Environmental Protection Agency Energy Star Portfolio Manager webpage. Available at https://www.energystar.gov/buildings/benchmark.

four-year period of [benchmarking and transparency] policy implementation."[i] For auditing policies that do not require efficiency improvements, the number of building owners that complete actions and the energy impact of those actions are important considerations in determining the impact of these policies.

The GHG impacts of these policies were not considered in the scenario analysis presented in Section 8.4. Only five CAPs quantified the GHG impacts of these policies. Many CAP measures related to auditing, benchmarking, and disclosure are supporting actions.

Example CAP Measures and Policies

Table 8.30 provides examples of the types of policies related to the assessment and disclosure of energy use information for each of the implementation mechanisms. Measures related to municipal buildings generally commit to conducting audits of municipal facilities. Education and outreach efforts seek to increase awareness about the process of audits, benchmarking, and information disclosure. In this context, incentives reduce or eliminate the cost of the energy audit or benchmarking process. Required action includes audits or benchmarking for certain buildings (e.g., undergoing additions or alterations) or intervention points (e.g., time of sale).

There are relatively few examples of measures from adopted or pending CAPs related to encouraging or requiring energy audits, benchmarking, and disclosure. California adopted a benchmarking requirement with AB 802 (2015), which requires certain buildings to report energy use data. Local ordinances are implemented in this context and can add to existing requirements.

Table 8.30 Examples of CAP Measures Related to Audit, Benchmarking, and Disclosure

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Conduct energy audits of municipal buildings
Education, Outreach, & Coordination	• Educate public on energy performance disclosure • Target outreach to specific communities • Develop partnerships to enroll users in benchmarking programs • Promote information disclosure tools and resources • Encourage regional partners to provide free energy audits
Evaluation	NA
Incentives	• Offer free home evaluations • Develop an incentive program for building benchmarking and disclosure • Provide free retrofit evaluations
Plan or Program	NA
Requirement(s)	• Require energy audits for additions and/or alterations to existing residential and/or nonresidential units • Require public disclosure at a specific point in time (e.g., time of sale)

[i] N. Mims, et al., 2017. Evaluation of U.S. Building Energy Benchmarking and Transparency Programs: Attributes, Impacts, and Best Practices. Energy Analysis and Environmental Impacts Division Lawrence Berkeley National Laboratory.

Chula Vista Energy Efficiency Ordinance

Objective 3.1 (Energy Education & Enforcement) of the City of Chula Vista CAP includes Strategy 1 (Expand education targeting key community segments and facilitate energy performance disclosure). Several actions are contemplated to implement this measure, including:

- Action 3.1.1 A: Offer free evaluations through Free Resource & Energy Business Energy Evaluations (FREBE) & Home Upgrade, Carbon Downgrade programs
- Action 3.1.1 F: Create local incentives or policies for building benchmarking and public disclosure
- Action 3.3.3 A: Require free energy evaluations for businesses as part of licensing process
- Action 3.3.3 B: Include free retrofit evaluations in Home Upgrade, Carbon Downgrade program

In March 2021, the City of Chula Vista adopted Ordinance No. 3498 to require benchmarking and energy efficiency improvements in certain multi-family and non-residential buildings.[i] Starting in 2022, owners of certain non-residential buildings with a GFA of at least 20,000 square feet are required to conduct regular benchmarking and to submit data annually via Energy Start Portfolio Manager. The City of Chula will disclose results to the public, and building owners will directly disclose to tenants and buyers.

City of Santee CAP

The City of Santee CAP has several quantified measures related to energy audits. Measure 1.1 (Energy Audits in the Existing Residential Sector) seeks to require energy audits of existing residential units requesting permits for major and minor Modifications. Measure 3.1 (Energy Audits in the Existing Commercial Sector) would require energy audits in existing commercial units requesting permits for minor or major modifications.

8.6.5 Electrify Building End Uses

Building decarbonization requires replacing fossil fuel end uses with electric or low-carbon fuels. Chapter 4 identified the following appliances as candidates for electrification (Table 8.31).

Table 8.31 Common Electric Appliances

End Use	Electric Appliance Option
Space Heating	Air Source Heat Pump; Ground Source Heat Pump
Water Heating	Heat Pump Water Heater; On-Demand Electric Water Heater
Cooking	Induction Cooktops and Stoves
Laundry	Electric Dryers; Heat Pump Dryers

These technologies replace natural gas usage with electricity. Because every fossil-fueled appliance is an emissions source, electrifying building end uses reduces GHG but also other criteria pollutants, both indoors and in the vicinity of the building. As the GHG intensity of electricity declines, the overall amount of GHG emissions associated with these appliances also declines. This reduces direct emissions from building end uses. Electrifying certain appliances is likely to have a relatively large impact on GHG emissions, depending on the amount of natural gas required to operate the appliance. For example, Figure 8.36 illustrates the total residential natural gas end use by appliance within the SDG&E territory. Water heating appliances account for the largest share of residential natural gas consumption (63%), followed by space heating (28%).[ii]

[i] City of Chula Vista, Building Energy saving Ordinance webpage. Available at https://www.chulavistaca.gov/departments/clean/benchmarking.

[ii] California 2019 Residential Appliance Saturation Survey (RASS) preliminary data provided to EPIC.

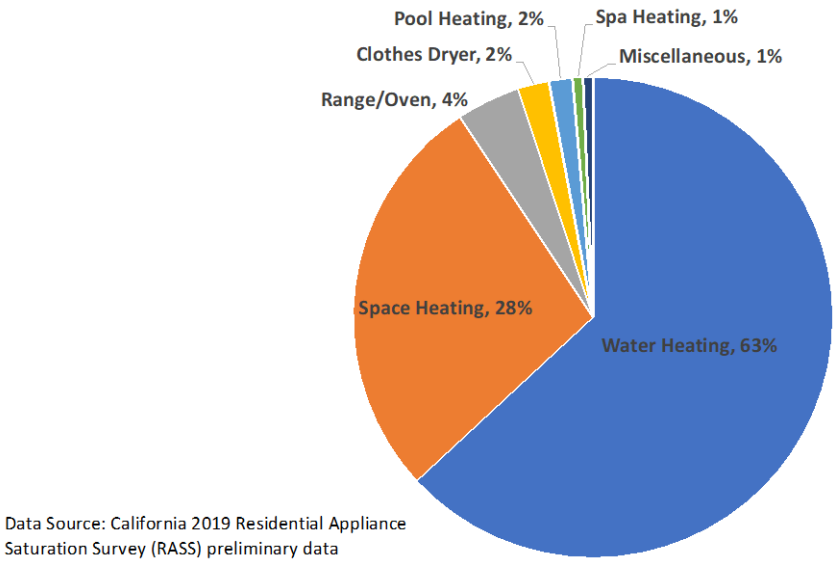


Figure 8.36 Total Residential Natural Gas End Use by Appliance in the SDG&E Territory

The time of day that buildings use energy also has an impact on emissions. In general, in California, the rate of emissions is lowest in the middle of the day when solar energy is abundant and highest after the sun sets in the evening and natural gas power plants increase production to meet the peak demand, which occurs between around 7 pm (Figure 8.37). In the short run and until California reaches its goal of 100% carbon-free electricity supply by 2045 and energy storage is widespread, using electric appliances will be associated with some level of carbon dioxide emissions, even if buildings have a distributed solar system installed. This is because natural gas power generators will supply a portion of the electricity supply, particularly in the evening and overnight when renewable electricity supplies are lower.

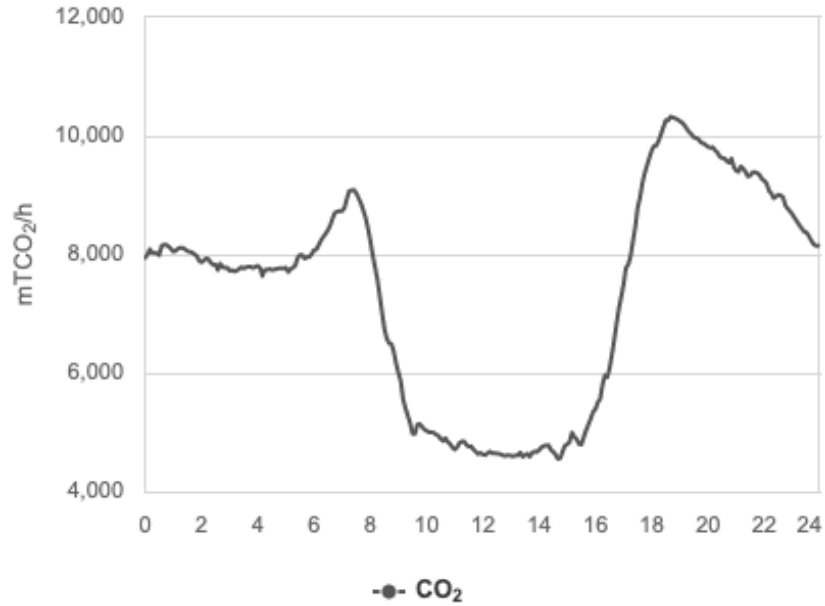


Figure 8.37 Carbon-Dioxide Emissions Rate from CAISO (10-27-21) [i]

[i] [i] California Independent System Operator (ISO) Today's Outlook webpage. Available at http://www.caiso.com/TodaysOutlook/Pages/emissions.html.

Efforts to electrify buildings have grown rapidly in the past several years, both at the state and local levels. At the state level, building requirements in the Energy Code (Title 24 Part 6) are shifting towards electrification, as seen in the upcoming 2022 standards approved by the CEC in August 2021.[i] Beginning January 1, 2023, all new residential construction must be electric-ready and prescriptive requirements for residential water heating set heat pump water heaters as the standard for most climate zones. It is anticipated that state requirements will shift even further towards all-electric requirements for both residential and nonresidential construction in future triennial code updates.

However, there are still opportunities for jurisdictions to go beyond state requirements. Increasingly, cities are adopting ordinances that encourage or require some degree of electrification. But not all electrification ordinances are alike, and requirements across the state fall along a broad spectrum (Figure 8.38). Despite this spectrum, many local governments are willing to pursue all-electric policies. As of June 2022, 55 jurisdictions have adopted all-electric requirements for residential and/or nonresidential construction since 2019, including the Cities of Encinitas and Solana Beach (Note: the City of Los Angeles directed staff to develop similar measures in June 2022). These requirements have come in two forms: a local ordinance that adopts an all-electric definition for new and/or existing buildings; and a natural gas infrastructure moratorium.

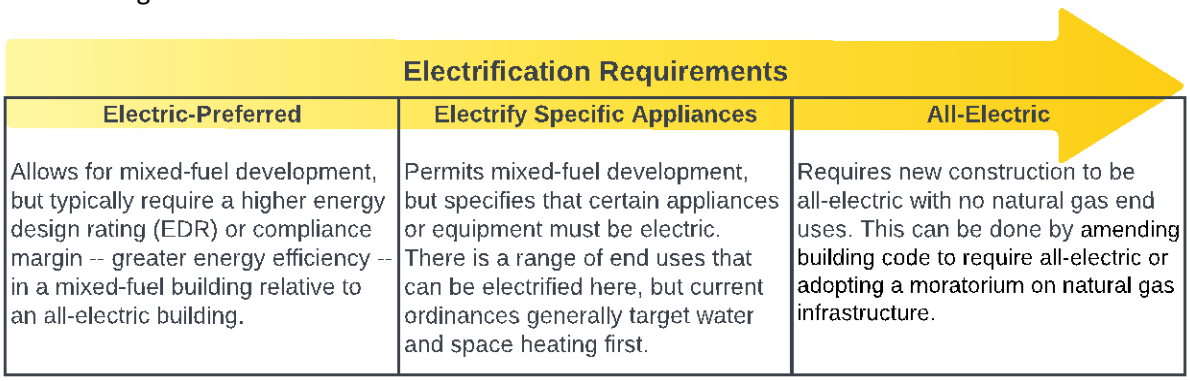


Figure 8.38 Spectrum of Electrification Options in Current Local Codes

Electrification within the existing building stock is more challenging to address than in new construction. Several barriers to adoption persist within the current market and will likely need to be directly addressed to encourage electrification in existing buildings and new construction where requirements are not present. These include, but are not limited to:[ii]

- Limited experience or comfort working with electric appliances among contractors;
- Limited awareness and/or negative perceptions of electric technologies among consumers;
- Limited access to low-cost financing for low-income consumers;
- Prioritization of least-cost commonly used technologies in new construction projects;
- Unwillingness of consumers to pay higher upfront costs;
- Perceived “hassle factor” of fuel switching appliances; and
- Inability to rapidly fuel switch when an “emergency” replacement is required (e.g., water heater failure).

[i] California Energy Commission. 2022 Building Energy Efficiency Standards. Available at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency.

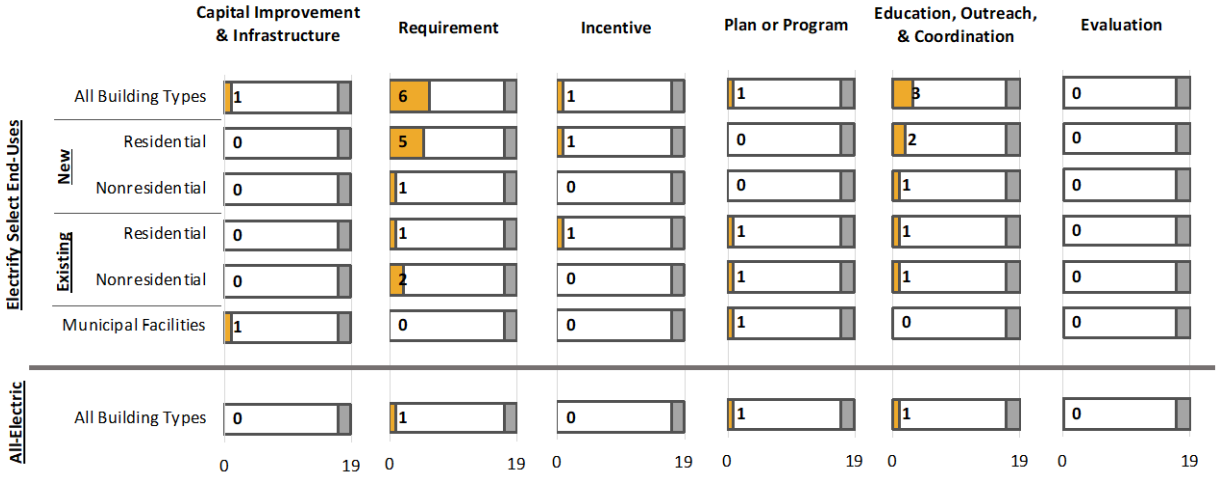
[ii] E3 (2019). Residential Building Electrification in California. Appendix D: Market Adoption Barriers and Potential Solutions (PDF).

CAP Measures Related to Building Electrification in the San Diego Region

Adopted commitments for building electrification in CAPs in the San Diego region are few and only focus on electrification of specific appliances.[i] For CAPs that contain at least one electrification measure, these measures account for one percent of local reductions on average. Figure 8.42 summarizes the number of jurisdictions with one or more CAP measures or supporting action that addresses building electrification across all building (e.g., residential and nonresidential) and construction (e.g., new and existing) types, and implementation mechanisms.

Relatively few CAP measures and supporting actions relate to building electrification. Collectively, only six of the 19 jurisdictions in the region have committed to some sort of electrification requirement for select appliances. Even fewer jurisdictions have committed to providing incentives and education on building electrification (one and three, respectively), and only one jurisdiction committed to all-electric activity within their CAP. Based on the relative lack of CAP measures to electrify buildings and the GHG implications as presented in the scenario analysis presented in Section 8.4 and above in this section, the commitment to electrification in adopted CAPs is insufficient given the level of building equipment electrification contemplated in Chapter 4.

Table 8.32 Number of Adopted and Pending CAPs with Measures Related to Building Electrification



Implementation Mechanisms

For those jurisdictions that do include building electrification, requirements are the most frequent approach used, followed by education and then incentives. No adopted CAPs commit to capital improvement and infrastructure (e.g., electrification of municipal facilities), developing a building electrification plan or program, or ongoing evaluation of current or future building electrification opportunities.

Building and Construction Type

Generally, CAPs have focused on electrifying select end-uses in new residential developments. In this case, measures have specified the electrification of one or more appliances, such as the water heater or cookstove/range, through the development of a local ordinance. Few CAPs, if any, look to electrify nonresidential projects and the existing building stock. The one jurisdiction that requires electrification of nonresidential buildings (new and existing) specifies electrification of water heating equipment. In

[i] While no CAP in the region commits to all-electric requirements, some jurisdictions have moved towards all-electric requirements during implementation of their CAP. Examples are provided later in this section.

addition, the electrification requirement for the existing nonresidential building stock only applies to qualifying addition and alteration projects.

Municipal facilities are covered under nonresidential requirements, but no jurisdiction has specifically committed to the electrification of municipal facilities.

Examples of Policies in Region

Table 8.33 provides general policies identified in adopted CAP measures and actions related to building electrification by implementation mechanism. While building electrification measures are only included in recent CAPs, several local jurisdictions have adopted related policies.

Table 8.33 Examples of CAP Measures to Electrify Select End Uses

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	NA
Education, Outreach, & Coordination	• Promote installation of heat pump water heaters in renovations • Provide educational materials on alternative water heaters • Educate homeowners and businesses on building electrification and appliance options
Evaluation	NA
Incentives	• Provide electric appliance incentives to new and existing residential units • Expedite permitting for replacement of natural gas space and/or water heaters
Plan or Program	NA
Requirement(s)	• Require electrification of water heater in new residential and/or nonresidential construction (including additions and alterations) • Develop materials to support requirements (e.g., cost effectiveness studies) • Explore requiring non-natural gas appliances in new residential development • Require new multi-family residential development to install electric cooking appliances

City of Encinitas

The 2020 interim revision to the City of Encinitas CAP included two CAP measures that focused on building electrification. Measures BE-2 (Require Decarbonization of New Residential Buildings) and BE-4 (Require Decarbonization of New Commercial Buildings) estimated the GHG reduction potential of electrifying water heating in new residential and nonresidential developments through the adoption of a local ordinance or reach code. In October 2021, the City of Encinitas adopted its Green Building Ordinance, which included, among other things, electrification requirements for new construction.[i] This ordinance goes beyond what was committed to in their CAP and requires all new residential and nonresidential construction to be all-electric, with some exceptions for commercial kitchens, essential facilities, and projects that would require significant utility upgrades to accommodate the increased electric load. For buildings where an exception applies, the building must be electric-ready.

Encinitas developed a Green Building Incentive Program that provides financial incentives, priority plan

[i] City of Encinitas. Green Building Ordinances webpage. Available at https://encinitasca.gov/Government/Departments/City-Manager/Environmental-Services/Climate-Action-Plan/Green-Building-Ordinances.

checks, and City Council recognition to qualifying projects to advance efforts within the city and encourage electrification in the existing building stock.[i]

City of Carlsbad

The City of Carlsbad adopted a CAP in 2015, which included Measure J, specifying the adoption of a local ordinance that requires a solar water heater or heat pump water heater in new residential and nonresidential construction with exceptions made for central water heating systems that serve multiple dwelling units. In March 2019, the city adopted this ordinance.[ii] While not explicitly an electrification requirement, this ordinance is representative of efforts to electrify certain end-uses, especially those responsible for most residential natural gas consumption.

City of Solana Beach

The City of Solana Beach did not commit to electrification in their 2017 CAP but recognized the potential to reach its climate goals by developing an electrification ordinance. In December 2021, the City adopted Ordinance 518, which requires electrification of most end-uses in new residential and nonresidential projects.[iii] End-uses required to be electric include space heating, water heating (including pools and spas), and clothes drying. The ordinance also has an electric-ready requirement for buildings plumbed for natural gas or propane cooking appliances.

Worth noting on this ordinance is how it defines *new* construction. The ordinance applies to certain existing buildings when they are substantially changed as defined within the ordinance as:

- Any non-residential or mixed-use remodel project that has a permit valuation of $750,000 or more; or alters 50% or more of major structural components including exterior walls, interior walls, floor area, roof structure, or foundation; or has an increase of 50% or more of floor area; and
- Any residential remodel project that alters 50% or more of structural components, including exterior walls, interior walls, floor area, roof structure, or foundation; or has an addition of 700 square feet or more floor area.

This reflects the discretion local jurisdictions act with when interpreting Title 24 and adopting their own building standard amendments to Title 24.

8.6.6 Opportunities for Additional Local Policy Action in the Decarbonize Buildings Pathway

Opportunities are a function of authority to act, frequency of measures in CAPs, and the GHG impact. As noted above, there is a range of policy mechanisms to implement CAP measures. For purposes of identifying policy options to decarbonize building in the San Diego region, we will focus on three key mechanisms: education, outreach, and collaboration, incentives and financing, and requirements. Recognizing that all three policy mechanisms are needed but that GHG impacts increase as we move from education to requirements, we will focus on incentives and requirements. In addition to these three, we will consider the equity implications of these policies

[i] City of Encinitas. Green Building webpage. Available at https://encinitasca.gov/Residents/Environmental-Programs/Green-Building.

[ii] City of Carlsbad. Ordinance No. CS-348. Available at https://localenergycodes.com/download/461/local_government_adoption_ordinance/fieldList/Carlsbad 2019 - Ordinance No CS-348.PDF.

[iii] City of Solana Beach. Ordinance 518. See City Council Meeting November 10, 2021. Available at https://solanabeach.12milesout.com/video/meeting/c5805988-cc39-4106-a75a-30975821258b.

In general, there is an opportunity for more jurisdictions to adopt energy efficiency and electrification policies and for all jurisdictions to adopt best-in-class policies.

Integrate Equity Considerations into Building Decarbonization Policy Process

As noted in Section 8.3.5 above, the integration of social equity considerations in adopted and pending CAPs is limited, inconsistent, and lacks specificity. In general, there is an opportunity to integrate these considerations into CAPs and the resulting measures and policies. In the context of electricity and natural gas policy, the CPUC often includes within the definition of low-income household "residential customers eligible for California Alternate Rates for Energy (CARE) and the Family Electric Rates Assistance (FERA) programs, resident-owners of single-family homes in disadvantaged communities (as defined in D.18-06-0127), or residential customers who live in California Indian Country (as defined in D.20-12-003)… ."[i]

The following provides a preliminary overview of several aspects of equity related to building electrification, but additional work would be needed to develop the capacity and tools to integrate equity into the San Diego region's building and other decarbonization policies.

High Proportion of Renters in Communities of Concern

Policies and programs to address energy use in buildings that lease or rent units often face the "split incentive" dilemma. Building owners often do not pay utility bills and have no incentive to address building energy, while renters pay the utility bills and have an incentive to improve energy use but do not own the building or the main energy-consuming appliances and equipment. In communities with a high proportion of renters, considering the split incentive is particularly important.

There is a range of actions to address the unique challenges that renters face, including the following: findings from a report by ACEEE focusing on energy efficiency in rental housing.[ii] Granting renters the right to make efficiency improvements

- Adopting a renter right of first refusal on property sale
- Creating a rental energy disclosure policy
- Advocating to expand state and utility rental efficiency programs
- Promoting existing state and utility efficiency programs to renters and landlords
- Adopting a rental energy performance standard and assisting affordable housing providers with compliance
- Instituting limited-scope rental property retrofit requirements
- Designing rental efficiency loan and grant programs with affordability covenants
- Coupling public housing energy-efficient rehab projects with inclusive workforce development
- Including energy efficiency in competitive, affordable housing funding criteria

An example from the San Diego region that addresses the split incentives is the City of Chula Vista Building Energy Savings Ordinance (Ordinance No. 3498), which requires certain multifamily building owners to benchmark and disclose energy usage and improve efficiency in rental units. Similar issues

[i] California Public Utilities Commission. Proposed Decision Revising Net Energy Metering Tariff and Subtariffs in Rulemaking 20-08-020, 12-13-21.

[ii] Samarripas, S., and A. Jarrah. 2021. A New Lease on Energy: Guidance for Improving Rental Housing Efficiency at the Local Level. Washington, DC: American Council for an Energy-Efficient Economy. Available at aceee.org/research-report/u2102.

and policy opportunities would exist for electrification. However, additional analysis would be needed to determine the applicability of these approaches in the San Diego region.

Relative Lack of Data and Analysis Related to Equity

In general, there is a lack of comprehensive data and analysis at the local jurisdiction and regional level for equity aspects of building energy use. Some work has been done to collect data at the local level and to develop visualization tools. For example, the City of San Diego[i] and the City of Chula Vista[ii] each have developed a Climate Equity Index, which includes metrics related to energy use and costs. The City of Escondido's CAP seeks to develop a Clean Energy Equity Plan and priority investment neighborhoods (PIN) to help target the implementation of certain CAP measures.[iii] Examples of detailed building energy mapping tools exist in other regions of California, including UCLA's Energy Atlas, which allows users to explore energy usage and greenhouse gas emissions at varying levels of geographic scale down to the neighborhood level.[iv] Researchers from UCLA also have developed equity-related metrics to understand issues of energy poverty.[v] Developing regional capacity to do this analysis could help to integrate equity-focused considerations into the policy development process.

Cost Implications of Building Electrification

The cost to residents in Communities of Concern of electrifying residential units depends on many factors, including equipment cost, the equipment being installed and replaced, type of construction (i.e., new vs. retrofit), age of the building, electric and natural gas rates, expected change in natural gas and electric consumption, and climate zone. Certain equipment or combinations of equipment have capital cost, bill, and lifecycle savings, including all-electric new homes with air conditioning, mini-split retrofits, ducted heat pumps in new construction air conditioning. While others result in additional upfront and operating costs, including electric induction cooktops and heat pump clothes dryers.[vi]

CPUC analysis has shown that for certain buildings in the San Diego region, particularly those in a hot climate zone, switching from mixed-fuel to electric space and water heating can lower monthly energy utility bills, considering electricity and natural gas use and rates. On the other hand, new all-electric homes in this same climate zone would have slightly higher bills. This is, in part, due to including less cost effective equipment like induction cooktops and heat pump clothes dryers.[vii] This is consistent with findings in Chapter 4, which notes that "[p]olicies should support increasing adoption of efficient heat pump-based space and water heating systems in both new and existing buildings, with particular focus on assistance for low-income residents and rental buildings." More analysis may be needed to understand the specific cost implications of building electrification in communities of concern in the San Diego region and the potential need for financial assistance.

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[i] City of San Diego. Climate Equity Index Mapping Tool webpage. Available at https://www.sandiego.gov/sustainability/social-equity-and-job-creation.

[ii] City of Chula Vista. Climate Equity Index Mapping Tool Available at https://usandiego.maps.arcgis.com/apps/webappviewer/index.html?id=4e6aab73778944148336d512edc032ea.

[iii] City of Escondido Climate Action Plan, 2021. Available at https://www.escondido.org/climate-action-plan-documents.aspx.

[iv] UCLA Energy Atlas Mapping Tool. Available at https://energyatlas.ucla.edu/map/usage_income.

[v] Fournier, ED, et al. 2020. On energy sufficiency and the need for new policies to combat growing inequities in the residential energy sector. Elem Sci Anth, 8: 24. DOI: https://doi.org/10.1525/elementa.419.

[vi] E3, "Residential Building Electrification in California" (2019). https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf.

[vii] California Public Utilities Commission, 2021. Utility Costs and Affordability of the Grid of the Future: An Evaluation of Electric Costs, Rates, and Equity Issues Pursuant to P.U. Code Section 913.1.

Adopt All-Electric Building Codes and/or Reach Codes for New Buildings and Additions/Alterations to Existing Buildings

Buildings have a long lifetime, and the number of buildings affected by energy codes accumulates over time; improving energy efficiency and electrifying buildings in new construction, additions, and alterations is a least regret policy. Based on the review of adopted and pending CAPs, there is an opportunity to increase the number of reach code policies in the San Diego region. Only four CAPs include at least one measure to improve new residential and nonresidential efficiency. Similarly, only 4 CAPs include requirements for new building – all focused on residential buildings.

Several cities in the San Diego region and many across California have adopted efficiency and electrification policies. Based on this previous experience, there are many example policies and several statewide cost effectiveness studies that can facilitate policy development.

However, there are limitations to policies that target new buildings. A relatively small number of buildings are built each year compared to the existing housing stock. In the San Diego region, new buildings account for about 1% of the total buildings stock each year. Between 2020 and 2050, the region will add an estimated 250,000 housing units, a 21% increase. The City of San Diego has the largest projected increase with 165,869, an increase of about 30% and about 65% of the expected new housing units in the region. Cities of Chula Vista (about 9% of total), Escondido (5%), and San Marcos (4%) have the next highest number of expected new housing units.

Table 8.34 Expected New Housing Units 2020–2050 by Jurisdiction

Jurisdiction	Change (2020-2050)	
	Number of New Units	Percent Change
San Diego	165,869	30.4%
Chula Vista	23,465	27.3%
Escondido	11,571	23.6%
San Marcos	9,155	28.7%
La Mesa	8,606	33.4%
Carlsbad	5,544	11.7%
National City	5,187	30.1%
Unincorporated	4,891	2.8%
Oceanside	4,767	7.2%
El Cajon	4,303	11.9%
Vista	3,464	10.7%
Imperial Beach	1,571	15.7%
Encinitas	1,352	5.1%
Poway	1,302	7.8%
Lemon Grove	1,279	13.9%
Santee	1,051	5.0%
Coronado	864	9.0%
Solana Beach	856	13.2%
Del Mar	163	6.2%
Regional Total	**255,260**	**21.0%**

Also, since California's building energy codes are so aggressive, any effort to seek incremental efficiency improvements will yield relatively few energy and GHG reductions. And because codes get stricter every

three years, future options for reach codes may be increasingly limited. Also, as California's electricity becomes increasingly clean, GHG reductions associated with efficiency of electric appliances will decline. So, while there is an opportunity to adopt more reach codes, the potential for GHG reductions is limited.

Key Considerations for All-Electric Construction and Reach Codes

- **Revisit Reach Code Opportunities with Building Code Cycle** – The State Energy Code updates every three years, and the opportunities for local requirements are likely to decrease with each code cycle as requirements are integrated into the building code language. This change can be seen with solar PV requirements for new construction. In the early to mid-2010s, a significant portion of reach codes required solar PV in new residential construction. Beginning in 2020, however, this requirement was mandated through the 2019 State Energy Code,[i] making a local requirement unnecessary. Since local jurisdictions have shifted to ordinances requiring PV on new nonresidential construction, however, this too is included in adopted language for the 2022 Energy Code,[ii] which is set to take effect January 1, 2023. As state standards tighten, jurisdictions can explore opportunities to achieve additional energy savings and GHG reductions from the new and existing building stock.
- **Adopt All-Electric Building Codes and/or Reach Codes for New Construction and Existing Buildings Sooner** – Jurisdictions can achieve greater reductions early on by adopting requirements before they are included in the State Energy Code. This helps state officials identify key trends statewide that may influence future requirements included in building code updates and has a greater impact on the cumulative reduction in emissions within the region. Note: the CEC does not consider All-electric construction to be a reach code, and, consequently adoption of all-electric requirements does not need CEC review.
- **Consider Cost Effectiveness and Energy Savings of Requirements** – For a reach code to be approved by the CEC, a jurisdiction must demonstrate that the requirements (1) consume no more energy than state standards and (2) are cost-effective. The latter is generally the limiting factor, especially for newer technologies that may have high costs for adoption. For instance, many CAPs in the region have included measures to require solar water (SW) heating in new residential and/or nonresidential construction. However, SW heating requirements are generally not cost-effective without significant rebates and incentives. For this reason, many jurisdictions have sought to modify the requirements they are pursuing (e.g., Encinitas updated their SW heating measure to an electrification measure in their CAP update).

Opportunities for Reach Codes

In addition to the above considerations, a number of resources have been developed by the Statewide Reach Codes Program, a subprogram of the California Statewide Energy Codes and Standards Program.[iii] These resources are specifically designed to help jurisdictions leverage their authority to adopt requirements that achieve greater building-related energy and GHG savings, highlighting many of the opportunities for reach code requirements currently available for adoption for new and existing

[i] California Energy Commission. 2019 Building Energy Efficiency Standards. Available at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency.

[ii] California Energy Commission. 2022 Building Energy Efficiency Standards. Available at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency.

[iii] Statewide Reach Codes Program, California Energy Codes and Standards – A Statewide Utility Program. Available at https://localenergycodes.com/.

buildings. Included in these resources are cost-effectiveness studies that document (1) energy savings and (2) cost-effectiveness for all climate zones in the state. Current statewide studies for new construction that pertain to the current 2019 State Energy Code are included in Table 8.33.

Table 8.35 Statewide Cost-Effectiveness Studies for New Construction, 2019 Building Code

Building / Construction Type	Building Fuel Types Analyzed	Building Energy Packages Analyzed
New Low-Rise Residential Construction[1]	• Mixed Fuel • All-Electric	• Energy efficiency • Energy efficiency + increased solar PV • Energy efficiency + increased solar PV + battery storage
New Mid-Rise Residential Construction[2]	• Mixed Fuel • All-Electric	• Energy efficiency • Energy efficiency + increased solar PV
New High-Rise Residential Construction[3]	• Mixed Fuel • All-Electric	• Energy efficiency • Energy efficiency + increased solar PV
New Detached Accessory Dwelling Units[4]	• All-Electric	• Energy efficiency • Energy efficiency + increased solar PV
New Nonresidential Construction[5]	• Mixed Fuel • All-Electric	• Energy efficiency • Energy efficiency + increased solar PV + battery storage

[1] CA Energy Codes & Standards Program (2019). *2019 Cost-Effectiveness Study: Low-Rise Residential New Construction*.
[2] CA Energy Codes & Standards Program (2020). *2019 Mid-Rise New Construction Reach Code Cost-Effectiveness Study*.
[3] CA Energy Codes & Standards Program (2021). *2019 Cost-Effectiveness Study: 2020 Analysis of High-Rise Residential New Construction*.
[4] CA Energy Codes & Standards Program (2021). *2020 Reach Code Cost-Effectiveness Analysis: Detached Accessory Dwelling Units*.
[5] CA Energy Codes & Standards Program (2019). *2019 Nonresidential New Construction Reach Code Cost Effectiveness Study*.

As they relate to building electrification, these studies support the adoption of a range of electrification requirements within the San Diego region, including electric-preferred and all-electric ordinances for new residential and nonresidential construction (as illustrated in Figure 8.38 above). Specific requirements applicable to each jurisdiction will depend on the building climate zone(s) within the jurisdiction's boundary. Included with these analyses, jurisdictions may also consider adopting electric ready requirements (e.g., pre-wiring and panel upgrades); however, these requirements are expected to be included in the 2022 State Energy Code.

In addition, the City of Carlsbad carried out its own study to support its reach code, which examines the cost-effectiveness of electrifying water heating in new residential construction.[i] This study found the requirement to be cost-effective, paving the way for a similar requirement to be adopted elsewhere as well.

Currently, there are no studies to support electrification requirements (all-electric or of specific appliances) for the existing building stock in the San Diego region.

Current opportunities for energy efficiency requirements are much broader than electrification and can be adopted in coordination with electrification requirements. Again, specific requirements will vary based on the climate zone(s) within each jurisdiction. In addition, requirements for additions and alterations may vary based on the building vintage. For instance, potential requirements identified for residential retrofits depend on the year in which the home was built. Studies developed for new

[i] California Energy Commission. Docket Number 16-BSTD-07, April 22, 2019. Local Ordinance Application – 2016 Standards. TN# 227844. Existing Building Efficiency Upgrade Cost Effectiveness Study. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=227844&DocumentContentId=59219.

construction *may* be used to support requirements for certain additions and alterations that are considered "new" in the context of the reach code. A separate study is also available to support a handful of requirements for retrofits of existing residential units.[i]

Explore Other Options for New Buildings

Other possible policy options exist to increase efficiency and electrifications in new buildings, including energy use rating and disclosure for new homes, improved building energy code compliance, and assessing and disclosing embedded carbon.

Implement More Policies to Increase Efficiency in Existing Buildings

In addition to the addition and alteration projects covered by reach codes, policies that affect other existing buildings can reduce GHG emissions. Based on the review of CAPs and the scenario analysis of GHG impacts, several potential opportunities emerge to increase efficiency in existing buildings.

- **Existing Building Incentives and Requirements** – Even though nearly half of CAPs include measures related to encouraging or requiring efficiency improvements because existing represent the largest portion of building-related GHG emissions is associated with existing buildings, additional activity related to existing buildings would be necessary.
- **Municipal Energy Efficiency Improvements** – More than half of the CAPs included in this analysis include measures to improve energy efficiency at municipal facilities. While related energy use is relatively small compared with city- or regionwide energy use, implementing cost effective energy efficiency in municipal buildings provides an opportunity not only to reduce energy expenditures but to demonstrate leadership by modeling the types of building improvements that CAPs may contemplate for homes and businesses.

Existing structures are key to building decarbonization since about 80% of buildings that will exist in the San Diego region in 2050 already exist in 2020. Efficiency remains a way to reduce energy use, emissions, and energy utility costs, particularly in the short- and medium-term while buildings transition toward electrification. As noted above, reach codes can address existing buildings that undergo alterations and additions, but given the number of CAPs with measures related to existing buildings and the expected GHG impacts both from existing CAP commitments and the best commitment scenario, there is an opportunity for additional local policy action.

Local jurisdictions have the authority to encourage or require energy efficiency improvements and to audit, benchmark, and disclose. And, there are numerous examples of these policies in the San Diego region and across California.

There are relatively few CAPs with audit, benchmarking, and disclosure measures. These policies result in relatively small energy and GHG emissions reductions but help to raise awareness of energy use and can form the foundation of future policies. These policies can transition to include information about associated carbon emissions in the future, especially as we transition to electric appliances.

Non-Residential

Figure 8.39 includes common elements of policies that require energy efficiency improvements or related activities in existing non-residential buildings. Policies often include one or more elements and

[i] CA Energy Codes and Standards Program (2021). *2019 Cost-Effectiveness Study: Existing Single Family Residential Building Upgrades*.

can cover water efficiency. There are examples of local policies that focus on just one of these elements, while others include nearly all of them.

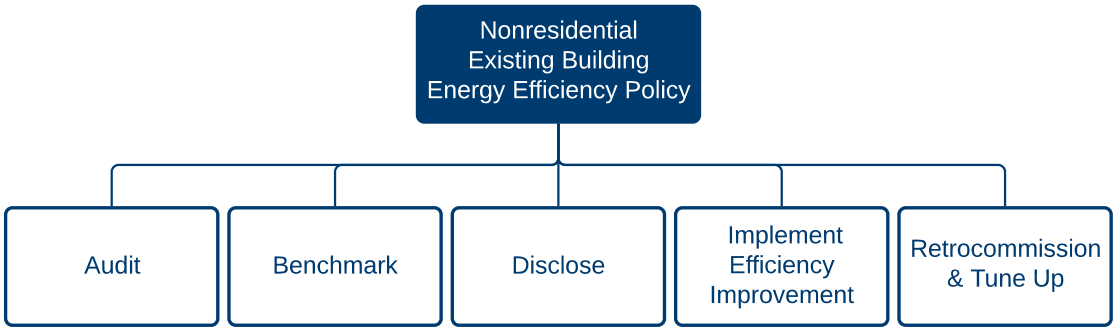


Figure 8.39 Key Elements of Nonresidential Existing Building Energy Efficiency Policies

- **Audits** – Policies can require building owners to complete energy audits of buildings to identify cost effective opportunities to improve efficiency. Energy improvement opportunities identified during an energy audit can be pursued voluntarily by building owners or form the basis for an energy improvement requirement.
- **Benchmarking** – Requiring a building owner to benchmark energy use typically entails collecting and reporting data through ENERGY STAR Portfolio Manager.[i] Once disclosed, benchmarking data allows building owners to compare energy use with similar buildings. As noted above, California has enacted AB 802 (2015), which requires certain buildings to report energy use data. More generally, benchmarking serves as a foundational policy that can provide needed information and data to develop more targeted and appropriate building energy policies.
- **Disclosure** – Often paired with audits and benchmarking, disclosure policies require building owners to disclose certain energy use and related data to tenants, lessees, and buyers. Disclosure provisions also often have local jurisdictions publicly post to a website certain energy data for building subject to the energy auditing or benchmarking requirement. These policies allow existing and potential tenants and buyers to understand energy consumption and the potential implications, including financial.
- **Efficiency Improvements** – Policies can require that certain buildings complete efficiency improvements. In general, there are two pathways to demonstrate compliance: performance and prescriptive. Using performance standards, a building owner can comply by meeting a specified performance standard, typically energy use per square foot of building area. There is a trend toward using carbon dioxide as a performance metric. Boston and New York City have adopted GHG performance standards.[ii] Using a prescriptive compliance pathway, building owners can comply by completing specified building energy improvements (e.g., installing insulation). Performance and prescriptive pathways are used in new building requirements in Title 24, part 6.
- **Retrocommissioning and Building Tune-Up** – These options focus on low- or no-capital improvements to energy-related building equipment. According to New York City's Local Law 87, retro-commissioning is a "systematic process for optimizing the energy efficiency of existing base building systems through the identification and correction of deficiencies in such systems, including but not limited to repairs of defects, cleaning, adjustments of valves, sensors, controls or

[i] U.S. Environmental Protection Agency Energy Star Portfolio Manager webpage. Available at https://www.energystar.gov/buildings/benchmark.

[ii] See New York City Local Law 97, available at https://www1.nyc.gov/assets/buildings/local_laws/ll97of2019.pdf. See also City of Boston Building Emissions Reduction and Disclosure Ordinance, available at https://www.boston.gov/departments/environment/building-emissions-reduction-and-disclosure.

programmed settings, and/or changes in operational practices."[i] For example, Chula Vista requires retro-commissioning as a compliance option for conservation requirements for non-residential and certain multi-family buildings. On the other hand, according to the City of Seattle, a building tune-up includes an inspection of building systems to identify operational or maintenance issues and corrections to operational issues identified in the inspection that have relatively short paybacks.[ii] In general, retro-commissioning includes more robust documentation than a building tune-up.

Several cities in California have adopted policies to improve energy efficiency in existing nonresidential buildings that include some or all of these key elements. The City of San Diego has also adopted a policy requiring benchmarking and disclosure.[iii] The City of Berkeley's Building Energy Savings Ordinance (BESO) requires all buildings, depending on size, to benchmark or audit, and disclose energy usage information at the time of listing for sales. Certain large buildings have to conduct benchmarking every 1–5 years.[iv] The City of San Francisco has a similar ordinance for nonresidential and large residential buildings.[v] The Cities of Chula Vista, Los Angeles, and San Jose have adopted ordinances that include benchmarking and disclosure provisions along with a building performance requirement with multiple compliance options, including completing energy efficiency improvements, audits, and retrocommissioning. Table 8.36 summarizes policies for a sample of cities in California.

Table 8.36 Comparison of Energy Efficiency Policies for Existing Non-Residential Buildings in CA.

Jurisdiction	Policy Name	Building Types and Sizes	Benchmarking	Disclosure	Audit	Energy Improvement	Retro-Commissioning
Chula Vista	Building Energy Saving Ordinance (BESO)	Multifamily and Non-Residential buildings ≥ 20,000 SF	X	X	X	X	X
Berkeley	Building Energy Saving Ordinance (BESO)	All	X	X	X		
Los Angeles	Existing Buildings Energy & Water Efficiency Program (EBEWE)	City-owned buildings ≥ 7,500 SF Privately-owned buildings ≥20,000 SF	X	X	X	X	X
San Diego	Building Energy Benchmarking Ordinance	Non-residential buildings >50,000 SF Multifamily and mixed-use buildings >50,000 SF and 17 or more residential accounts	X	X			
San Francisco	Existing Building Energy Performance Ordinance	Non-residential buildings ≥10,000 SF Residential buildings ≥50,000 SF	X	X	X		
San Jose	Energy and Water Building Performance Ordinance (EWBPO)	Multifamily and Non-Residential buildings ≥ 20,000 SF	X	X	X	X	X

[i] Erin Beddingfield and Zachary Hart, "Putting Data to Work: Using Data from Action-Oriented Energy Efficiency Policies and Programs." IMT. https://www.imt.org/wp-content/uploads/2019/11/IMT-PuttingDatatoWork-Using-Audit-Data.pdf.

[ii] City of Seattle, Building Tune-ups Resources.

[iii] City of San Diego Municipal Code. Article 12, Division 1, Sections 1412.0101 to 1412.0113. See https://docs.sandiego.gov/municode/MuniCodeChapter14/Ch14Art12Division01.pdf.

[iv] City of Berkeley Municipal Code Chapter 19.81 Sections 19.81.010 to 19.81.170. See https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/BESOordinanceUpdated_20201215.pdf.

[v] https://sfenvironment.org/sites/default/files/fliers/files/sfe_gb_ecb_ordinance_overview.pdf.

Residential Buildings

There are fewer adopted policies for existing residential buildings in California. Two examples include the City of Berkeley's Building Energy Savings Ordinance and the City of San Francisco's Residential Energy Conservation Ordinance (RECO). These policies include auditing, disclosure, and energy efficiency improvement provisions.

As described above, the City of Berkeley's Building Energy Savings Ordinance requires all buildings, including residential buildings with 1-4 units, to conduct a building energy audit and disclose the results to potential lessees and buyers prior to executing a lease or contract for sale.

The City of San Francisco has adopted a RECO that requires owners of single- and two-family dwellings, apartment buildings, and residential hotels to conduct an audit and to complete prescriptive energy and water efficiency improvements at the time of sale and prior to the transfer of title.[i] In addition to time of sale, there are several other intervention points for this policy, including metering conversion, major improvements, and condominium conversions.

Examples of the prescriptive measures required for single- and two-family family buildings include: insulation, weatherstripping, water heater insulation, low-flow showerhead, caulk and seal openings in building exterior, insulate heating and cooling ducts, faucet aerators, and low flush toilets. San Francisco's RECO includes compliance cost limits of one percent of purchase price or one percent of assessed value, whichever is great. For a building with two units or fewer, there is a cap of $1,300.

Evaluate Policies to Accelerate Electrification in Existing Buildings

Only two CAPs in the region have measures or supporting actions that seek to electrify the existing building stock — one through incentives and the other through a requirement. In both instances, the focus is on water heating only. Since the existing building stock represents an outsized share of building-related emissions, additional activity to electrify the existing building stock will be necessary to reach deep decarbonization targets.

California's building energy code covers additions and alterations to existing buildings but does not affect the vast majority of existing buildings that are not subject to these requirements. Developing policies to accelerate electrification in existing buildings would be necessary to reach the level of building equipment replacement contemplated in Chapter 4. At present, there are very few examples in California to electrify existing buildings outside of the building energy codes. Two cities that have begun exploring and developing policies — the City of Berkeley and the City of Sacramento — provide some guidance.

In April 2021, the City of Berkeley released a draft existing building electrification strategy.[ii] It includes a detailed treatment of the social equity considerations related to building electrification, technical analysis of buildings and energy use, cost analysis, and policy options. The City of Berkeley's overall policy framework, as presented in Figure 8.40, includes equity considerations; three main implementation strategies (pillars) that are similar to those identified in the review of CAPs (Section 8.3);

[i] San Francisco Housing Code Chapter 12 (Residential Energy Conservation) and Chapter 12 A (Residential Water Conservation).

[ii] City of Berkeley. April 2021. Existing Building Electrification Strategy. Available at https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Draft_Berkeley_Existing_Bldg_Electrification_Strategy_20210415.pdf.

and four strategies to electrify buildings, including replacing natural gas appliances at the time of replacement and building renovation, and at the time sale; building performance standards; and neighborhood approaches to electrification and natural gas pruning, the latter concept is discussed in Chapter 4. A similar analysis of buildings, equity, and policy options could be done by cities in the San Diego region or on a regional basis, as described below.

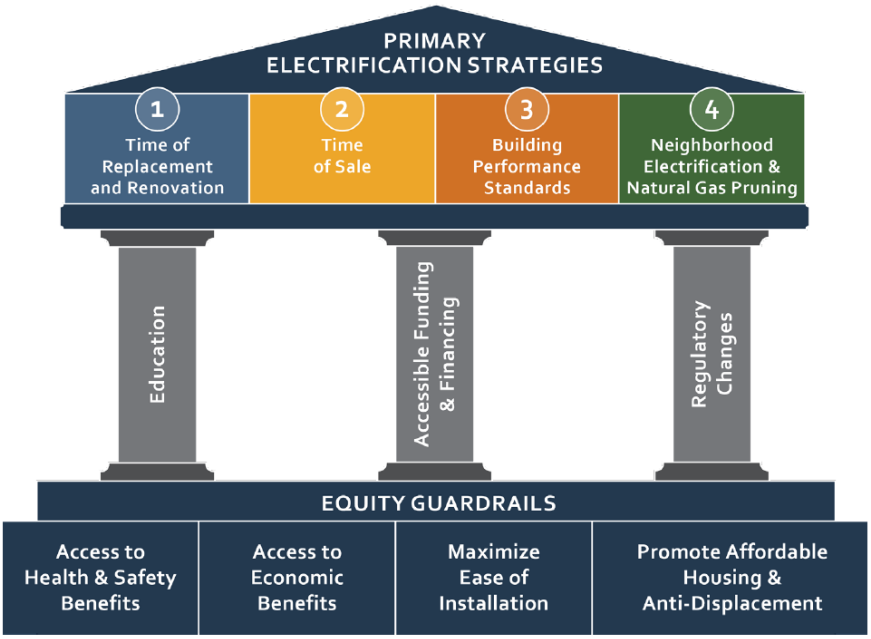


Figure 8.40 City of Berkeley Building Electrification Framework[i]

In June 2020, Mayors' Commission on Climate Change (MCCC) released final recommendations for the City of Sacramento and the City of West Sacramento to achieve carbon neutrality by 2045, including the goal of transitioning 25% of existing residential and small nonresidential buildings to all-electric by 2030, and 100% of existing buildings by 2045.[ii] In June 2021, the City of Sacramento adopted a to guide building electrification.[iii] The framework established goals, objectives, milestones, and a timeline for completion. It also seeks to integrate social equity-focused considerations.

Key Considerations for Existing Building Policies

There are several key considerations when developing a policy to electrify existing buildings. These also apply to energy efficiency improvements.

- **Applicability** – This determines which buildings will be covered by the policy. Applicability is often determined on the basis of building type (e.g., residential and nonresidential) and size (e.g., square feet of building area). As important as which buildings are included in which buildings are specifically exempted or excepted from the provisions of the policy. Exemptions can be based on many different factors, including who owns the building (e.g., public or private), the type of equipment used, how recently similar improvements were made, the function of the buildings (e.g., essential or emergency function), and cost of compliance.

[i] Id.
[ii] The Mayors' Commission on Climate Change webpage. Available at https://www.lgc.org/climatecommission/.
[iii] Resolution No. 2021-0166, Adopted by the Sacramento City Council, June 1, 2021. Available at https://www.cityofsacramento.org/Community-Development/Planning/Major-Projects/General-Plan/About-The-Project/Climate_Change/Existing-Building-Electrification.

- **Phasing** – This determines when building owners will be subject to the provisions of the policy. Provisions can be in force at the date of adoption or phased in over time to allow building owners time to adjust to the requirements.
- **Intervention Points** – Sometimes called "triggers," these determine when the provisions of the policy apply. Intervention points can include: time of sale or time of listing; building size, typically based on building size (i.e., square footage); point of lease or rental; building renovation; building maintenance or major system replacement; building resilience upgrade (e.g., seismic renovation, flood prevention); building type (e.g., single-family or multi-family), and strategies that implement activities by geography (e.g., neighborhood).[i]
- **Enforcement** – Whether and how a local jurisdiction can monitor compliance and enforce a policy, particularly a requirement, is an important consideration. Enforcement can be related to the intervention point. For example, policies that use the permitting process as a trigger for a requirement may be easier to enforce given existing staff and capacity. On the other hand, new requirements attached to permitting may create a disincentive to acquire a permit.

Local Governments Continue to Demonstrate Building Efficiency and Electrification

Just over half of CAPs have measures to improve efficiency at municipal facilities. This is least regret policy because implementing cost effective measures help to reduce operating costs and can model the type of actions local governments may encourage homes and businesses to do. It is possible that these are already happening but are not included in CAPs, but there appears to be an opportunity for additional energy efficiency improvements in municipal facilities. It is common for local governments to conduct audits of existing facilities to identify opportunities for energy efficiency, and some cities have developed detailed energy strategies.

Potential for Regional Collaboration

While local governments have authority to act to encourage and require efficiency and electrification of buildings, a regional approach could facilitate broad adoption of policies both for new and existing buildings.

Regional Program to Support Reach Code Policy Development

Given the clear, existing authority that local governments have to adopt local building codes (e.g., reach codes) for new buildings and the existing knowledge and experience in the region and around statewide, developing a regional approach to reach code development, adoption, and implementation is a least regret policy. Such a program could include the following key elements.

- **Conduct a Regional Reach Code Analysis** – Conduct regional reach code analysis to identify opportunities for further action by jurisdiction and climate zone. This analysis could consider the future build out of the region, analyze future building growth in each jurisdiction, identify the best approaches, and identify policy gaps and opportunities for each jurisdiction.
- **Support Development and Implementation of Reach Code Policies** – A regional program could support development and implementation of regional reach codes. This program could leverage existing resources, including SDG&E Codes and Standards program and Statewide Reach Code Program.[ii] The Clean Power Alliance, the Los Angeles region CCA, completed a report on potential programs and identified a regional reach code program as one option. Based on the report, such a program could: develop model ordinances to streamline the process for local

[i] City of Berkeley Building Energy Saving Ordinance Evaluation Report February 11, 2020. Energy Solutions.
[ii] https://localenergycodes.com/.

jurisdictions, provide funding to local governments for the development and adoption process of a building electrification code, and make available technical assistance to municipalities that want to adopt a building electrification reach code.[i] The Bay Area Renewable Energy Network, known as BayREN, has a similar program to support development of local building energy code policies for new buildings. [ii]

Regional Program for Decarbonizing Existing Buildings

The largest policy gap in CAPs related to building decarbonization is improving efficiency and electrifying existing buildings. In particular, there are relatively few CAP measures to accelerate the turnover of natural gas appliances in both residential and commercial buildings. Federal and state action will continue to encourage building decarbonization, but there is a role for local jurisdictions.

Historically, improving energy efficiency in existing buildings has been difficult. It is expected that electrifying existing buildings will be equally challenging. There is an opportunity to evaluate the potential for a regional program that could complete analysis, help develop policy options and support the adoption and implementation of related policies. This is similar in concept to the reach code support program contemplated above, but the prerequisite analysis, materials, and approach are comparatively less developed than for reach codes. Also, existing building policies are sufficiently different from new building policies and approaches to warrant a separate effort. The following are examples of elements of such a program.

- **Conduct Data Analysis on Existing Buildings** – There is a lack of publicly available data related to existing building energy use. Collecting and analyzing existing regional building data could help form evidence-based policies. This could include mapping buildings; collecting data to characterize buildings by age, type, use, etc.; determining whether they use natural gas appliances; etc. This work can form the analytical basis for develop a strategy and eventual policies. Also could provide necessary information and mechanisms to monitor progress over time, preferably using a publicly available data portal. Because privacy rules exist that govern the types and granularity of energy consumption data that can be shared publicly, methods would have to be developed to aggregate results in a way that does not violate these rules.
- **Convene an Existing Building Decarbonization Task Force** – Results of a regional building energy analysis could inform the work of a regional building decarbonization task force, which could comprise key stakeholders from around the region including: community-based organizations, environmental advocates, San Diego Gas & Electric, community choice aggregation programs, building officials and related city staff, labor unions, building trades, developers, policy experts, etc. The goal of the task force could be to develop a regional strategy to decarbonize buildings.
- **Develop a Regional Strategy to Decarbonize Existing Buildings** – A regional existing building decarbonization strategy would help to develop a framework and implementation pathways to accelerate both energy efficiency and electrification. Chapter 4 provides a good first step, but a more detailed analysis, strategies, and policies are needed. As an example, the City of Berkeley has developed Existing Buildings Electrification Strategy.[iii] A strategy could consider social equity factors, the potential for a regional incentive program, and stakeholder outreach.
- **Develop a Program to Support Development of Existing Building Policy** – A regional program could support development, adoption, and implementation of existing building policies. Such a

[i] Clean Power Alliance. 2020 Local Programs for a Clean Energy Future, p. 26.
[ii] Bay Area Regional Energy Network (BAYREN). Reach Codes and Policies webpage. Available at https://www.bayrencodes.org/reachcodes/.
[iii] City of Berkeley. April 2021. Existing Building Electrification Strategy.

program could include model policies and supporting materials, technical/expert support throughout the process, and implementation support.

8.7 Decarbonize the Electricity Supply

Decarbonizing the electric supply is a pivotal step in the overall decarbonization framework. Increasing carbon-free electricity supplies not only reduces GHGs from the electricity sector it also becomes the low- or zero-carbon energy source of choice for transportation and buildings to enable additional GHG reductions. In general, there are two main methods to reduce emissions from the electricity supply: (1) increase the amount of carbon-free electricity supplied to customers from the electric grid, typically from large-scale projects, and (2) increase installation of distributed renewable energy projects located on the customer side of the electric meter.

This section follows a similar format as the sections above and will cover authority of local governments to act; local CAP commitments, including the number of CAPs with related measures and the GHG impact of those measures; and a summary of opportunities for additional local action and regional collaboration. The geospatial analysis of renewable energy presented in Chapter 2 estimates the potential for both large-scale and distributed (e.g., rooftop and infill) in the region. We provide some findings on the GHG contribution of related CAP policies but did not include distributed solar in our scenario analysis of CAPs, mainly because associated GHG reductions are included in the reference scenario.

8.7.1 Summary of Findings

Table 8.37 summarizes key takeaways for the Decarbonize the Electricity Supply Pathway.

Table 8.37 Summary of Key Takeaways from the Decarbonize the Electricity Supply Pathway

Policy Category	Key Takeaways
Grid Supply	All adopted and pending CAPs have related measures, typically related to community choice aggregation (CCA), reflective of existing authority; relatively high GHG reductions in CAPs; opportunity for more cities to join existing CCAs, and commit to 100% carbon-free service options for municipal accounts and default community accounts.
Customer Side Supply	All adopted and pending CAPs have related measures reflective of existing authority; relatively low GHG reductions in CAPs due mainly to State activity in this area; limited opportunity for more jurisdictions to adopt reach codes for new construction, but more opportunity exists for alterations and additions; opportunity to increase customer side generation in existing buildings, particularly when coupled with energy storage.

Key Findings of Analysis

This is a summary of results of the review of authority to act, the review of CAPs, and the scenario analysis that estimates the aggregated impacts of CAPs.

- Authority Exists to Procure and Require Carbon-Free Electricity Supply – Local jurisdictions may supply electricity to their citizens either through the formation of community choice aggregator (CCA) or municipal utility, with the primary difference between the two being that the municipal utility owns the distribution and transmission infrastructure while the CCA does not. Both options allow the procurement and supply of higher renewable energy content electricity than that required by California's Renewable Portfolio Standard (RPS) for the incumbent investor-owned utility. Both options are subject to federal and/or state preemption over reliability, which complicates fully decarbonizing the electricity supply with renewable energy. However,

authority exists to support alternatively fueled thermal power plants and related infrastructure that can provide low- or zero-emission (e.g., green hydrogen) electricity to meet reliability and air quality requirements. Local jurisdictions also play a direct role in increasing distributed generation through CCAs, reach codes, and permit streamlining. Local jurisdiction over more stringent regulation of direct emissions from conventional fossil fuel generators is uncertain because of litigation but possibly preempted by the Federal Clean Air Act. California's Cap-and-Trade preempts local jurisdiction authority over GHG emissions from these fossil fuel facilities unless the facility falls below Cap-and-Trade's 25,000 metric ton emissions threshold.

- Decarbonizing Electricity has the Highest GHG Reduction in CAPs – Increasing carbon-free electricity is the single largest contributor to GHG reductions in adopted and pending CAPs. All 17 CAPs evaluated have a measure to achieve a high renewable electricity supply, typically from forming or joining a CCA program. If the most aggressive CAP policy related to CCA is applied to all jurisdictions, additional reductions are possible; however, because most CAPs include a measure to achieve or approach 100% renewable or carbon-free electricity supply, expanding participation in CCA programs would increase expected GHG reductions by about 30%, which is less than other policy actions considered in our scenario analysis of GHG impacts from CAP measures.

Opportunities for Further Action

The following summarizes key opportunities for further action.

- Opportunities Exist for Local Policies to Increase Carbon-Free Electricity Supply – In the San Diego region, there is an opportunity for more local jurisdictions to join existing CCAs or to increase renewable supply otherwise and commit to 100% service options for municipal accounts and default community accounts. CCAs also have the ability to develop programs to encourage solar installations, including financial incentives for customer-scale projects and feed-in tariffs for larger scale projects.
- State Requirements for Solar on New Buildings Limit Local Opportunities – In the past, CAPs sought to require solar in new construction, but the State's building energy code now requires solar for new low-rise residential. Also, while local jurisdictions could require solar in nonresidential new construction, it will be mandated when the next code cycle is effective in January 2023. As a result, the State requirements limit the role of local jurisdictions to reduce GHG emissions from distributed solar. An opportunity exists to evaluate mandating or incentives for energy storage systems paired with solar to decrease marginal emissions during the electric system's peak and highest GHG emission hours, which will align both with new net energy regulations and rates that reflect these realities.
- Opportunities Remain to Require Solar in Alteration and Addition Projects – While upcoming changes to the State's building energy code will require solar on new nonresidential buildings, there is an opportunity for local jurisdictions to adopt reach codes that require solar on alteration and addition projects. Examples of these policies exist in the region and around California. GHG reductions associated with these policies likely would be limited given the number of affected projects but more analysis would be needed to determine the full potential of these policies.
- Additional Work Would be Needed to Make Carbon-Free Electricity Supply More Accessible – Research shows that most distributed solar PV systems installed in California have been installed in higher-income neighborhoods with higher levels of homeownership compared to the statewide average. Numerous options exist to address the inequitable distribution of solar installations, including targeted incentives and financing. Also, in the short run before California

meets its 100% carbon-free electricity requirement, enabling residents in communities of concern to participate in service options with high levels of carbon-free electricity can also address this issue. CCA programs can maximize participation in the Disadvantaged Communities Green Tariff Program and subsidize CARE and FERA customers to opt up to 100% carbon free electricity service options.

8.7.2 Summary of Authority in the Decarbonize the Electric Supply Pathway

Electricity regulation is divided between state regulation of the distribution system and procurement of supply and federal regulation of bulk-power transmission systems and bulk-power markets. In both instances, reliability requirements preempt local authority over electricity procurement where the procurement impacts either CPUC resource adequacy (RA) requirements[i] or FERC authority over electric reliability in bulk-power systems.[ii] The following will discuss local authority in light of the state and federal regulation of conventional and renewable electricity supply resources. Additional information can be found in Appendix B.

Conventional and Fossil Fuel Generation

California's Cap-and-Trade program regulates covered entities that include cogeneration, self-generation of electricity, stationary combustion, and first deliverers of electricity that emit 25,000 metric tons or more of CO_2e per data year.[iii] The CEC is the siting authority for thermal power plants of 50 megawatts or more with authority that preempts local jurisdiction land use authority.[iv] The CEC is prohibited from siting new nuclear power plants unless there is demonstrated technology or disposal site for high-level nuclear waste.[v] The Governor may also preempt local land use authority on a limited basis through an emergency declaration.[vi] Finally, all electric utilities and load-serving entities are prohibited from entering into any baseload power generating commitments of 5 years or more if such projects are not as clean as a combined-cycle gas turbine project.[vii]

In terms of air quality, there is uncertainty as to the extent that a local air district may further regulate GHG emissions in relation to CARB's authority and U.S. EPA authority due to litigation and presidential administration changes. A June 2022 U.S. Supreme Court decision[viii] limited U.S. EPA's ability to regulate new and existing power plant GHG emissions. It remains unclear what action U.S. EPA will take in response and how that will impact CARB and local air district regulation of new and existing power plants in California. However, authority exists to create voluntary GHG reduction generation and certification programs in an air district.

Renewable Energy

Existing authority allows a local jurisdiction to procure electricity supply on behalf of their citizens with a chosen renewable energy content that meets or exceeds the RPS through a CCA or municipal utility

[i] See Public Utilities Code § 380; See CPUC Resource Adequacy Proceeding R.19-11-009.
[ii] See 14 U.S.C. § 8240.
[iii] 17 C.C.R. §§ 95811 (a)–(b) & 95812(c).
[iv] Public Resources Code §§ 25500 et seq.
[v] Public Resources Code § 25524.2.
[vi] See Governor's July 30, 2021 Proclamation of A State of Emergency to address energy supply and demand issues; See U.S. Const. Amendment X; See California Emergency Services Act: Government Code §§ 8558, 8567, 8571, 8625, & 8627.
[vii] Public Utilities Code §§ 8340–8341.
[viii] See *West Virginia v. U.S. EPA*, 597 U.S. __ (2022).

corporation (including developing thermal generation fueled from renewable sources such as green hydrogen), determine the GHG emission content of CCA supplied electricity under its police power or as a member of a CCA, franchise public rights of way for energy infrastructure, and support of distributed generation through CCA policy, incentives, and permit streamlining.

8.7.3 GHG Impacts of CAP Measures in the Decarbonize the Electricity Supply Pathway

This section summarizes the GHG impacts from CAP measures related to building decarbonization from our CAP review. The scenario analysis of GHG impacts from CAPs only looked at policies related to grid supply. Those results are provided in Section 8.7.4 below.

Review of the Decarbonize the Electric Supply Pathway Policies

For this analysis, we compare GHG impacts across CAPs. Based on the review of CAPs, measures in the Decarbonize the Electric Supply Pathway account for between 10% and 67% of local reductions, with an average across all CAPs of 42% (Figure 8.41).

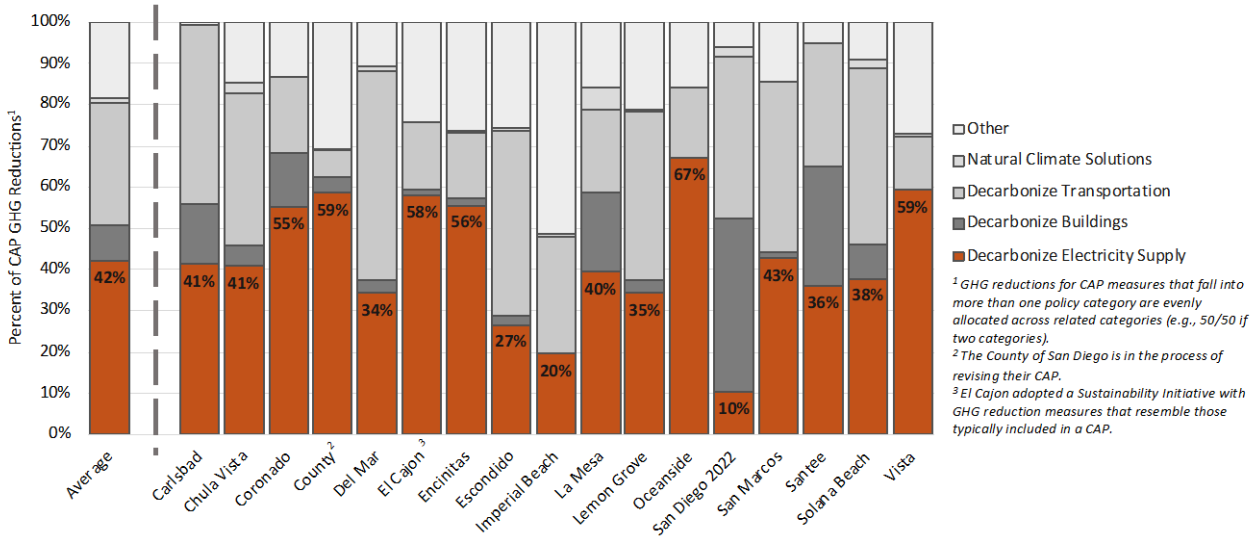


Figure 8.41 Contribution of Measures to Decarbonize the Electricity Supply in Adopted and Pending CAPs.

A further breakdown of CAP measures related to decarbonizing the electric supply from the review of CAPs shows the number of jurisdictions with one or more CAP measures or supporting action related to each of the three related policy categories and the associated average GHG contribution to the local CAP GHG reduction. Figure 8.42 shows that all of the 17 adopted or pending CAPs have measures related to increasing both grid supply and customer-side renewable energy supplies. Those related to grid supply, which includes measures to develop a community choice aggregation program, contribute on average about 36%, and range from about 10% to 55%. On average, measures to increase utility scale renewable energy contribute more than any other policy category – about twice as much as the next highest category (Alternative Fuel Vehicles and Equipment, including electric vehicles, at 16%). Measures to increase use of customer side renewable electricity systems, typically solar photovoltaics, represent on average about 9% of local CAP GHG reductions and range from about 1% to 29% of local reductions.

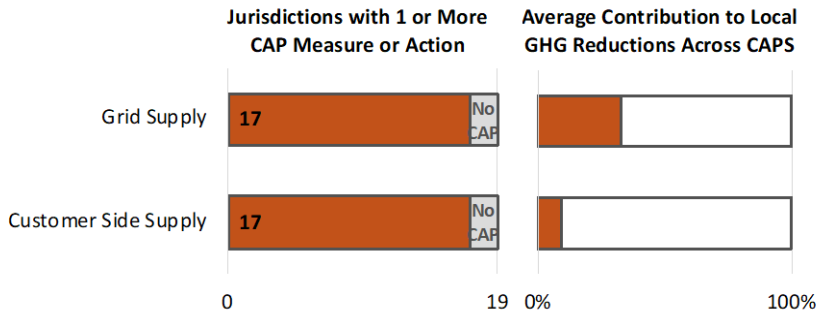


Figure 8.42 Number of Jurisdictions with Related CAP Measures and Associated GHG Impacts

8.7.4 Grid Supply of Carbon-Free Electricity

California has a statutory target of 100% carbon-free electricity supply by 2045. So, regardless of local action, the region's renewable supply will approach this target. Nonetheless, local governments can accelerate attainment of this goal, thus realizing more overall GHG reductions and doing so earlier than the statutory trajectory. GHG emissions impacts associated with CCAs are those above and beyond what is expected from the state requirements. Table 8.38 summarizes the requirement for renewable and carbon free content of the electric supply. For example, energy suppliers are required to supply 60% renewable content by 2030. If a CAP were to commit to increasing that amount to 75%, the difference would be attributed to CCA and is included in the local CAP GHG reduction.

Table 8.38 SB 100 (2018) Requirements for Renewable and Carbon Free Content in Electric Supply.

Renewable Content Requirement	Deadline
44%	21/31/24
50%	12/31/26
52%	21/31/27
60%	12/31/30
100% carbon free	21/31/45

According to the most recent Renewable Portfolio Standards Annual Report submitted to the legislature by the CPUC, the percentage of RPS-eligible renewable supplies for each of the three large IOUs in California ranges from 34% to 39%.[i] SDG&E has the highest percentage at nearly 39% renewable content. On average, renewable content accounts for about 47% of electricity supplies by Community Choice Aggregation programs in California.

Values reported for IOUs include unbundled renewable energy credits (REC). These may vary from values in the CEC Power Source Disclosure process, which account differently for RECs. CCA programs in the region are not fully operational but have stated that they will not use unbundled RECs and likely will achieve at least 50% renewable content, given the default service plans described in more detail below.

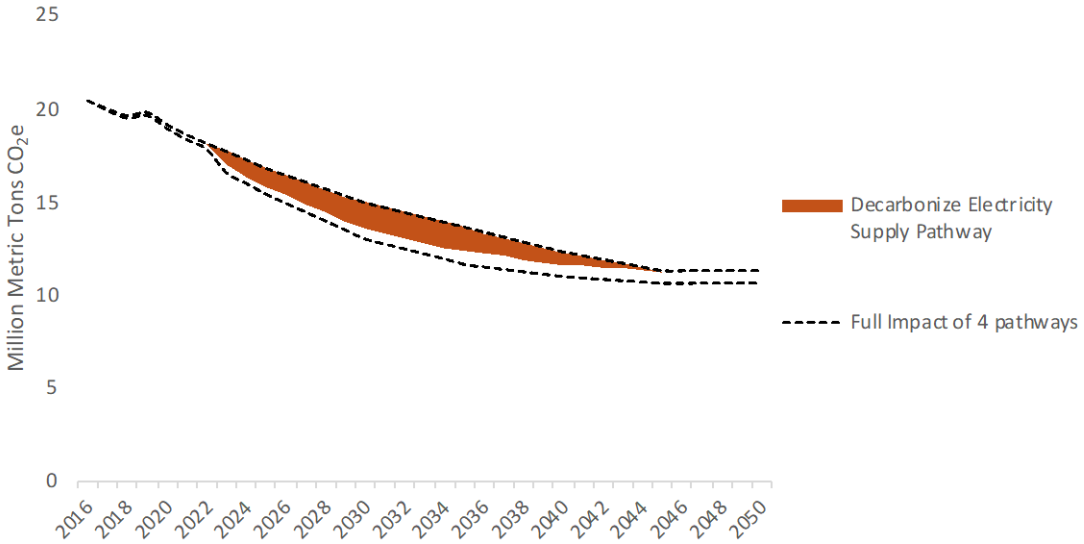
Scenario Analysis of GHG Impacts for the Decarbonize Buildings Pathway

In contrast to the review of CAPs, which considers measures in all emissions categories and does not

[i] 2021 Renewable Energy Portfolio Annual Report. November 2021. California Public Utilities Commission. Available at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/energy-reports-and-whitepapers/rps-reports-and-data.

consider the combined impact of measures, the scenario analysis only evaluates emissions from on-road transportation, electricity, and natural gas, and estimates the GHG impact of all related CAP measures. For purposes of showing the combined GHG impact of all CAP commitments to decarbonize the electricity supply, we only looked at those related to exploring, forming, or joining CCA programs. These represent the vast majority of GHG reductions from CAP commitments, about 1.3 MMT CO_2e in 2035. Figure 8.43 shows the impact of these measures (orange wedge) on regional emissions. The upper dashed line represents the legislatively adjusted BAU emissions level. The bottom dashed line represents the impact of policies of all four decarbonization pathways in adopted and pending CAPs.

No customer side renewable electricity is included in the GHG analysis because an increase in distributed solar is embedded in the legislatively adjusted BAU, and some of the policies to increase the amount of solar on new residential construction in adopted and pending CAPs are now mandated by California building energy code Title 24, Part 6. Nonetheless, we provide a review of existing CAP measures related to customer side renewables.



Energy Policy Initiatives Center, 2022

Figure 8.43 Contribution of Decarbonizing the Electric Supply in the Adopted CAP Commitment Scenario.

GHG Impact from Best Adopted CAP Commitments Applied Regionwide

If the best adopted CAP commitment related to CCA adoption is applied to all local jurisdictions in the San Diego region, the GHG reduction would be about 1.6 MMT CO_2e. As noted in Figure 8.44, while the contribution of CCA programs is larger, it represents a smaller portion of the overall reduction that would result from the best adopted CAP commitment in all policy subcategories being applied to all jurisdictions in the region (bottom dashed line). Also, because all electricity in California must be 100% carbon free by 2045, the incremental impact from local actions decreases over time as the supply complies with state mandates. This is why the wedge in both the CAP Commitment (Figure 8.43) and Best Adopted CAP Commitment Scenario (Figure 8.44) show that accelerating renewable electricity mandates can lead to higher cumulative GHG reductions (area of the wedge). While this may not affect whether a CAP attains the required emissions level in a target year, it can affect overall atmospheric warming.

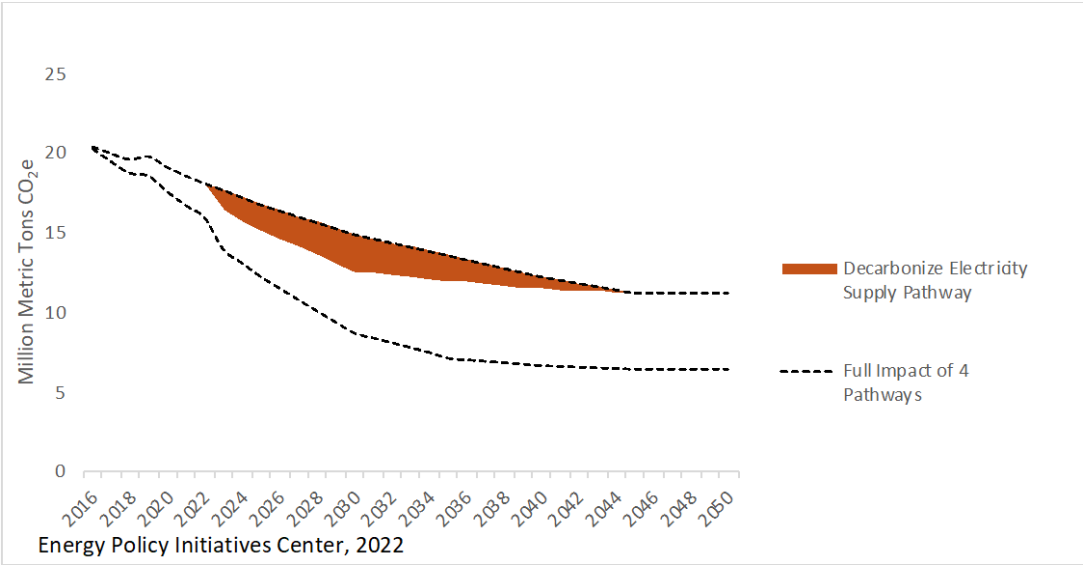
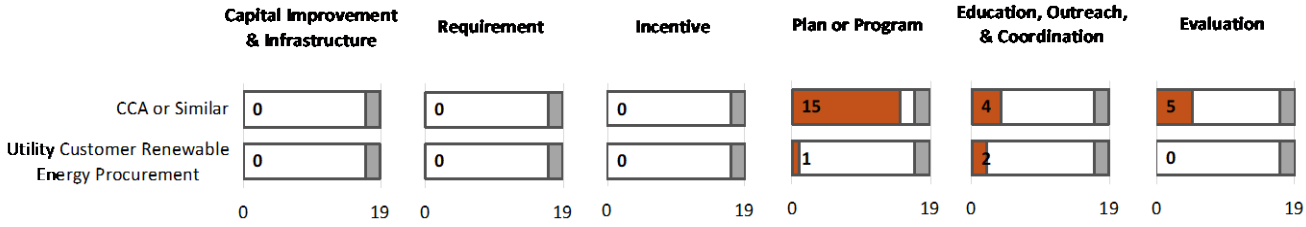


Figure 8.44 Contribution of Decarbonizing the Electric Supply in the Best Adopted CAP Commitment Scenario

CAP Measures Related to Increasing Grid Supply of Carbon-Free Electricity in the San Diego Region

Based on the review of CAPs, all 17 of the adopted or pending CAPs reviewed include a measure to explore, develop, or join a community choice aggregation or similar program (Table 8.39). Examples of related CAP measures are provided in Table 8.40. While SDG&E offers a 100% renewable option and a few CAPs include measures related to increasing awareness of this program, it is limited in scope by statute, and SDG&E has requested that the CPUC suspend the program due to current and expected declines in enrollment and consequent increases in costs to customers.[i] In practice, to leverage local government authority to influence the electricity supply in the region at a significant scale, CCA is the main policy mechanism in this policy subcategory.

Table 8.39 Number of Adopted and Pending CAPs with Measures Related to Increase Renewable Grid Supply



[i] Robb Nikolewski. Why SDG&E Wants to Suspend a Program that Offers Customers Extra Renewable Energy. San Diego Union Tribune, January 6, 2022. Available at https://www.sandiegouniontribune.com/business/story/2022-01-06/sdg-e-looks-to-suspend-customer-program-for-extra-renewable-energy.

Table 8.40 Examples of CAP Measures to Expand Grid Supplied Renewable Electricity via CCA

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	NA
Education, Outreach, & Coordination	• Encourage SDG&E to achieve 100% renewable • Partner with neighboring municipalities to explore CCA feasibility • Advocate for a regional CCA
Evaluation	• Conduct a CCA feasibility study
Incentives	NA
Plan or Program	• Develop or join a CCA or similar program • Adopt a renewable energy procurement policy
Requirement(s)	NA

Examples of Policies in Region

Because nearly all of the adopted or pending CAPs have a measure to explore, develop, or join a CCA, we focus here on the implementation of those measures. As a result of CAP measures, in part, there are two operational CCAs in the San Diego region: San Diego Community Power and Clean Energy Alliance (Table 8.41). The total number of customers that will be included in these programs is yet to be determined since local jurisdictions continue to join, and each CCA is not serving all customers. As an opt-out program, the total number of participating customers depends on the number that affirmatively opt-out to either continue receiving electricity from SDG&E or from a direct access provider. This will be unknown until all SDCP residential customers are enrolled by the middle of 2022.

Table 8.41 Community Choice Aggregation Programs in the San Diego Region

CCA Program	Member Jurisdictions	Status
San Diego Community Power (SDCP)	Chula Vista, Encinitas, Imperial Beach, La Mesa, San Diego National City and County of San Diego joining in 2023	Launched service for Municipal customers in March 2021 and commercial customers in June 2021. Residential service planned for early 2022.
Clean Energy Alliance (CEA)	Carlsbad, Solana Beach, and Del Mar Escondido and San Marcos joining in 2023	Launched service on May 1 for Carlsbad, Del Mar and Solana Beach residents.

CCAs can, within statutory limits, determine the percentage of renewable electricity supplied to customers. SDCP has two service plans: PowerOn, which includes 50% renewable supply and serves as the default option for customers; and, Power100, which has 100% renewable supply and is available for the customer to opt-up.[i] Similarly, CEA has multiple service plans: Clean Impact, which is 50% renewable and is available for customers to opt-down from the default; Clean Impact Plus, which is 50% renewable and 75% Carbon-Free, and serves as the default option for customers; and Green Impact, which is 100% renewable content and is available for the customer to opt-up.[ii] Figure 8.45 summarizes the renewable energy or carbon-free content of SDCP and CEA service plans.

[i] San Diego Community Power. Compare Service Plans webpage. Available at https://sdcommunitypower.org/your-choice/compare-service-plans/.

[ii] Clean Energy Alliance Service Options webpage. Available at https://thecleanenergyalliance.org/your-options/.

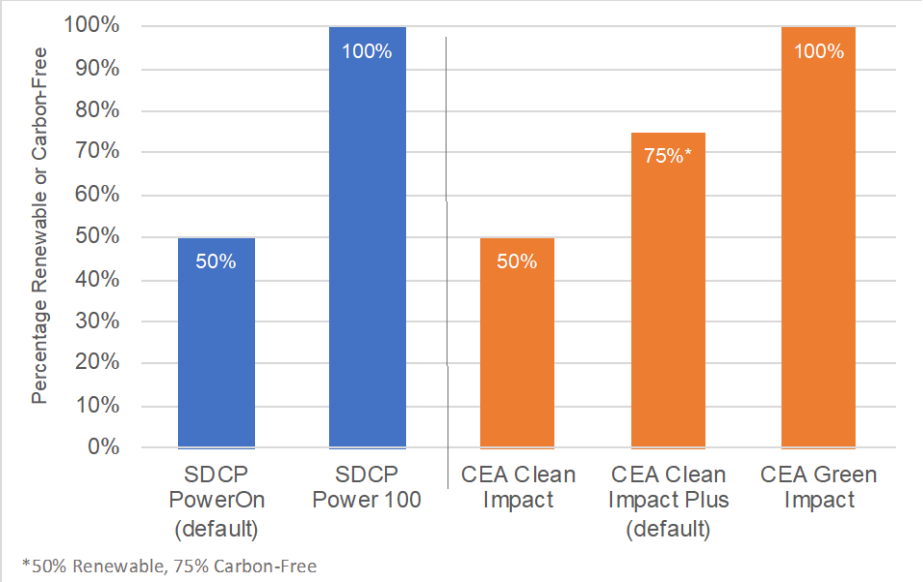


Figure 8.45 Renewable or Carbon-Free Content of CCE Electricity Service Plans

In addition to the renewable electricity service options offered by CCAs, SDG&E offers EcoChoice[i] and Ecoshare.[ii] These are opt-in programs that provide customers with an option to purchase 100% renewable electricity. These programs are limited to 59 MW of solar capacity by statute and are currently available to customers. Given the limited customer uptake for these programs and the number of customers transitioning to CCA programs, SDG&E has asked the CPUC to suspend the programs.[iii]

In addition to forming a CCA, there are other actions local governments can take to influence the GHG emissions impact of these programs.

- Choice of Service Plan for Municipal Operations – Because CCA programs offer service plans with differing levels of renewable content, local governments can choose to opt-up to the higher renewable content product for municipal operations. For example, all local governments participating in SDCP have opted up to the Power100 for municipal operations.
- Choice of Default Service Plan for Customers – City of Encinitas opted for Power100 as the default option for customers.

Local governments also can influence is the siting and permitting of renewable electricity generation projects. Currently, no CAPs include measures related to siting electric generation projects. Chapter 2 focuses on siting of large-scale renewable projects in the San Diego region. Based on findings, most utility scale projects would be located in the unincorporated areas of San Diego County.

8.7.5 Customer Side Renewable Electricity

On average, measures to encourage or require solar on buildings account for about 8% of local reductions in CAPs in the San Diego region. CAPs include a range of quantified measures and supporting

[i] San Diego Gas & Electric. Ecochoice webpage. Available at https://www.sdge.com/residential/savings-center/solar-power-renewable-energy/ecochoice.
[ii] San Diego Gas & Electric. Ecoshare webpage. Available at https://www.sdge.com/residential/savings-center/solar-power-renewable-energy/ecoshare.
[iii] Robb Nikolewski. Why SDG&E Wants to Suspend a Program that Offers Customers Extra Renewable Energy. San Diego Union Tribune, January 6, 2022.

efforts to increase use of distributed renewable electricity systems, mainly solar photovoltaics.

CAP Measures Related to Distributed Renewable Generation in the San Diego Region

Figure 8.46 summarizes the number of CAPs with at least one measure to increase distributed renewable electricity supplies across all implementation mechanisms. The values presented here are not mutually exclusive, and a CAP may have measures in multiple implementation mechanisms or building/construction types. Table 8.42 below provides examples of CAP measures related to distributed renewables for each of the implementation mechanisms.

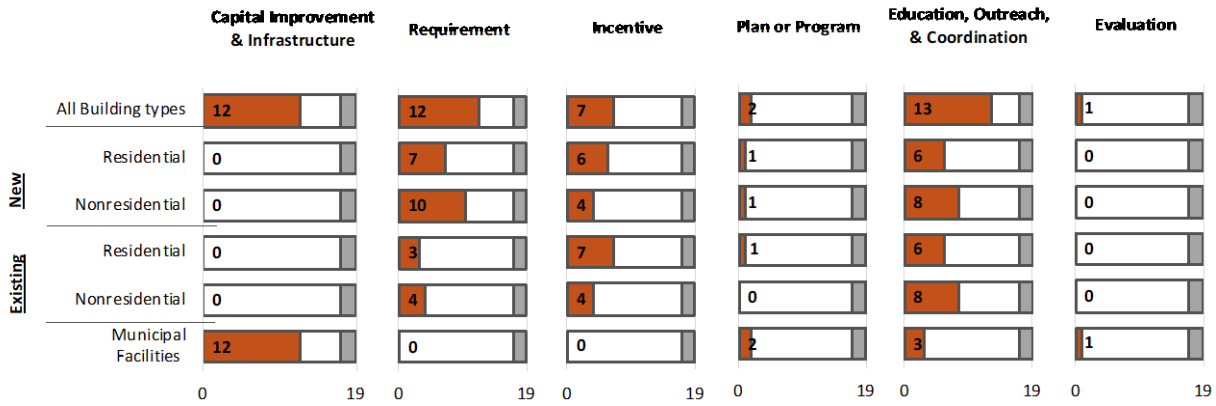


Figure 8.46 Number of Adopted and Pending CAPs with Measures Related to Renewable Distributed Generation.

Based on the number of CAPs in Figure 8.46, measures to increase renewable electricity from distributed generation systems follow a similar pattern as other policy categories, with most measures falling into three categories: education, outreach, and coordination; incentives; and requirements. In this case, the implementation mechanism with the highest number of CAPs with at least one measure related to education, outreach, and coordination, including a range of actions to raise awareness about distributed generation options and potential funding sources.

The number of remaining CAPs with related measures is roughly evenly split between incentives and requirements. Incentive measures include actions to streamline the permitting process to lower the soft costs associated with solar photovoltaics and make financing available, mainly through property-assessed clean energy (PACE) programs. Focusing on requirements, the highest number of CAPs have measures related to new buildings, with a slightly higher number related to non-residential. These measures include requiring pre-wiring for solar photovoltaics and requiring solar in new construction, additions, and alterations.

More than half of all CAPs have at least one measure to install distributed renewable systems at municipal facilities. As noted above, while municipal energy use is relatively small compared with city- or regionwide energy use, implementing cost effective energy efficiency in municipal buildings provides an opportunity not only to reduce energy expenditures but to model the types of actions that CAPs may include for homes and businesses.

Measures associated with new buildings are represented in the highest number of CAPs. Those associated with new nonresidential building are represented in slightly more CAPs than new residential buildings. As noted above, CAP measures to require solar photovoltaics in new residential construction are no longer valid since California building energy codes now require this for most residential buildings. Measures for existing buildings are relatively underrepresented in CAPs and are mostly requirements associated with additions and alterations.

Table 8.42 Examples of CAP Measures to Expand Renewable Electricity via Distributed Generation.

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Install solar PV on municipal facilities and other public buildings, including parking lots
Education, Outreach, & Coordination	• Partner with local utility to provide educational materials to account holders • Support state and regional efforts to increase solar PV installs • Promote existing funding sources and other resources • Train city staff to provide educational materials • Develop regional partnerships to provide educational materials and technical assistance • Collaborate with local solar PV providers • Work with local universities to install solar PV systems • Pursue partnerships and grant opportunities for funding • Provide technical resources and case studies
Evaluation	• Evaluate potential for microgrid at municipal facilities
Incentives	• Make permitting easier (e.g., over-the-counter, streamlined, expedited) • Expand PACE financing options • Provide incentives for residential and nonresidential PV installs
Plan or Program	• Develop a professional certification permitting program
Requirement(s)	• Require pre-wiring for solar in new developments • Require solar PV in new developments • Require qualifying nonresidential additions and alterations to install solar PV

Examples of Policies in Region

The 2019 California Building Energy Code (Title 24, Part 6) updates required new low-rise residential projects to include solar photovoltaics. As a result, there are no adopted ordinances in the region to require solar on residential new construction. There are two jurisdictions in the San Diego region that have adopted requirements for certain nonresidential new construction, alteration, and addition projects to install solar. In the 2022 code update, which will take effect January 2023, new nonresidential projects will be required to install solar and storage. Once this code update is effective, reach codes requiring solar on new nonresidential buildings will be obsolete, though opportunities remain for additions and alterations.

The City of Encinitas adopted Ordinance 2021–13 in October 2021. Section 120.10 requires certain nonresidential projects to install solar photovoltaics. This requirement applies to all new nonresidential, high-rise residential, and hotel/motel buildings, alterations that increase total roof area by at least 1,000 square feet, and alterations with a permit valuation of at least $1 million and that affect at least 75% of building floor area. There are two methods to calculate the required amount of solar: one based on gross floor area and the other based on time dependent valuation. Several exceptions are included in the ordinance. For example, buildings with practical challenges, like shading or limited roof space and commercial GHGs, are not required to meet the solar provisions of the ordinance.

The City of Carlsbad adopted a similar ordinance in March 2019 but has thresholds of 2,000 square feet of additional roof area for additions.

8.7.6 Opportunities for Further Local Action to Decarbonize Electricity

Integrate Equity Considerations into Policies to Decarbonize the Electric Supply

Several relevant factors related to equity could be considered when considering policies to decarbonize electricity. The following presents a preliminary summary of some of these issues, but additional work would be needed to understand and address these issues in the San Diego region.

In California, most distributed solar PV systems have been installed in higher-income neighborhoods with higher levels of homeownership compared to the statewide average.[i] However, the proportion of systems installed in disadvantaged communities has increased in recent years.[ii] This increase is due in part to the falling price of PV and equity-focused programs, including SOMAH, Single-Family Affordable Solar Homes Program (SASH), Multifamily Affordable Solar Housing Program (MASH), and other programs funded by proceeds from California's Cap and Trade Program.[iii] Programs like these, solar PV leasing, and PACE financing have been associated with higher levels of solar PV adoption in disadvantaged communities.[iv] The CPUC has an ongoing rulemaking to change several aspects of NEM for residential customers, including addressing inequities related to how customers are compensated for power that is exported to the electric grid.

While demand side factors like household income and homeownership can help determine solar PV adoption, supply-side factors may also play a role. Recent research indicates that income-targeted marketing by installers may lead to lower access to installers and fewer quotes by installers.[v] Several policy options exist to address supply side factors, including providing incentives for companies to locate their headquarters in communities of concern, provide incentives based on the number of quotes rather than systems installed, train installers to understand the needs of customers located in communities of concern, and explore options for installers to secure financing for these customers like green banks.[vi]

Owning or leasing a solar PV system is only an option for homeowners. While the MASH program provides incentives for multi-family building owners to install solar PV and innovative business models to equitably share the solar production exist,[vii] solar rooftop ownership or leasing is not an option for renters. Increasing the percentage of grid electricity provided by zero carbon sources can address this population. Near zero or zero-carbon service, options can cost more than other electricity service options by the IOU or CCA. CEA CARE customers could receive the Green Impact Premium service options, which would have a higher renewable electricity content with a relatively small price premium. Alternatively, CCAs could subsidize the cost of opting CARE customers to the 100% zero-carbon service option. Figure 8.47 shows the CEA rates for CARE customers for various service options as compared to similar options from SDG&E. The cost premium for CARE customers to move from the 50% renewable

[i] Verdant Associates LLC. Net-Energy Metering 2.0 Lookback Study. Prepared for CPUC. P. 39. See also G.Barbose, et al. (2021) Residential Solar-Adopter Income and Demographic Trends: 2021 Update. Lawrence Berkeley National Laboratory, p. 39.
[ii] Id. at p. 39.
[iii] Id. at p. 39.
[iv] E. O'Shaughnessy, et al. (2021) The impact of policies and business models on income equity in rooftop solar adoption. Nature Energy, Vol 6, p. 84-9.
[v] E. O'Shaughnessy, et al. (2021) Income-targeted marketing as a supply-side barrier to low-income solar adoption. iScience 24, 103137.
[vi] Id. at 10.
[vii] See https://www.ivy-energy.com/.

option to the 100% renewable option is about $2.50 per month, based on the average bill provided.

Residential: DRLI	SDG&E 31% Renewable	SDG&E EcoChoice 100% Renewable	CEA Clean Impact 50% Renewable	CEA Green Impact Premium 100% Renewable
Generation Rate ($/kWh)	$0.07472	$0.12776	$0.07946	$0.08699
SDG&E Delivery Rate ($/kWh)	$0.07328	$0.07328	$0.07569	$0.07569
SDG&E PCIA ($/kWh)	$0.04516	$0.04516	$0.03770	$0.03770
Franchise Fees ($/%)	$0.00322	$0.00331	$0.00275	$0.00275
Total Electricity Cost ($/kWh)	$0.19638	$0.24952	$0.19560	$0.20312
Average Monthly Bill ($)	**$65.79**	**$83.59**	**$65.52**	**$68.04**

Average Monthly Usage: 335 kWh Rates current as of June 1, 2021

Figure 8.47 CEA Rates for Standard-DR Residential - CARE[i].

More Local Jurisdictions Can Join a CCA Program

Currently, 14 of the 17 CAPs evaluated for this project include CAP measures to increase the supply of renewable electricity from the grid. Most of these specify forming or joining a CCA or similar program. No other program options exist to yield the scale of renewable electricity procurement that can result from CCA programs. As noted above, two CCAs have formed in the San Diego region: SDCP (6 jurisdictions) and CEA (5 jurisdictions). Eight cities in the region have not joined one of the CCA programs in the region, though it appears that there are ongoing discussions. If the additional cities joined a CCA or developed another measure to increase the amount of carbon-free electricity delivered to their jurisdiction earlier than required by state law, more GHG reductions would occur earlier than otherwise expected. Based on our Aggregated CAP Commitment analysis, adopted CAP commitments would reduce GHG emissions by 1.2 MMT CO_2e, while a scenario in which all jurisdictions adopted the most aggressive renewable energy measures would result in 1.6 MMT CO_2e. The overall GHG impact would be relatively small since most jurisdictions already have committed to a high percentage of renewable electricity. And since the law requires 100% carbon free electricity supply by 2045, the annual reduction in that year would not change; however, reducing emissions earlier than state law requires would lead to higher cumulative emission reductions.

Develop Options to Supply Higher Carbon-Free Content Electricity to Residents and Businesses

Because CCAs are opt-out programs, eligible residents and businesses are automatically enrolled into default service options. Customers can opt-out of the program altogether or select another service option, which could have a higher level of renewable content. Getting more customers to participate in the 100% carbon-free service option would increase the GHG impacts of CCA programs. Participating jurisdictions can consider the following options:

- **Make 100% Carbon-Free Default for All Participants** – One option is to make 100% renewable option default for all customers and allow customers to opt-down to lower renewable content service options. This can be done on a jurisdiction by jurisdiction basis. For example, the City of Encinitas City Council voted to make SDCP's 100% renewable option (Power100) the default for

[i] Proposed Decision Revisiting Net Energy Metering Tariffs and Subtariffs. Rulemaking 20-08-020. 12-13-21. Available at https://thecleanenergyalliance.org/wp-content/uploads/2021/07/SDGE-CEA-JRC-Online-Template-06-01-2021_final-1.pdf.

all participants.[i] East Bay Community Energy provides transparent tracking of the default service options for all participating cities. Of the 15 participating jurisdictions, five make the 100 carbon-free service option default for all customers, and another two make it the default for residential customers only. [ii]

- **Participate in Disadvantaged Communities Green Tariff Program** – Because the higher renewable content service options is often more expensive, not all participants will be able to cover the incremental costs. As directed by AB 327 (2013), the CPUC developed options for certain income qualified customers who live in disadvantaged communities (DACs) to have access to renewable electricity generated locally.[iii] In June 2018, the CPUC created the Disadvantage Communities Green Tariff (DAC-GT), which allows income-qualified, residential customers in DACs who may not be able to install solar to receive a 20% bill discount for higher renewable content electricity supply.[iv] The program is similar to the existing Green Tariff portion of the Green Tariff/Shared Renewables Programs[v] (i.e., EcoChoice and EcoShare in the SDG&E service territory) and is available to customers who meet the income eligibility requirements for the CARE and FERA programs and live in an investor-owned utility service territory (e.g., SDG&E).[vi]
- **Subsidize Cost to Opt-up to 100% Carbon Free for CARE and FERA Customers** – Additional options may be possible, including subsidizing the incremental cost for CARE and FERA customers to opt-up to 100% carbon-free service options. Additional research would be needed to determine the GHG impacts of opting up and the additional costs to determine whether a program to opt-up to 100% renewable content is a cost effective means to reduce GHG emissions.

Supply Municipal Operations with Carbon-Free Electricity

Local jurisdictions that participate in a CCA program can opt up to the 100% carbon-free service options for municipal operations. All cities in SDCP have opted up to the 100% carbon-free service option for municipal operations.[vii] For jurisdictions not participating in a CCA, other options exist, including SDG&E EcoChoice, though there is a regional CAP on the amount of solar projects that can be installed to supply this program, and SDG&E has recently requested the CPUC to suspend the program due to limited uptake.

Require Solar PV on Existing Nonresidential Buildings

Local jurisdictions have the authority to adopt local energy codes that exceed statewide building energy codes (Title 24, Part 6) and could require solar on new nonresidential construction, additions, and alterations. California building energy codes already require solar for low-rise residential buildings. The

[i] Coast News. March 2, 2021. Encinitas commits to San Diego's renewable electricity offering. Available at https://thecoastnews.com/encinitas-commits-to-san-diegos-renewable-electricity-offering/.
[ii] East Bay Community Energy. Service levels transitions webpage. Avaialble at https://ebce.org/transition-to-renewable-energy/.
[iii] Assembly Bill (AB) 327 (Perea, 2013)
[iv] California Public Utilities Commission. Decision 18-06-027 in Rulemaking 12-07-002. Available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M216/K789/216789285.PDF. See also https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/solar-in-disadvantaged-communities/the-disadvantaged-communities-green-tariff-dac-gt-program.
[v] California Public Utilities Commission. Green Tariff/Shared Renewables program (GTSR) webpage. Available at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-rates/green-tariff-shared-renewables-program.
[vi] San Diego Gas & Electric. Bill Payment Assistance webpage. Available at https://www.sdge.com/residential/pay-bill/get-payment-bill-assistance/assistance-programs.
[vii] Personal communication with SDCP Director of Data Analytics and Account Services, Lucas Utouh, 9-30-21.

Cities of Carlsbad and Encinitas adopted an ordinance to require solar on non-residential buildings. While local jurisdictions have authority, statewide cost effectiveness studies are available, and examples exist in the region, a solar requirement for new nonresidential buildings would be obsolete as soon as the most recently approved codes are effective in January 2023 since solar and storage will be required for new nonresidential buildings. However, there is an opportunity for local jurisdictions to adopt reach codes that require solar on alteration and addition projects. Examples of these policies exist in the region and around California. GHG reductions associated with these policies likely would be limited given the number of affected projects, but more analysis would be needed to determine the full potential of these policies.

Other Local Opportunities

Through the supply procurement authority of existing CCAs in the region, there is an opportunity to explore options to decrease emissions from in-region and out-of-region thermal fossil fuel generation that supply electricity to the San Diego region. This may include:

- Evaluating development and procurement of low-carbon or zero-carbon fuel alternatives — such as hydrogen — to existing natural gas fired base generators and fast start generators that both achieve GHG reduction objectives, decrease local criteria pollutants, and ensure system and local reliability; and
- Evaluate carbon removal and storage options for existing in-region or contracted for out-of-region natural gas generation where these facilities will be required to operate per federal and state reliability standards.

For distributed energy resources, additional opportunities exist to expand upon state statutory mandates for streamlined approval of small wind energy systems,[i] residential rooftop solar PV systems,[ii] and advanced energy storage systems.[iii] There is opportunity to further streamline the application approval process for larger wind energy systems, nonresidential and large residential solar PV systems, and energy storage systems that are not covered by the current statutory language.

Potential for Regional Collaboration

In addition to the measures and policies local jurisdictions can adopt on their own, there are opportunities for collaboration across jurisdictions and even regionally to increase use of carbon-free electricity.

Develop CCA Customer Programs to Encourage Use and Generation of Clean Electricity

CCAs in California have developed programs to encourage participation in high renewable or carbon-free electricity service options or installation of distributed solar projects.

- Net Energy Metering (NEM) – NEM allows customers to be compensated for electricity exported to the electric grid on a monthly basis. The amount of electricity exported to and imported from the grid is summed, and if a customer is a net importer, they are charged; if the customer is a net exporter, they are paid the retail value of that amount. Because CCA programs set their own electric rates, subject to state law and regulatory requirements, they can modify the terms of certain aspects of NEM, including the crediting process and rate used to compensate net exporters. Also, customers that are net exporters on an annual basis are eligible for net surplus compensation, which uses a rate called the default load aggregation point (DLAP) price,

[i] See AB 45 (Blakeslee, Chapter 404, Statutes of 2009).
[ii] Government Code §§ 65850.5 & 65850.55.
[iii] Government Code § 65850.8.

sometimes referred to as average wholesale rates.[i] This rate is much lower than the retail rate used for calculating the value of net exported electricity each month. CCAs can also modify the net surplus compensation rate. For example, Marin Clean Energy offers two times the DLAP offered by the incumbent utility, Pacific Gas & Electric (PG&E).[ii] Note that the CPUC has an ongoing rulemaking to change several aspects of NEM for residential customers that may affect the cost effectiveness of installing distributed solar.[iii]

- Financial Incentives – CCAs in California offer financial incentives to encourage installation of distributed solar and projects that include energy storage. For example, East Bay Community Energy (ECBE) has a rebate program for solar projects energy storage to improve resilience,[iv] and Marin Clean Energy provides MCE solar rebates for communities of concern.[v]
- Feed In Tariffs – In addition to programs to encourage customers to increase supply of renewable electricity, CCAs also can develop programs to encourage development of renewable electricity projects within its service. Some CCAs have Feed-In tariffs (FIT), which purchase electricity from local projects for a fixed price over a fixed number of years. In January 2021, the SDCP adopted a FIT and will be launching the program in 2022.[vi] Other CCAs have existing programs. For example, Marin Clean Energy has two FIT programs. Projects that are up to 1 MW are eligible for the FIT Program, while projects between 1 MW and 5 MW are eligible for the FIT Plus Program.[vii]

Collect and Assess Data on Equity and other Indicators Related to Renewable Electricity

Similar to other policy categories, there is a general need to continue to develop capacity in the region to collect, assess, and communicate data on equity and other energy-related indicators. Such data would allow additional analysis in the region to assess the current impact of renewable electricity policies in the region and to enable the process to develop policies and processes to address any inequities found.

Regional Program to Support Reach Code Policy Development

Similar to the opportunity described in Section 8.6.6 above, a regional program could support development and implementation of regional reach codes to encourage installation of distributed solar. This program could leverage existing resources, including SDG&E Codes and Standards program and Statewide Reach Code Program.[viii] The Clean Power Alliance, the Los Angeles region's CCA, completed a report on potential programs and identified a regional reach code program as one option. Based on the report, such a program could: develop model ordinances to streamline the process for local jurisdictions, provide funding to local governments for the development and adoption process of a building electrification code, and make available technical assistance to municipalities that want to adopt a

[i] In D.11-06-016, the CPUC determined that the electricity portion of the net surplus compensation rate is the simple rolling average of the default load aggregation point (DLAP) price from 7 a.m. to 5 p.m. that corresponds to the customer's 12-month true-up period.
[ii] Marin Clean Energy. Solar Program webpage. Available at https://www.mcecleanenergy.org/solar-customers/.
[iii] California Public Utilities Commissions. Proposed Decision in Rulemaking 20-08-020 (Dec. 13. 2021).
[iv] East Bay Community Energy. Resilient Homes Program webpage. Available at https://ebce.org/resilient-home/.
[v] Marin Clean Energy. Solar Rebates and Discounts for MCE Customers webpage. Available at https://www.mcecleanenergy.org/solar-rebates/.
[vi] San Diego Community Power. Community Advisory Committee Presentation, Special Meeting Dec. 9. 2021. Available at https://sdcommunitypower.org/wp-content/uploads/2020/12/CAC-Presentation_v1.pdf.
[vii] Marin Clean Energy. Feed In Tariffs webpage. Available at https://www.mcecleanenergy.org/feed-in-tariff/.
[viii] Statewide Reach Codes Program, California Energy Codes and Standards – A Statewide Utility Program. Available at https://localenergycodes.com/.

distributed solar reach codes.[i]

One notable limitation to this approach for distributed solar is that statewide building energy codes already require solar for certain low-rise residential new construction projects and will require new nonresidential buildings to install solar and storage in the next triennial code update cycle.

8.8 Natural Climate Solutions

Natural and working lands are becoming a major focal point for state policy and local land use planning. Existing efforts include quantifying the value of existing carbon stock and sequestration potential and conserving and restoring existing natural and working lands. According to a recent study by the Institute for Ecological Monitoring and Management at San Diego State University (IEMM), approximately 2.9 million acres of San Diego County's more than 3.2 million acres of land, submerged land, and waters are natural lands. Of these, the un-conserved portion is distributed throughout the region, representing a significant opportunity to develop nature-based carbon sequestration strategies in CAPs across the region. This will become more important if net zero GHG emissions, which will require carbon removal and storage, is the regional target for GHG emissions.

8.8.1 Summary of Findings

Table 8.43 presents the key takeaways of the analysis for the Natural Climate Solutions Pathway.

Table 8.43 Key Takeaways for the Natural Climate Solutions

Policy Category	Key Takeaways
Agriculture Methane Reduction	No CAP measures related to methane reduction; limited analysis completed, additional research needed; State preemption may exist starting in 2024 depending on future CARB regulation.
Carbon Stock Preservation	Many adopted and pending CAPs have related measures, mostly to conserve and restore habitat; low GHG contribution; opportunity to continue research on carbon storage potential and regularly develop regional inventories of carbon stocks; Existing authority allows conservation, preservation, and restoration of lands for this purpose.
Carbon Removal and Storage	Many adopted and pending CAP have related measures, mostly urban tree planting, the only quantified measure from this pathway; low GHG contribution; opportunity exists to develop a regional approach to urban tree planting, including equity considerations, and to track carbon all removal activities regionwide; Existing authority allows conservation, preservation, and restoration of lands for this purpose. State legislation will create removal and storage projects with an opportunity to develop such projects in the San Diego Region.

Key Findings of Analysis

This is a summary of results of the review of authority to act, the review of CAPs, and the scenario analysis that estimates the aggregated GHG impact of CAPs.

- Authority Exists Over Land Use and Land Preservation, But Ownership Issues Require Cooperation Between Owners and Land Managers – Local jurisdictions exercise police power over land use and zoning and delegated authority that allows for the preservation of land through conservation and agricultural easements with regard to natural and working lands. However, presently it is unclear to what extent local authority can be exercised over activities

[i] Clean Power Alliance. 2020 Local Programs for a Clean Energy Future. Available at https://electricenergyonline.com/article/energy/category/ev-storage/143/849132/clean-power-alliance-approves-new-five-year-clean-energy-programs-plan.html.

on private natural and working land beyond land use designation with regards to GHG regulation. The region is complicated because it is composed of federal, state, tribal, and privately held land, submerged land, and waters. Various statutes and agencies regulate the different land types, with none focused on GHG emissions or sequestration as it relates to land use. State land use and regulating agencies also operate with a wide range of statutory mandates. California statutes and executive orders require state land use agencies to account for GHG emissions from natural and working lands as well as begin to assess and regulate carbon removal and storage on these lands with significant targets in 2030. Local jurisdictions act with authority to preserve land, set goals, evaluate how to quantify and implement carbon storage requirements on existing land, and work with private owners, tribes, and state and federal land managers to achieve state, regional, and local goals related to natural and working lands. Developing local GHG targets and aligning with state goals, statutes, quantification methods informed by San Diego specific carbon valuation science, and funding may provide a path forward to achieve local natural and working land objectives.

- The Only Quantified CAP Measure Relevant to This Pathway is Urban Tree Planting – Based on our review of CAPs, nearly all CAPs (15) have at least one measure related to urban tree planting, though these measures contribute on average just over 1% of local GHG reductions in CAPs. Based on our scenario analysis, the total GHG reduction expected from urban tree planting measures, which assumes 7% tree cover in developed areas, would be 0.1 MMT CO_2e in 2035. If the best adopted CAP commitment, which assumes 35% tree cover, were applied to all jurisdictions in the region, the reduction would be 0.6 MMT CO_2e.

Opportunities for Further Local Action

The following summarizes key opportunities for further action.

- Opportunities at Jurisdictional Level and Regional Collaboration in Identifying Suitable Tree Planting Locations – Existing urban canopy cover varies by jurisdiction, ranging from 7% to 22%. CAP urban tree planting targets do not specify suitable tree planting locations or where trees are needed the most. Opportunities exist at the jurisdictional level to identify locations based on local needs. The most aggressive CAP measure commits to 35% urban canopy cover in developed areas. Not all developed areas in the region are suitable for tree planting. An opportunity exists for cross-jurisdictional collaboration to identify suitable locations across the region, including taking into account social equity considerations.
- Continue and Increase Land Conservation, Preservation, and Restoration Across the Region – Existing authority allows land conservation, preservation, and restoration on natural and working lands. There is an opportunity to increase existing efforts and to explore additional actions to further conserve, preserve, and restore these lands.
- Collaboration with Tribes, State and Federal Land Agencies and Managers, and Private Land Owners – It is necessary to evaluate the various mandates on these lands and waters to determine where collaboration is viable to achieve local, regional, and state goals for natural and working lands. Private land owners also serve as important partners to preserve land and to test and fund pilot projects for carbon removal and storage.
- Continue to Develop and Integrate both State and Local Science for the Value and Integration of Natural and Working Lands in CAPs and other Land Use Plans – CARB is currently developing methods to quantify carbon values for these lands and demonstrate sequestration values. This could be integrated with existing local science on San Diego region's natural and working land carbon values from San Diego State University's IEMM and other San Diego specific science.

- Develop Land Use Specific Values for Land Conservation and Restoration, including Agricultural Land – There are opportunities to conserve and preserve additional land across the region. There are also some opportunities to restore land. The science behind the value of these actions is developing and needs additional support. The region could identify lands that can be conserved or preserved in support of existing and future land use planning. This process must include all tribal, federal, private, and local government stakeholders. This process could also account for the new SB 27 (2021) mandate that calls for the creation of natural and working land carbon removal and storage projects. To the extent possible, the San Diego region could develop and aid in creating these projects.
- Develop and Regularly Update a Regional Carbon Stock Inventory Based on San Diego Specific Science – Similar to the CARB Inventory of Emissions from Natural and Work Lands, the San Diego region could develop a process to regularly estimate and track over time the amount of carbon stored vegetation, wetlands, etc. This would help to understand how carbon stocks are being preserved and whether net emissions occurred due to changes in land use. These emissions are not typically included in the communitywide GHG inventory of local jurisdictions, but tracking changes over time can help understand the region's net impact on emissions, which can imply contribution to warming. A similar process could be developed to track carbon removal projects regionwide.

8.8.2 Summary of Authority in the Natural Climate Solutions Pathway

The San Diego region is composed of federal, tribal, state, local, and privately held land. The following will discuss authority over this land, submerged land, water, and coast (land(s)). Authority over the land(s) directly determines its uses, potentially limiting whether the use can support GHG reductions, removal, and/or storage. The following will summarize opportunities to engage with federal, tribal, the State of California, and local authorities regarding natural and working lands. It concludes with an analysis of agricultural land. Additional research is required to further vet this pathway. Additional information on all topics presented here can be found in Appendix B.

Local Authority Over Natural and Working Lands

Cities and counties often use planning and land use control authorities to protect or regulate natural and working lands. In this regard, the full extent of this authority requires further research and development to determine what is feasible at the local level to regulate, preserve, and augment natural and working lands for GHG regulations and any removal or storage activities in the region. Additionally, local jurisdictions act with authority to lobby Congress and the California Legislature, and negotiate with federal, tribal, and state agencies and lands managers to further these aims. Local jurisdictions may act with existing authority to create pilots or programs in this regard. Local jurisdictions also act with existing authority to fund local science to accurately identify and quantify local natural and working lands carbon stock and sequestration potential to inform local decisions and investment. Further research would be needed to develop and vet these and other actions on natural and working lands.

Known local government authorities and actions that can be used to regulate and protect natural and working lands include general plans, specific plans, climate action plans, local coastal plans (LCPs), zoning, special use permits, subdivision maps, and development agreements. Policies that support easements (e.g., conservation[i] — including California Forest Legacy Program Act easements[ii] — and

[i] Civil Code §§ 815.1, 815.3, 815.2(a)-(b).
[ii] Public Resources Code § 12200 et seq.

open-space[i]), as well as incentives largely based on easements to preserve land. Local jurisdictions can also apply for state programs — like the Urban & Community Forestry Program under the Urban Forestry Act[ii] to support local urban forestry — efforts that are included in general plans or climate action plans.

Federal Natural and Working Lands

The primary actions local jurisdictions may take related to federal lands is through lobbying Congress, engaging with federal lands management agencies to create government to government agreements (e.g., a memorandum of understanding (MOU)), and working directly with federal lands managers to achieve local objectives across the region.

One such example includes evaluation opportunities from the Energy Act of 2020 that established a research, development, and demonstration program to test, validate, or improve technologies and strategies to remove carbon dioxide from the atmosphere on a large scale through activities that include:

- Direct air capture and storage technologies;
- Bioenergy with carbon capture and storage technologies;
- Enhanced geological weathering;
- Agricultural practices;
- Forest management and afforestation; and
- Planned or managed carbon sinks, including natural and artificial.[iii]

There is opportunity at the state and local level to develop and demonstrate or benefit from projects funded by this legislation. Further efforts could be made to investigate this opportunity, particularly with regard to federal land in the region.

For the four main federal land managers (excluding the Department of Defense), opportunities to coordinate with local governments or the State of California based on federal land and resources in the San Diego region:

- National Parks Service (NPS): The NPS's discretion in achieving its mission suggests that partnering with local jurisdictions to decrease carbon emissions related to the Cabrillo Monument and increase natural land carbon removal may be feasible. Any action would need to be consistent with the purpose of creating the Cabrillo National Monument.[iv] It may also be possible to preserve land through the creation of a national park or additional monument in the San Diego region.
- Fish and Wildlife Service (FWS): There is some level of discretion afforded to FWS officials with regards to uses that should be further analyzed. Opportunities may include increasing the size of existing refuge and working with FWS officials to exercise their discretion in a way that benefits regional decarbonization goals.
- Bureau of Land Management (BLM): BLM land managers act with broad discretion to plan and manage land and resources. Local BLM managers act with different authorities when compared to U.S. Forest Service officials, who must change already established localized plans developed in

[i] Government Code § 51070 (The Open-Space Easement Act of 1974).
[ii] Public Utilities Code § 4799.06–4799.12.
[iii] 47 H.R. 133 — 116th Congress (2019-2020): Consolidated Appropriation Act, 2021. December 27, 2020 (Public Law No: 116-260), Division Z (Energy Act of 2020), Title V: https://www.congress.gov/bill/116th-congress/house-bill/133/text.
[iv] See *United States v. City & County of Denver*, 656 P.2d 1 (Colo. 1982).

compliance with existing broad agency rules that limit discretion. This may provide an opportunity for local jurisdictions to work directly with local BLM land managers on decarbonization efforts in the San Diego region.

- The U.S. Forest Service (U.S.F.S.): Because there are localized planning requirements and less manager discretion, there is less flexibility with National Forest land than BLM land without amending or creating a new local plan under the NFMA. However, inclusion of decarbonization actions in U.S.F.S. authority to issue broad rules of applicability to manage forest land does create an opportunity for local jurisdictions to engage in the U.S.F.S. regulatory process that affects local planning in addition to advocating for changes to existing local plans, such as the Cleveland National Forest Land Management Plan.

Tribal Authority Over Natural and Working Lands

States and local governments generally act with limited to no authority over tribal land use and activity. Cooperative intergovernmental policies and agreements that support tribal land preservation, land conservation, and decarbonization efforts through mechanisms that include the fee-to-trust process appear to be existing paths to work with tribes in achieving regional decarbonization goals.

State of California Authority Over Natural and Working Lands

California actively manages natural and working lands through various agencies with a wide range of authority and missions. State authority and specific agency authority to preempt local police power over zoning is narrow and limited[i] to specific statewide objects, that include housing requirements but not where the units should be zoned,[ii] and specific areas like the coastal zone or under the Subdivision Map Act.[iii, iv] State preemption over charter city municipal affairs is expressly limited by California Constitution Article XI, §§ 3 and 5. Additionally, CEQA applies to a broad range of projects, as defined, on natural and working lands and is a major consideration when analyzing land and resource uses. The California Endangered Species Act may also affect use of habitat and would need to be specifically analyzed.[v]

State policy continues to increase focus on natural and working lands that may inform and support local action or create the opportunity to align with state action. The following summarizes some of these state policies:

- SB 1386 (Wolk, Chapter 545, Statutes of 2016) established protecting and managing natural and working lands as state policy to help achieve California's GHG reduction goals, including the intent to promote cooperation of owners of natural and working lands.
- Executive Order B-55-18's 18's goal to achieve carbon neutrality by 2045 incorporates working lands, including agriculture, in the CARB's 2022 AB 32 Scoping Plan update that is currently under development and expected to be approved by the end of 2022.
- Executive Order N-82-20's addresses biodiversity, 30% land and coastal water conservation, acceleration of natural carbon sequestration and climate resiliency on natural and working lands, and creation of the Natural and Working Lands Climate Smart Strategy, including setting a statewide target to meet the 2045 carbon neutrality goal.

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[i] See Government Code § 65000 et seq.; See *Scrutton v. County of Sacramento*, 275 Cal. App. 2d 412, 417 (1978).
[ii] See Government Code §§ 65913.1(a), 65863.5, 65583(a)(3), 65584, & 65584.01.
[iii] Government Code §§ 66410 et seq.
[iv] See Government Code §§ 66411, 66421, 66477, 66478, 66479, 66483, & 66484; see also *Friends of Lake Arrowhead v. Board of Supervisors*, 38 Cal. App. 3d 497, 505, (1974).
[v] Fish & Game Code § 2050 et seq.

- SB 27 (Skinner, Chapter 237, Statutes of 2021) established a Natural and Working Land Climate Smart Strategy that includes developing a framework to achieve California's climate goals and mandates CARB to set CO_2 removal targets for 2030 and beyond under its Scoping Plan for all emission sectors including those in this framework. It also requires the Natural Resources Agency to create a carbon removal and sequestration registry to identify, list, fund projects by state agencies and private entities, and retire projects in the state that drive climate action on the state's natural and working lands.
- SB 859 (Committee on Budget and Fiscal Review, Chapter 368, Statutes of 2016) Natural and Working Land Inventory quantitatively estimated the existing state of ecosystem carbon stored in the State's land base and excluded GHG emissions associated with direct human activity quantified in CARB's annual statewide GHG inventory.[i]
- The Natural and Working Lands Climate Change Implementation Plan set targets out to 2030 and pathways to at least double the pace and scale of state-funded restoration and management activities, including: 1) increasing the acreage in soil conservation practices for cultivated land and rangelands by five times to change agricultural land from a net emitter to a sink by 2030; 2) doubling the pace and scale of forest managed or restored; 3) tripling the pace of restoration of oak savannas and riparian areas; and 4) and doubling the rate of wetland seagrass restoration.[ii]
- 2022 Draft AB 32 Scoping Plan seeks to mitigate the expected increase in emissions from Natural and Working Lands through active management relevant to San Diego that includes: 1) a ten times increase in management of forest, shrubland, and grassland; 2) increase investment in urban trees by at least 20%; 3) restore 60,000 acres or 15% of Sacramento-San Joaquin Delta wetlands; and 4) decrease conversion of deserts and sparsely vegetated landscapes by at least 50% annually.[iii]

Agriculture

Local jurisdiction's authority over agricultural land stems from police power over land use and zoning. Agriculture emissions or GHG mitigation actions also may be part of a local jurisdiction's climate action plan. It is unclear how and to what extent a local jurisdiction may use its police power to regulate agriculture activities that cause GHG emissions directly. Some potential opportunities are dependent on whether and how CARB regulates certain activities.

Federal authority over agriculture land use and practices is limited with certain land use requirements for leased federal land for farming or animal production but no specific regulation of GHG emissions. As previously stated, the Energy Act of 2020 established a research, development, and demonstration program to test, validate, or improve technologies and strategies to remove carbon dioxide from the atmosphere on a large scale through activities that include Agricultural practices. [iv]

State policy continues to increase focus on agricultural lands that may inform and support local action or

[i] See CARB California Natural and Working Land Inventory (2018), p. 7 & 15: https://ww2.arb.ca.gov/nwl-inventory.
[ii] See January 2019 Draft California 2030 Natural and Working Lands Climate Change Implementation Plan (Updated January 2019), p. 13–14: https://ww2.arb.ca.gov/sites/default/files/2020-10/draft-nwl-ip-040419.pdf.
[iii] CARB Draft 2022 Scoping Plan Update, May 10, 2022, p, 201: https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf.
[iv] 47 H.R. 133 — 116th Congress (2019-2020): Consolidated Appropriation Act, 2021. December 27, 2020 (Public Law No: 116-260), Division Z (Energy Act of 2020), Title V: https://www.congress.gov/bill/116th-congress/house-bill/133/text.

create the opportunity to align with state policy and funding. Beyond SB 1386 (2016) establishing protecting and managing natural and working lands as state policy, SB 1383 (2016) mandated that CARB achieve a 40% reduction in methane emissions below 2014 levels by 2030, including reducing emissions from livestock manure management operations and dairy manure management operations the creation and implementation of a Short-Lived Climate Pollutant Strategy. SB 1383 (2016) sets the date of on or after January 1, 2024, as the effective date to implement regulation of these emissions with ongoing investments and incentives to achieve the reductions. SB 1383 (2016) also limits regulation of enteric fermentation to incentive-based mechanisms until CARB and the Department of Food and Agriculture determine that a cost-effective and scientifically proven method of reducing enteric emissions is available, adoption of which would not damage animal health, public health, or consumer acceptance. It remains unclear whether CARB will enact regulations in 2024 to achieve these reductions. CARB regulation will likely preempt local authority action, but the current state offers an opportunity for local regulation unless, and until, CARB acts.

AB 32 (2006) and SB 32 (2016) authorized programs do not directly regulate agricultural land use, onsite agriculture GHG emission (excluding off-road emissions[i]), require carbon sequestration, or require carbon removal on working agricultural lands. However, Executive Orders B-55-18, N-82-20 require agricultural land to meet the 2045 carbon neutrality goal. SB 27's (2021) Natural and Working Land Climate Smart, CO_2 removal targets for 2030 and beyond under the Scoping Plan for all emission sectors, including agriculture, and creation of a carbon registry for carbon removal and sequestration will drive climate action on agricultural land.

These efforts will further support existing agriculture preservation statutes in the coastal zone,[ii] the long-term productivity of soil,[iii] and under the Williamson Act (California's primary agricultural preservation statute).[iv] It will also likely affect CEQA analysis on land conversion and agricultural land preservation mitigation.

Finally, the April 2019 CARB NWL Implementation Plan, informed by SB 859's (2016) Natural and Working Land Inventory's quantitative estimate of the existing state of ecosystem carbon stored in the State's land base (excluding GHG emissions associated from direct human activity quantified in CARB's annual statewide GHG inventory),[v] sets targets out to 2030 and pathways to scale needed implementation. Specific to agriculture, these include increasing the acreage in soil conservation practices for cultivated land and rangelands by five times to change agricultural land from a net emitter to a sink by 2030.[vi] The NWL Implementation Plan also calls for increases in compost application, agroforestry, grazing land and grassland management, and cropland management to decrease emissions

[i] See CARB Funding Agricultural Replacement Measures for Emission Reductions: https://ww2.arb.ca.gov/our-work/programs/farmer-program.
[ii] See Public Resources Code §§ 30000 et seq. (Coastal Act) & §§ 31000 et seq. (State Coastal Conservancy); Public Resources Code §§ 31050, 31051, 30241, 30114, 30243, 30108.6, 30500(c), 30200(a), 30514, 30241.5, 30241, 30250, 30610.1, 30242, 31054, 31104.1, 31150, 31151, 31152, 31156.
[iii] Public Resources Code § 30243.
[iv] Government Code § 51201(c); See Government Code § 51200 et seq.
[v] See CARB California Natural and Working Land Inventory (2018), p. 7 & 15: https://ww2.arb.ca.gov/nwl-inventory.
[vi] See January 2019 Draft California 2030 Natural and Working Lands Climate Change Implementation Plan (Updated January 2019), p. 13: https://ww2.arb.ca.gov/sites/default/files/2020-10/draft-nwl-ip-040419.pdf.

and increase carbon sequestration.[i] The 2022 Draft AB 32 Scoping Plan calls for a five times increase in healthy soil practices and organic agriculture, the reduction of pesticide use, changes in pest management practices, decreases of agricultural burning through increase carbon storage practices, and changes to onsite energy use that reduce GHG emissions from agricultural operations.[ii]

8.8.3 GHG Impacts of CAP Measures in the Natural Climate Solutions Pathway

Natural Climate Solutions is different from the other decarbonization pathways. The other pathways focus on reducing GHG emissions. This pathway focuses on carbon removal and storage. We make a distinction between carbon removal and storage — sometimes referred to as sequestration — and preserving existing stocks of carbon. For example, the GHG impacts of carbon removal and storage measures are due to physically removing carbon dioxide from the atmosphere through activities like urban tree planting and carbon farming. Such activities increase removal capacity (e.g., planting new trees) or enhance the amount of existing capacity (e.g., increasing the capacity of existing vegetation to remove carbon). On the other hand, preserving existing carbon stocks seeks to conserve the existing capacity of natural systems to store carbon. In this case, GHG impacts are associated with avoiding the conversion of existing land. For example, creating easements prevent development of existing land prevents potential emissions from disturbing natural vegetation and soil. Note that emissions associated with avoided development (e.g., reduction in VMT) are addressed in the Decarbonizing Transportation Section (Section 8.5). Table 8.44 summarizes the policy categories and subcategories used to analyze this decarbonization pathway. In the context of this decarbonization pathway, methane reduction refers to emissions related to agriculture, mainly from livestock. Because there are no related CAP measures, we do not discuss this policy category further in this chapter.

Table 8.44 Policy Categories Included in the Natural Climate Solutions Pathway

Policy Category	Policy Subcategory
Carbon Removal and Storage	Urban Tree Planting
	Conservation & Restoration Projects (Removal)
	Urban Gardens
	Carbon-Farming Practices (Removal)
	Turf Management
Preservation of Carbon Stocks	Agriculture Easements
	Open Space Easements
	Wildfire Prevention
	Carbon-Farming Practices (Preservation)
	Conservation & Restoration Projects (Preservation)
Agriculture Methane Reduction	TBD

[i] See January 2019 Draft California 2030 Natural and Working Lands Climate Change Implementation Plan (Updated January 2019), p. 17: https://ww2.arb.ca.gov/sites/default/files/2020-10/draft-nwl-ip-040419.pdf.
[ii] CARB Draft 2022 Scoping Plan Update, May 10, 2022, p. 208: https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf.

Review of Adopted and Pending CAP Measures

For this analysis, we compare GHG impacts across CAPs. Based on the review of CAPs, measures in the Natural Climate Solutions pathway account for between 0% and 5% of local reductions, with an average across all CAPs of about 1% (Figure 8.48).

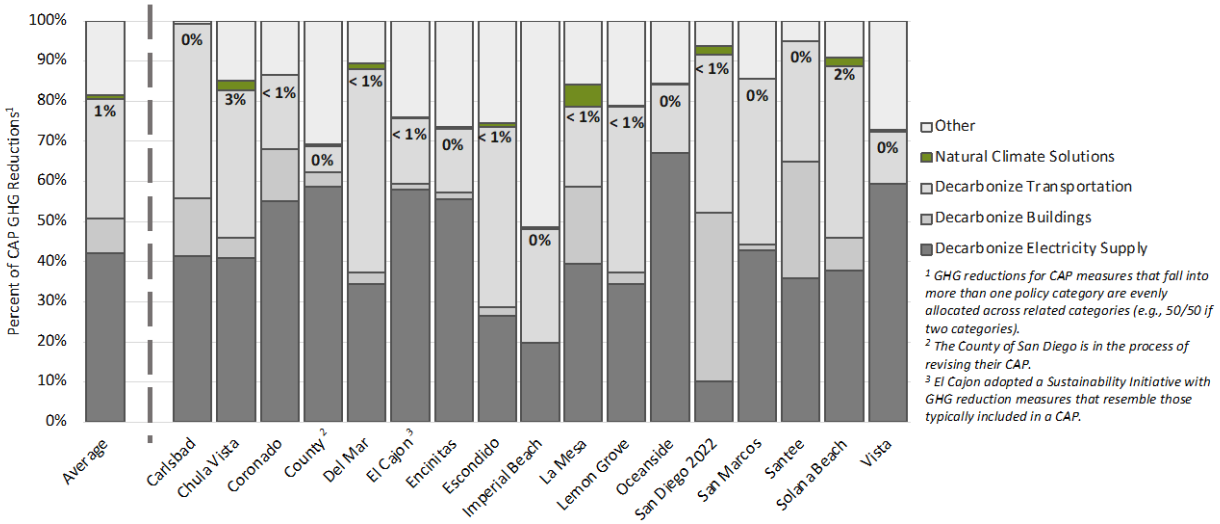

Figure 8.48 Contribution of Natural Climate Solutions Measures in Adopted and Pending CAPs**.**

Based on the review of CAPs, nearly all adopted or pending CAPs include at least one measure related to carbon removal and storage, but only one has measures related to preserving carbon stocks (Figure 8.49). The estimated GHG impact of these measures in CAPs is minimal. Carbon removal and storage measures contributed on average just over 1% to local GHG reductions, while preserving carbon stocks contributes less than 1%. No CAP had measures related to agriculture methane reductions.

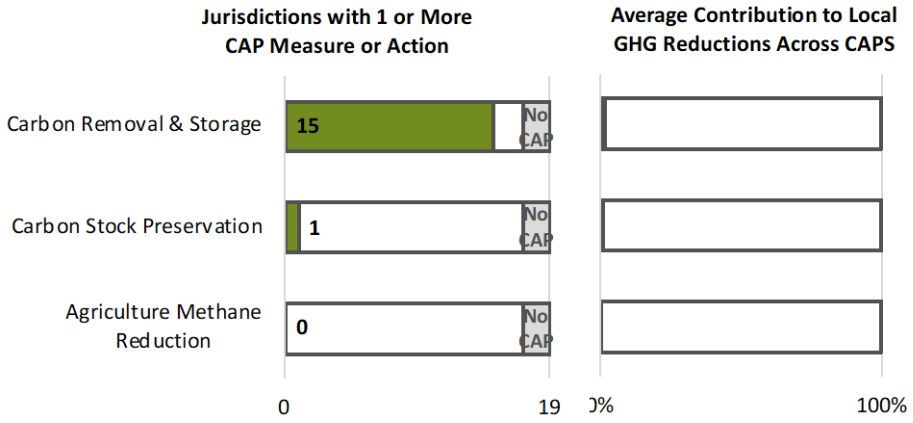

Figure 8.49 Number of Jurisdictions with Related CAP Measures and Associated GHG Impacts

Scenario Analysis of GHG Impacts from Adopted CAP Measures

In contrast to the review of CAPs, which considers measures in all emissions categories and does not consider the combined impact of measures, the scenario analysis only evaluates emissions from on-road transportation, electricity, and natural gas and estimates the GHG impact of all related CAP measures. To assess the combined impact of all adopted CAPs in the region, we summed the activity level in CAP measures and recalculated a regional GHG impact value. For purposes of showing the GHG impact of policies related to this pathway, we only looked at those related to urban tree planting under the carbon

removal and storage category because all quantified CAP measures focus on this subcategory. The carbon sequestered would be 0.1 MMT CO_2e in 2035. CAP urban tree planting measures include: (1) municipal (e.g., public right-of-way, parks) tree planting targets; (2) urban canopy target for developed area in the jurisdiction; and (3) tree planting targets for new residential and commercial developments (e.g., number of new trees per dwelling unit, number of new trees per surface parking spaces).

Figure 8.50 shows the impact of these measures (green wedge) on regional emissions. The upper and bottom dashed line represents the full impact of all four decarbonization pathways discussed in this document.

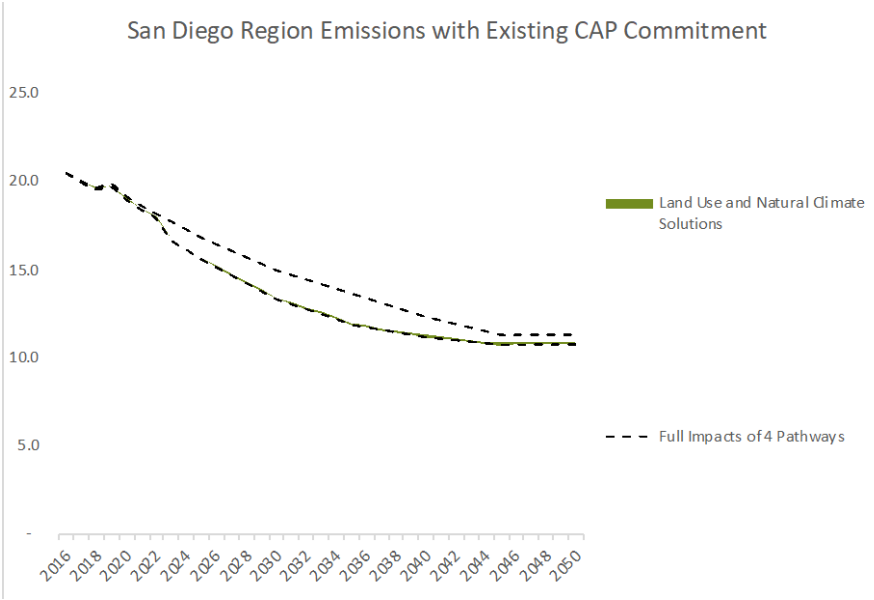

Figure 8.50 San Diego Emissions in Four Decarbonization Pathways with Adopted CAP Commitments.

A 2015/2016 LiDAR assessment shows existing tree canopy cover at approximately 13% across all jurisdictions in the region, ranging from 7% to 22%.[i] With the existing CAP commitment, the region would have an additional 7% urban canopy cover.

GHG Impact from Best Adopted CAP Commitments Applied Regionwide

If the best adopted CAP commitment related to urban tree planting is applied to all local jurisdictions in the San Diego region, the carbon sequestration would be about 0.6 MMT CO_2e in 2035, as shown in Figure 8.51.

The best adopted CAP commitment assumes 35% canopy cover of approximately 1 million acres of developed area in the San Diego region. With the best adopted CAP commitment, the region would have additional 21% urban canopy cover, more than the adopted CAP commitment (7%). While it is not clear whether it would be possible to achieve this level of urban canopy cover across the region, this value represents an upper limit of what can be expected from adopted CAP measures.

[i] San Diego Tree Canopy Assessment. https://perma.cc/4MNP-JGM6.

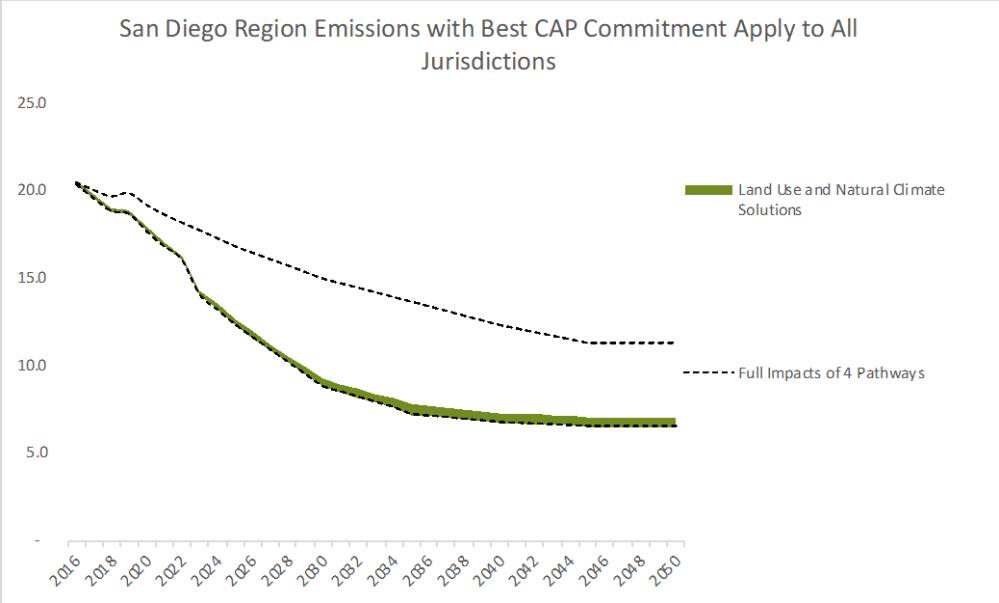

Figure 8.51 San Diego Emissions in Four Decarbonization Pathways with Adopted CAP Commitments.

8.8.4 Carbon Removal and Storage

CAP Measure Related to Carbon Removal and Storage

Figure 8.52 summarizes the number of CAPs with at least one measure related to carbon removal and storage. More CAPs have measures related to urban tree planting than any other policy subcategory analyzed here. Twelve of the 17 adopted and pending CAPs assessed have a requirement to plant urban trees. Urban forestry measures are the predominant driver of carbon sequestration related GHG reductions in local CAPs, and for the few jurisdictions that do include measures and/or actions that relate to the other policy categories, they are generally not quantified.

Figure 8.52 Number of Adopted and Pending CAPs with Measures Related to Carbon Removal and Storage

Urban Tree Planting

Table 8.46 provides examples of the types of CAP measures related to urban tree planting in each of the implementation mechanisms.

Table 8.46 Examples of General CAP Policies Related to Urban Tree Planting

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	• Plant street trees • Include trees in capital improvement projects • Hire an urban forest program manager • Manage health of urban forest and other open spaces
Education, Outreach, & Coordination	• Pursue partnerships and grant funding opportunities • Develop partnerships with neighborhood groups, CBOs, and other stakeholders • Develop regional partnerships to establish a regional urban forest strategy • Provide educational materials to residential and nonresidential property owners • Establish public-private partnerships for volunteer efforts
Evaluation	• Conduct a street tree inventory • Develop a regional urban tree canopy assessment • Track trees planted annually
Incentives	• Provide streamlined review for projects with additional trees • Provide incentives that increase tree plantings • Give away seedlings during special events
Plan or Program	• Develop an Urban Forestry Master Plan or similar • Develop/expand an urban forestry program • Hire an urban forest program manager
Requirement(s)	• Require tree planting in new and redeveloped residential and/or nonresidential properties • Require shade trees in parking lots • Require tree planting at new and redeveloped sites when mature trees are removed

Urban Gardens

Table 8.46 provides examples of the types of CAP measures related to urban gardens in each of the implementation mechanisms.

Table 8.46 Examples of General CAP Policies Related to Urban Gardens.

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	NA
Education, Outreach, & Coordination	• Encourage and promote urban agriculture including community gardens
Evaluation	• Evaluate sites for feasibility of future community gardens • Assess equity in access to community gardens
Incentives	• Reduce property taxes for landowners who convert certain properties to agricultural uses (Urban Agriculture Incentive Zone Ordinance) • Provide incentives to multi-family developments with community gardens • Provide incentives to businesses participating or sponsoring community gardens
Plan or Program	• Update land use plans to permit community gardens in certain zones • Create a Community Garden Program or similar
Requirement(s)	NA

Carbon-Farming Practices (Removal and Storage)

Table 8.47 provides examples of the types of CAP measures related to carbon farming in each of the implementation mechanisms.

Table 8.47 Examples of General CAP Policies Related to Carbon Farming

Implementation Mechanism	General Policy
Capital Improvement & Infrastructure	NA
Education, Outreach, & Coordination	• Develop partnerships with agriculture-based businesses • Promote existing incentives and programs • Promote best-practices in carbon farming
Evaluation	NA
Incentives	• Provide incentives to establish demonstration carbon farms
Plan or Program	• Develop a carbon farming program
Requirement(s)	NA

Turf Management

Only three CAPs have measures related to turf management, which all use capital improvement and infrastructure as the implementation mechanism. These CAPs include measures that use top-dressing of compost at City parks.

Conservation and Restoration Projects (Removal and Storage aspects)

Only two CAPs have measures related to conservation and restoration projects, which use evaluation as the implementation mechanism. These CAPs include measures to identify opportunities to enhance and conserve habitat and to research and monitor Blue Carbon opportunities.

8.8.5 Preservation of Carbon Stocks

CAP Measure Related to Preservation of Carbon Stocks

Figure 8.53 summarizes the number of CAPs with at least one measure related to the preservation of carbon stocks. Only one adopted or pending CAP includes measures related to the preservation of carbon stocks. This reference is through agricultural and open space easements and consists of actions that call for the development of a plan or program and education and outreach efforts. Examples of education and outreach include working with regional partners to identify funding sources for agricultural land protection (e.g., acquisition and management). Examples of plans or programs include developing conservation. No CAPs have measures related to the other policy subcategories listed.

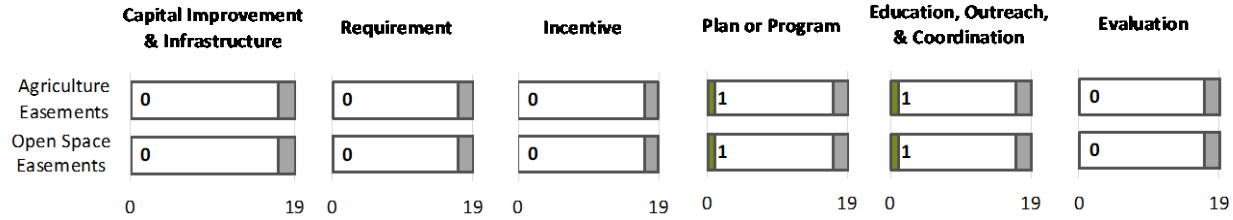

Figure 8.53 Number of Adopted and Pending CAPs with Measures Related to Preservation of Carbon Stocks

Agriculture and Open Space Easements

Several adopted or pending CAPs have measures related to agricultural and open space easements. Those that do have use plan or program and education outreach and Coordination as implementation

mechanisms. Examples of education and outreach include working with regional partners to identify funding sources for agricultural land protection (e.g., acquisition and management). Examples of plans or programs include developing conservation.

Other Policy Subcategories

No relevant measures or actions are currently included in inactive and pending CAPs for the following policy subcategories: wildfire prevention; carbon-farming practices (storage).

8.8.6 Opportunities for Further Action

The following summarizes key opportunities for further action.

- Opportunities at Jurisdictional Level and Regional Collaboration in Identifying Suitable Tree Planting Locations – Existing urban canopy cover varies by jurisdiction, ranging from 7% to 22%. CAP urban tree planting targets do not specify suitable tree planting locations or where trees are needed the most. Opportunities exist at the jurisdictional level to identify locations based on local needs. The most aggressive CAP measure commits to 35% urban canopy cover in the developed area. Not all developed areas in the region are suitable for tree planting. An opportunity exists for cross-jurisdictional collaboration to identify suitable locations across the region, including taking into account social equity considerations.
- Continue and Increase Land Conservation, Preservation, and Restoration Across the Region – Existing authority allows land conservation, preservation, and restoration on natural and working lands. There is an opportunity to increase existing efforts and to explore additional actions to further conserve, preserve, and restore these lands.
- Collaboration with Tribes, State and Federal Land Agencies and Managers, and Private Landowners – It is necessary to evaluate the various mandates on these lands and waters to determine where collaboration is viable to achieve local, regional, and state goals for natural and working lands. Private landowners also serve as important partners to preserve land and to test and fund pilot projects for carbon removal and storage.
- Continue to Develop and Integrate both State and Local Science for the Value and Integration of Natural and Working Lands in CAPs and other Land Use Plans – CARB is currently developing methods to quantify carbon values for these lands and demonstrate sequestration values. This could be integrated with existing local science on San Diego region's natural and working land carbon values from San Diego State University's IEMM and other San Diego specific science.
- Identify Land for Conservation and Restoration, including Agricultural Land – There are opportunities to conserve and preserve additional land across the region. There are also some opportunities to restore land. The science behind the value of these actions is developing and needs additional support. The region could identify lands that can be conserved or preserved in support of existing and future land use planning. This process could include all tribal, federal, private, and local government stakeholders. This process could also account for the new SB 27 (2021) mandate that calls for the creation of natural and working land carbon removal and storage projects. To the extent possible, the San Diego region could develop and aid in creating these projects.
- Develop and Regularly Update a Regional Carbon Stock Inventory Based on San Diego Specific Science – Similar to the CARB Inventory of Emissions from Natural and Work Lands, the San Diego region could develop a process to regularly estimate and track over time the amount of carbon stored vegetation, wetlands, etc. This would help to understand how carbon stocks are being preserved and whether net emissions occurred due to changes in land use. These emissions are not typically included in the communitywide GHG inventory of local jurisdictions,

but tracking changes over time can help understand the region's net impact on emissions, which can imply contribution to warming. A similar process could be developed to track carbon removal projects regionwide. Several studies related to carbon stocks have been completed in the San Diego region, including those in Chapter 5 of this report, an estimate by the SANDAG using the TerraCount analysis tool, and recent research by SDSU developed regionally-relevant sequestration rates for all relevant habitats.[i]

8.9 Other Limitations

There are inherent limitations with any analysis like this that result in a degree of uncertainty. This CAP policy opportunity analysis uses the best information, data, and methods available at the time. Nonetheless, in addition to the limitations presented above in Sections 8.5 through 8.8, there are limitations to the work completed to identify opportunities for each decarbonization pathway.

No Comprehensive Review of Implementation Progress

While implementation is a critical step of the climate action planning cycle, the analysis presented here focuses on measures and supporting actions included in CAPs and some of the policies that have been adopted as a result of these measures. We assume that CAPs represent what local jurisdictions and their elected officials have determined to be a reasonable and feasible commitment to reduce GHG emissions. While we reference some policies adopted by local jurisdictions related to the four decarbonization pathways throughout the report, additional research would be needed to determine whether and to what extent measures have been implemented by local jurisdictions. Such an analysis likely would require close collaboration with local jurisdictions since much of the data and knowledge about implementation activities may not be publicly available.

Also, the SANDAG RECAP Technical Appendix VI presents a framework to monitor progress.[ii] It comprises two main parts: conducting GHG inventories to determine progress toward GHG emissions targets and evaluating progress on implementing CAP measures. While it is possible to estimate the amount of emissions associated with completed CAP activities in some cases, it can be difficult to attribute the emissions reductions to local jurisdiction's actions. For example, while it is relatively easy to track the miles of bike lanes installed, it can be difficult to attribute the amount of VMT reduced due to installing a mile of bike lanes. Similarly, it is difficult to attribute an increase in energy efficiency or rooftop solar to specific actions taken by local jurisdictions. Also, the SANDAG Climate Action Data Portal tracks the level of activity in a range of indicators related to CAP measures.[iii]

No Further Evaluation of Policy Opportunities Completed

The goal of this analysis was to identify local policy opportunities to help achieve deep decarbonization targets. As such, we did not provide detailed analysis of or prioritize the policies we identified. Additional work would be needed to evaluate policy options based on selection criteria, including cost, potential to reduce GHG emissions, feasibility to implement, scalability, social equity implications, etc.

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[i] Megan Jennings, et al., 2021. Carbon Valuation for San Diego's Natural Landscapes. Institute for Ecological Monitoring and Management, San Diego State University.

[ii] SANDAG Regional Climate Action Planning Framework: TECHNICAL APPENDIX VI-CAP Monitoring and Reporting, VERSION 1.1: December 2020.

[iii] ReCAP Snapshots and Climate Data Portal available at https://climatedata.sandag.org/.

Limited Analysis of Certain Policy Categories and Subcategories

There are several policy categories or subcategories that we did not analyze to the degree of others. For example, because there are no CAP measures related to increasing use of low-carbon fuels in building or reducing methane from agricultural operations, including dairy operations, we included only limited information. To the extent that stakeholders and decision makers want to learn more about these areas, additional work would be needed.

No Analysis of Other Public Agency GHG Reduction Plans

This analysis focuses on the GHG reduction commitments in the CAPs of local jurisdictions. It does not include analysis of plans adopted by other agencies like the San Diego Unified Port District and San Diego International Airport. Additional analysis would be needed to determine the GHG commitments, implementation plans, and relationship to local jurisdiction CAPs.

Not All GHG Emissions Categories Included in Analysis

The RDF Technical Report focused on emissions from energy systems — including buildings, electricity generation, and transportation fuels — and land use and natural climate solutions. While these emissions comprise the vast majority of emissions, there are other sources of emissions, including solid waste and industrial gases, that are not addressed in this report. Future analysis could supplement this report with policy options for emissions and policy categories not included here.

8.10 Conclusion

This chapter assesses current commitments in CAPs to determine if additional activity would be needed to put the region on a trajectory to meet these goals and to identify opportunities for local jurisdictions in the region to take further action to support the decarbonization pathways.

We completed analysis in three areas. First, we reviewed the authority of local governments and agencies to act to influence and regulate GHG emissions, including a summary of key federal, state, and local agencies, and key legislation and regulation at the federal and state levels to help to clarify the ability of local governments to act to reduce GHG emissions. Second, we completed a review of CAPs to determine the frequency of measures, relative GHG impact of decarbonization pathways and measures, and integration of social equity considerations. Third, we completed a scenario analysis to estimate the total impact of the GHG reduction commitments in all adopted and pending CAPs and the potential GHG impact of a scenario of applying the best adopted CAP commitments to all jurisdictions. Using results of the above analysis and additional research, identify opportunities for further local action and regional collaboration in each of the four decarbonization pathways.

The review of authority found that local jurisdictions have authority to influence and regulate GHG emissions using police powers and delegated authority. Some local jurisdictions are exercising delegated authority, but the full extent of a local jurisdiction's police power to regulate GHG emissions is unknown. The review of CAPs and scenario analyses found that the GHG impacts of adopted CAP commitments are relatively small, and applying the best adopted CAP commitments to all jurisdictions in the region would still not be enough to reach the levels of deep decarbonization contemplated in the technical analysis presented in the other chapters of this report. As a result, additional policies would be needed to decarbonize transportation and buildings, particularly VMT reductions and building electrification, respectively. Across all decarbonization pathways, there are opportunities for further local action and for regional collaboration, including collecting and tracking data, providing support to develop and

implement policies, and convening stakeholder and working groups to develop regional strategies and monitor progress. Finally, based on a preliminary review of CAPs, additional work would be needed to integrate social equity considerations into climate.

Appendix 8.A Assumptions for Estimating GHG Impact of Best CAP Commitment

Table A.1 Best Adopted CAP Commitment Applied Regionwide – Decarbonize Transportation Pathway

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Decarbonize Transportation	VMT Reductions	Increase Commute by Bicycling	Additional 4 miles of bike lane per square mile = additional 4% commute by bicycling (Imperial Beach CAP Measure T.4: Improve Pedestrian and Bicycle Facilities)	Additional 76,859 commuters by bicycling (4% of total regionwide jobs) One-way commute distance by bicycling: 5 miles
		Increase Commute by Walking	Additional 10% commute by walking (Imperial Beach CAP Measure T.4 Improve Pedestrian and Bicycle Facilities)	Additional 192,147 commuters by walking (10% of total regionwide jobs) One-way commute distance by walking: 1 mile
		Increase Safe Routes to School	Additional 9% students walk to school and 0.5% students ride bicycles to school (Escondido CAP Measure T-3.3 Implement Safe Routes to School at Escondido Union School District & Lemon Grove Measure T-9: Implement the Safe Routes to School Program)	Additional 172,933 students work to school (9% of regional 5-14 population) and 9,607 students ride bicycles to school (0.5% of regional 5-14 population) One-way walk to school distance: 0.5 mile One-way ride bicycle to school distance: 1.25 mile
		Complete Street	0.13% VMT reduction from implementing multi-modal enhancements as part of a "Complete Streets" approach (County of San Diego CAP: Measure T-2.1: Improve Roadway Segments as Multi-Modal)	Equivalent to 0.13% VMT reduction in regional LDV VMT
		Increase Commute by Mass Transit + Intra-city Shuttle	Additional 13% commute by mass transit (San Marcos CAP Measure T-11: Increase Transit Ridership)	Mass transit: additional 249,792 commuters by walking (13% of total regionwide jobs) One-way commute distance by mass transit: 10.4 miles Intra-city Shuttle: Adopted CAP commitment carry over
		Parking Reduction	50% reduction in residential parking space requirements = 25% VMT reduction per household	14 miles avoided per day (25% of household VMT) per household of the housing units in 2021

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide	
			CAP Measure and Assumptions	Application to the Region for Year 2035
			(Lemon Grove CAP Measure T-11: Reduce Residential Parking Requirements Near Trolley Station)	SANDAG Regional Plan Mobility Hubs (743,711 units)
		Commute TDM Strategies	Additional 10% commuters using alternative modes = additional 10% commuters not driving alone (Carlsbad CAP Measure K: Promote Transportation Demand Management Strategies)	Additional 192,147 commuters not driving alone (10% of total regionwide jobs) One-way driving distance avoided: 10.9 miles
		Increase Commute By Vanpool	Additional 19% commute by vanpool (Solana Beach CAP Measure T-2: Increase Commuting by Vanpools to 20 percent of Labor Force)	Additional 365,080 commuters by bicycling (19% of total regionwide jobs) One-way commute distance by vanpool: 25 miles Number of people per vanpool: 6
	Fuel Use Reductions	Fuel Reduction from Traffic Calming Policies	Equivalent to 0.25% reduction in VMT (Carlsbad CAP: General Plan Policies and Measures - Traffic Calming)	Equivalent to 0.25% VMT reduction in regional LDV VMT
		Vehicle Retirement	446 MT CO_2e avoided from replacing 1,600 vehicles (County of San Diego CAP: Measure T-3.3 Develop a Local Vehicle Retirement Program)	Equivalent to 2,973 MT CO_2e GHG avoided regionwide by replacing 10,667 vehicles (15% of regionwide VMT is from County of San Diego)
	Alternative Fuel Vehicles and Equipment	Increase City-wide electric vehicle miles driven	Increase citywide electric vehicle miles driven to 30% total miles (Del Mar CAP Goal 16: Increase percentage of vehicle miles traveled driven by electric and alternative fuel vehicles & Solana Beach CAP Measure T-1 Increase electric vehicles and alternative fuel vehicles miles traveled to 30 percent of total vehicle miles traveled)	30% regional LDV VMT is electric
		Increase alternative fuel vehicles in municipal fleet	90% reduction in municipal gasoline fleet GHG emissions (San Diego CAP Action 2.3 Present to City Council for Consideration a Municipal Alternative Fuel Policy)	90% of reduction in municipal gasoline fleet emissions. Municipal gasoline fleet emissions is 0.4% of regionwide transportation GHG emissions.

Table A.2 Best Adopted CAP Commitment Applied Regionwide – Decarbonize Buildings

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Decarbonize Buildings	Electrification	Electrify New Residential Construction	All-electric new residential (single-family and multi-family) construction after 2023 (Lemon Grove CAP Measure E-6: Require New Residential Uses to be All-Electric and Generate Renewable Energy On-Site)	New housing units from 2023 to 2035 regionwide: 163,351 196 therms of natural gas avoided and 1,680 kWh of electricity added per new Energy Code-compliant unit (average of single-family and multifamily unit in Climate Zone 7 and 10)
	Energy Efficiency	Residential Energy Retrofit	50% energy reduction at 30% existing homes (single-family and multifamily) (Carlsbad CAP Measure D: Encourage Single-Family Residential Efficiency Retrofits & Measure E: Encourage Multi-family Residential Efficiency Retrofits)	15% reduction in regionwide residential energy use = 106 therms of natural gas avoided and 1,989 kWh of electricity avoided per home (50% of average regionwide household energy use)
		Non-residential Energy Retrofit	40% energy reduction at 30% existing commercial spaces (Carlsbad CAP Measure F: Encourage Commercial and City Facility Efficiency Retrofits)	12% reduction in regionwide commercial energy use
		Residential Water Heater Retrofit	25% of existing homes retrofitted with solar water heating (Solana Beach CAP Measure E-5: Solar Hot Water Heating at 25 Percent of new homes and home retrofits)	112 therms avoided per natural gas water heater retrofit (60% of water heaters are natural gas); and 2,300 kWh avoided per electric water heater retrofit (40% water heaters are electric).
		Non-residential Solar Water Heater Retrofit	20% of existing commercial spaces retrofitted with solar water heating (Solana Beach CAP Measure E-4: Solar Hot Water Heating at 20 Percent of existing commercial spaces)	6% of total commercial energy use is from water heating. 10% of reduction in water heating energy use per retrofit.

Table A.3 Best Adopted CAP Commitment Applied Regionwide – Decarbonize the Electricity Supply

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Decarbonize Electricity Supply	Grid Supply	Community Choice Energy (CCE) Program	100% renewable or zero carbon electricity (Encinitas CAP City Action RE-1: Establish a Community Choice Energy Program & Escondido CAP Measure E-5.3 Increase Grid-supply Renewable and/or Zero Carbon Electricity)	95% of the SDG& bundled load in the region would switch to CCE with 100% renewable or zero carbon electricity (zero GHG emissions)

Table A.4 Best Adopted CAP Commitment Applied Regionwide – Natural Climate Solutions

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide (with City of San Diego draft 2020 CAP)	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Natural Climate Solutions	Carbon Removal and Storage	Urban Tree Planting or Urban Canopy Cover	Achieve 35% urban canopy cover (Del Mar CAP Goal 22: Urban Tree Planting & San Diego CAP Measure 5.1 Urban Tree Planting Program)	35% of developed area in the region would have urban canopy cover.

Table A.5 Best CAP Commitment with Draft San Diego 2022 CAP Applied Regionwide – Decarbonize Transportation Pathway

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide (with City of San Diego draft 2020 CAP)	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Decarbonize Transportation	VMT Reductions	Bike, Walk, and Complete Street	25% walking (11% beyond projected) and 10% (8% beyond projected) cycling mode share of all San Diego residents' trips (San Diego Draft 2022 CAP Measure 3.1: Safe and Enjoyable Routes for Pedestrians and Cyclists)	Cycling: Additional 304,109 trips by cycling (8% of regionwide population, and one trip per day), one-way trip distance: 2.9 miles Walking: Additional 398,238 trips by walking (11% of regionwide population, and one trip per day), one-way trip distance: 0.8 mile
		Mass Transit + Intra-city Shuttle	15% (10% beyond projected) transit mode share of all San Diego residents' trips (San Diego Draft 2022 CAP Measure 3.2: Increase Safe, Convenient, and Enjoyable Transit Use)	Transit: Additional 347,553person trips by walking (10% of regionwide population, and one trip per day), one-way trip distance: 7.9 mile Intra-city Shuttle: Existing CAP commitment carry over
		Smart Growth Development and Parking Reduction	15% VMT (commuter and non-commuter) reductio per capita (San Diego Draft 2022 CAP Measure 3.5: Climate-Focused Land Use and Measure 3.6: Vehicle Management)	15% reduction below 2016 regional wide baseline VMT per capita: 25.6 miles per capita per day
		Commute TDM Strategies	6% citywide VMT reduction through telecommute (San Diego Draft 2022 CAP Measure 3.3: increase Telecommuting)	6% regionwide VMT reduction
	Fuel Use Reductions	Fuel Reduction from Traffic Calming Policies	Equivalent to 0.25% reduction in VMT (Carlsbad CAP: General Plan Policies and Measures - Traffic Calming)	Equivalent to 0.25% VMT in regional LDV VMT
	Alternative Fuel Vehicles and Equipment	Increase alternative fuel vehicles in municipal fleet	81% reduction in municipal gasoline fleet GHG emissions (San Diego Draft 2022 CAP Measure 2.2: Increase Municipal Zero Emission Vehicles)	81% of reduction in municipal gasoline fleet emissions. Municipal gasoline fleet emissions is 0.4% of region-wide transportation GHG emissions.
		Increase City-wide electric vehicle miles driven	Increase citywide electric vehicle miles driven to 30% total miles (Del Mar CAP Goal 16: Increase percentage of vehicle miles traveled driven by electric and alternative fuel vehicles & Solana Beach CAP Measure T-1 Increase electric vehicles and alternative fuel vehicles miles traveled to 30 percent of total vehicle miles traveled)	30% regional LDV VMT is electric

Table A.6 Best CAP Commitment with Draft San Diego 2022 CAP Applied Regionwide – Decarbonize Building Pathway

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide (with City of San Diego draft 2020 CAP)	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Decarbonize Buildings	Electrification	Electrify New Homes	All-electric new residential (single-family and multi-family) construction after 2023 (Lemon Grove CAP Measure E-6: Require New Residential Uses to be All-Electric and Generate Renewable Energy On-Site & San Diego Draft 2022 CAP Measure 1.2 Decarbonize New Building Development)	New housing units from 2023 to 2035 regionwide: 163,351 196 therms of natural gas avoided and 1,680 kWh of electricity added per new Energy Code-compliant unit (average of single-family and multifamily unit in Climate Zone 7 and 10)
		Electrify New Nonresidential Buildings	All-electric reach code starting 2023 at new commercial development (San Diego Draft 2022 CAP Measure 1.2 Decarbonize New Building Development)	0.5% of annual regionwide commercial natural gas use is from new construction and avoided starting 2023. Regionwide commercial natural gas use is about 33% of total energy use.
	Decarbonize Existing Buildings/ Energy Efficiency	Residential Energy Retrofit (Electricity savings only)	50% energy reduction at 30% existing homes (single-family and multifamily) (Carlsbad CAP Measure D: Encourage Single-Family Residential Efficiency Retrofits & Measure E: Encourage Multi-family Residential Efficiency Retrofits)	15% reduction in regionwide residential electricity use, 1,989 kWh of electricity avoided per home (50% of average regionwide household energy use)
		Non-residential Energy Retrofit (Electricity savings only)	40% energy reduction at 30% existing commercial spaces (Carlsbad CAP Measure F: Encourage Commercial and City Facility Efficiency Retrofits)	12% reduction in regionwide commercial electricity use
		Residential Solar Water Heater Retrofit (Electricity savings only)	25% of existing homes retrofitted with solar water heating (Solana Beach CAP Measure E-5: Solar Hot Water Heating at 25 Percent of new homes and home retrofits)	2,300 kWh avoided per electric water heater retrofit (40% water heaters are electric).
		Non-residential Solar Water Heater Retrofit (Electricity savings only)	20% of existing commercial spaces retrofitted with solar water heating (Solana Beach CAP Measure E-4: Solar Hot Water Heating at 20 Percent of existing commercial spaces)	6% of total commercial energy use is from water heating. 10% of reduction in water heating energy use per retrofit.
		Decarbonize Existing Buildings	Phase out 90% of natural gas from existing buildings (San Diego Draft 2022 CAP Measure 1.1 Decarbonize Existing Buildings)	Phase 90% remaining natural gas use (remaining after electrify new constructions and decarbonize municipal operations)

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide (with City of San Diego draft 2020 CAP)	
			CAP Measure and Assumptions	Application to the Region for Year 2035
		Retrofit/ Decarbonize Municipal Building	Phase out 100% natural gas use in municipal facilities (San Diego Draft 2022 CAP Measure 1.3 Decarbonize City Facilities)	2% of regionwide nonresidential natural gas use is municipal natural gas use. Phase out 100% is equivalent to approximately 7 million therms in 2035.

Table A.7 Best CAP Commitment with Draft San Diego 2022 CAP Applied Regionwide – Decarbonize Electricity Supply

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide (with City of San Diego draft 2020 CAP)	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Decarbonize Electricity Supply	Utility Scale Energy	Community Choice Energy (CCE) Program	100% renewable or zero carbon electricity (Encinitas CAP City Action RE-1: Establish a Community Choice Energy Program, Escondido CAP Measure E-5.3 Increase Grid-supply Renewable and/or Zero Carbon Electricity, & San Diego Draft 2022 CAP Measure 2.1: Citywide Renewable Energy Generation)	95% of the SDG&E bundled load in the region would switch to CCE with 100% renewable or zero carbon electricity (zero GHG emissions)

Table A.8 Best CAP Commitment with Draft San Diego 2022 CAP Applied Regionwide – Natural Climate Solutions

Decarbonization Pathway	Policy Category	Policy Subcategory	Best Adopted CAP Commitment Applied Regionwide (with City of San Diego draft 2020 CAP)	
			CAP Measure and Assumptions	Application to the Region for Year 2035
Natural Climate Solutions	Carbon Removal and Storage	Urban Tree Planting or Urban Canopy Cover	Achieve 35% urban canopy cover (Del Mar CAP Goal 22: Urban Tree Planting & San Diego Draft CAP Measure 5.2 Tree Canopy)	35% of developed area in the region would have urban canopy cover.
		Salt Marsh Land Restoration	Restore 700 acres of salt marsh, other associated tidal wetland and riparian habitats (San Diego Draft 2022 CAP Measure 5.2 Tree Canopy)	Same as left

Appendix 8.B Supporting Material for Decarbonize Transportation Policy Assessment

B.1 Overlap or Gaps Between CAP Actions and Key Opportunities Identified in Chapter 3

Chapter 3 identified key actions to address two main areas of on-road transportation GHG reduction. These are listed in Table 8.B.1 The extent to which these actions appear as CAP policies, and whether they are quantified for GHG reduction, are also shown.

Table 8.B.1 Overlap Between CAPs and with Key Opportunities Identifies in Chapter 3

Key Actions Chapter 3	Equivalent CAP Policy Category and Number of CAPs Addressing	# of CAPs with Quantified GHG Reduction Amount	Challenges as Identified in CAPs	Local Opportunity?
VMT Reduction Actions				
Expand geographic reach and service hours of bus and rail services in areas where development can support transit use	Mass transit	1	Y - Requires regional cooperation	
Provide incentives and regulatory relief to facilitate higher density infill and transit-oriented development	Permit and CEQA streamlining (regulatory relief) for projects;	2	Local resistance to infill, higher density and transit-oriented development	Y
Disincentivize development in rural (or non-infill) areas that cannot support efficient transit use or multi-modal transportation options	Not addressed in CAPs	0	Not addressed in CAPs	Y
In existing rural, non-infill, or underserved transit areas, invest in TNC partnerships prioritizing electric and high-occupancy vehicles to ensure sufficient access to opportunities	Not addressed in CAPs	0	Not addressed in CAPs	Y

Key Actions Chapter 3	Equivalent CAP Policy Category and Number of CAPs Addressing	# of CAPs with Quantified GHG Reduction Amount	Challenges as Identified in CAPs	Local Opportunity?
Investigate opportunities to implement pricing structures (cordon pricing, HOT lanes, etc.) that incentivize high occupancy vehicles	Not addressed in CAPs	0	1. Regional cooperation/authority; 2. Pricing is used for larger roads (arterials and freeways) over which local jurisdictions have no authority; 3. Even at the regional level, road pricing faces local resistance	N
Adopt pedestrian-oriented design guidelines for all new development; reduce or remove parking minimums in walkable neighborhoods	Bike, walk, complete streets; parking reduction	16 CAPs address bike, walk complete streets, 4 address parking reduction as a requirement or CIP	Local resistance to removing parking or road diets to accommodate complete streets	
Update county bicycle and pedestrian planning documents; partner with SANDAG to accelerate implementation of 2010 San Diego Regional Bicycle Plan; develop Pedestrian Safety and/or Vision Zero and/or Local Road Safety Plan	Bike, walk, complete streets; specific to unincorporated County	Not addressed in CAPs	Needs assessment since distances are large, may be practical only in urbanized areas	Y
Partner with SANDAG to build out a network of Mobility Hubs where shared vehicles and new mobility services can be found	Smart growth	3 CAPs address micromobility; SANDAG quantifies GHG reductions from shared mobility	Local resistance to micromobility services; regional cooperation to establish mobility hubs	Y
Develop County TDM ordinance and Transportation Management Organization (TMO) to work with employers and service providers	County specific - Commuter TDM	Half the CAPs address commuter TDM	-	Y

Key Actions Chapter 3	Equivalent CAP Policy Category and Number of CAPs Addressing	# of CAPs with Quantified GHG Reduction Amount	Challenges as Identified in CAPs	Local Opportunity?
Conduct broadband gap analysis; seek funding to improve communications infrastructure in areas that lag; require enhanced communication technology in all new development through TDM ordinance	Not addressed in CAPs	Not addressed in CAPs	-	Y
Conduct electrified freight study to understand where opportunities for distribution efficiencies exist; modify zoning code to encourage distribution centers in efficient locations	Not addressed in CAPs	Not addressed in CAPs	-	Y for some CAPs where freight transport is an issue
Electrification Actions				
Set and meet aggressive public EV charging target	Alternative Fuels,	n/a	"Aggressive" needs definition. Assess A2Z gap report versus CAP public charging targets.	Y – see also "Best commitment" Scenario EV numbers in 2035
Set and meet aggressive (100%) fleet adoption target	Alternative fuels in municipal fleets	8	-	Y
Require new development to include EV charging	Alternative Fuels,	12	-	Y
Require existing development to retrofit parking with EV charging	Alternative Fuels,	12	-	Y
Increase dollar value and streamline consumer vehicle purchase incentives with application to both new and used vehicles	Alternative Fuels	4	-	Y

Key Actions Chapter 3	Equivalent CAP Policy Category and Number of CAPs Addressing	# of CAPs with Quantified GHG Reduction Amount	Challenges as Identified in CAPs	Local Opportunity?
Increase dollar value of incentives, provide educational resources, and streamline permitting process for landowners to install EV charging in multi-family developments	Alternative Fuels,	4	-	Y
Partner with educational institutions to assess workforce training needs; increase funding to existing programs	Alternative Fuels,	0	-	Y
Continue to partner with A2Z Collaborative to share information and successful implementation strategies across jurisdictions, advocate for funding and coordination at the state level	Alternative Fuels,	0	Evaluation/cooperation	Y