APPENDIX II

Opportunities for Local Carbon Offset Credits in the Electricity and Natural Gas Categories

A Preliminary Review of Regulations and Protocols Related to End-Use and Supply

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EPIC
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About EPIC

The Energy Policy Initiatives Center is a research center of the USD School of Law that studies energy policy issues affecting California and the San Diego region. Energy Policy Initiatives Center's mission is to increase awareness and understanding of energy- and climate-related policy issues by conducting research and analysis to inform decision makers and educating law students.

For more information, please visit the Energy Policy Initiatives Center website at www.sandiego.edu/epic.

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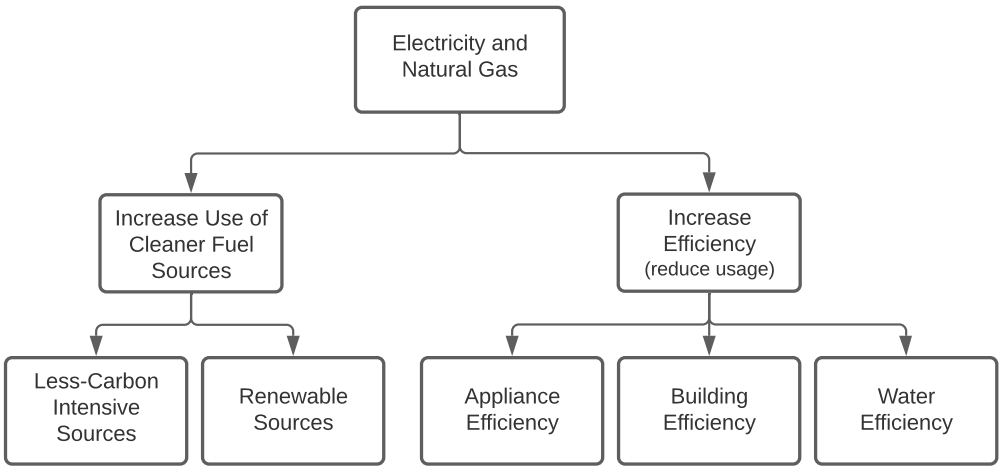
1 INTRODUCTION

The electric and natural gas categories account for about 30% of regional emissions.[1] Of this total, about 20% is from electricity, and 10% from natural gas end uses. The commercial sector generally consumes the most electricity, while the residential sector consumes the most natural gas in the San Diego region. Combining electricity and natural gas on a normalized basis (million British Thermal Units), the commercial sector consumes the most energy overall.

Emissions from the electricity and natural gas category are a function of the type of fuel supplied and the quantity consumed (Figure 1). For each of these, there are several methods to reduce emissions. On the supply side, policies to promote renewable electricity supply (e.g., solar photovoltaics) are separate from those to promote renewable natural gas or green hydrogen blending. Efficiency policy, on the other hand, often addresses both electricity and natural gas at the same time. For example, new building standards affect both natural gas and electric usage.

Figure 1 Electricity and Natural Gas Emissions Framework



1.1 Project Purpose and Methods

The goal of this project is to identify project opportunities to reduce or remove GHG emissions in the San Diego region that could be used to generate carbon offset credits (offset credits). To support this overall goal, the Energy Policy Initiatives Center (EPIC) identified categories of GHG emissions in the San Diego region; identified activities to reduce or remove emissions; identified related regulations that require such activities; identified related offset credit protocols; evaluated these protocols based on applicability to conditions in the San Diego region and the number of projects developed in the United States (U.S.), California, and the San Diego region; and, determined whether the offset credit protocols and related activities would be considered

[1] San Diego Association of Governments, San Diego Forward: The Regional Plan, Appendix D 2012 Regional Greenhouse Gas Emission Inventory for the San Diego Region and Projections, 2015, p. 26: https://www.sdforward.com/pdfs/RP_final/AppendixD-2012GreenhouseGasEmissionsInventoryfortheSanDiegoRegionandProjections.pdf (Note this is the last publicly available estimate of regional emissions.)

additional to what would have happened otherwise. The additionality determination is based on a two-part test. The legal requirement test determines whether the activity is required by legislation or regulation, or otherwise legally mandated. The common practice test determines whether the project activity is considered a common practice and would have happened otherwise for financial or technological reasons. A more detailed discussion of the project approach is provided in Section 3 of the main project report.

This report summarizes the findings of this analysis for the electric and natural gas categories.

1.2 Key Findings for Electricity and Natural Gas Category

California's electric and natural gas emissions category is heavily regulated both in terms of federal, state, and local mandates for electricity supply, regulation of end-use usage for buildings and appliances, and direct and indirect regulations of emission sources. This results in complexity when determining whether opportunities to reduce emissions are additional and, if so, who owns the emission reduction. The following describes these key findings:

- There are Limited Opportunities for Local Offset Credit Projects in the Electric and Natural Gas Category - There are limited opportunities using existing protocols for additional offset credits in the electric and natural emissions category in the San Diego region. This is due to high levels of regulation and common practices around electricity supply and end-use efficiency.
- The Federal Government, State of California, and Local Governments Regulate Electricity Supply, Energy End-use, and Related Emissions - Electricity supply and end-use and Natural Gas end-use are highly regulated sectors of the economy by local, state, and federal governments. California operates under various mandates, including Cap-and-Trade, renewable portfolio standard (RPS), carbon-free electricity supply mandate by California for 2045 and local governments ranging from 2030-2035, Low-Carbon Fuel Standard (LCFS), and appliance and building energy end-use regulations that capture or will capture most of the emission reductions from this sector.
- None of the Carbon Offset Credit Protocols Reviewed are Considered Additional - California's Cap-and-Trade regulation makes determining ownership of electric-related GHG reduction activities challenging. Projects may be additional, but ownership is unclear or expressly limited by the policy of the offset credit program. For example, Verified Carbon Standard's (VCS) policy explicitly addresses projects in jurisdictions with Cap-and-Trade regimes as well as limiting the issuance of offset credits if other GHG-related environmental credits are being sequentially issued for that project (e.g., renewable energy credits). VCS also explicitly excludes certain electricity projects in non-Least Developed Countries related to:
    - Grid-connected renewable energy/heat activities (solar, hydro, wind, geothermal, biomass, fuel switching);
    - Activities for recovery/use of waste heat; and
    - Energy efficiency activities (lighting, transmission lines, transformers).

  Consequently, there are only two energy-related offset projects located in California that use protocols or methods identified for this project (Table 1). Both are Climate Action Reserve (CAR) Pool Cover (Climate Forward) projects, which grant forward mitigation units (FMU) on an *ex ante*

basis. This differs from offset credits, which are granted on an *ex post* basis after it is demonstrated that emissions reductions or removals occurred.[2] While this relative lack of electricity and natural gas projects in California is not definitive, it is indicative of the potential challenge of meeting protocol eligibility requirements.

Table 1 Projects in Active and Applicable Protocols and Additionality Determination in the Electrical and Natural Gas Category

GHG Reduction Activity/Protocols	US	CA	SD Region	Additionality Determination
Energy Efficiency	**19**	**2**	**0**	
CAPCOA Boiler Efficiency Protocol	0	0	0	Likely Not Additional
CAPCOA Weatherization of Single and Multi-Family Homes (Verra)	0	0	0	Likely Not Additional
CAR Pool Covers (Climate Forward)	2	2	0	Likely Not Additional
VCS AMS-II.E.: Energy Efficiency and Fuel Switching Measures for Buildings, Version 12.0 (Efficiency only)*	1	0	0	Likely Not Additional
VCS AMS-II.J.: Demand-side Activities for Efficient Lighting Technologies, Version 7.0 (Small-scale only)	1	0	0	Likely Not Additional
VCS VM0008 Weatherization of Single Family and Multi-Family Buildings	4	0	0	Likely Not Additional
VCS VM0018 Energy Efficiency and Solid Waste Diversion Activities within a Sustainable Community*	0	0	0	Likely Not Additional
VCS VM0025 Campus Clean Energy and Energy Efficiency (Efficiency only)*	11	0	0	Likely Not Additional
VCS VMR0005 Methodology for Installation of Low-Flow Water Devices	0	0	0	Not Additional
Renewable Electricity	**1**	**0**	**0**	
CAPCOA Biomass to Energy	0	0	0	Likely Not Additional
VCS ACM0022: Alternative Waste Treatment Processes, Version 2.0*	1	0	0	Likely Not Additional
Total	**20**	**2**	**0**	

*Protocol included in more than one category.

[2] Note that the Climate Action Reserve (CAR) Solar Photovoltaics (PV) (Climate Forward) methodology is undergoing an update and is on hold.

2 LEGISLATION AND REGULATION

Emissions from the electricity and natural gas sectors are regulated at the federal, state, and local levels. State regulations are both independent and build off or fill gaps in federal regulations. Legislation and regulation in this area address activities to reduce the carbon intensity of both electricity generation and natural gas supply and reduce usage, including the following:

- Reduction of Emissions Caused or Related to Electricity Supply: 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.[3] The RPS and local government mandates on renewable energy content of electricity supply further decrease the carbon intensity of electricity. The carbon intensity of the electricity supply also impacts the value of offset credits under the LCFS, a statewide regulation with the same impact as Cap-and-Trade on ownership and additionality of offset protocols. Additionally, efforts continue to increase the thermal efficiency of natural gas power plants through improved heat rates.
- Reduction of Emissions From Natural Gas: California's Cap-and-Trade program regulates covered entities that include suppliers of natural gas that emit 25,000 metric tons or more of CO_2e per data year.[4] Additionally, California and Federal regulations address emissions from methane flaring, combustion, and leaks from natural gas extraction, processing, interstate and intrastate pipelines, and natural gas storage facilities.
- Adding Less Carbon Intensive Fuel Supplies to Existing Natural Gas Supply: With the lack of available renewable natural gas, blending renewable natural gas and renewable hydrogen decreases the emission intensity of the delivered natural gas. Current efforts seek to determine the best mixture of renewable hydrogen and natural gas to ensure BTU standards for the commodity. There are also efforts to use only renewable hydrogen to power fuel cells for self-generation or to supply large power generation units with zero-carbon fuel inputs. The carbon intensity of natural gas supply also impacts the value of offset credits under the LCFS, again with the same impact as Cap-and-Trade on ownership and additionality of offset protocols.
- Banning New Natural Gas Infrastructure: Several local jurisdictions banned the construction of natural gas infrastructure for new construction.[5] These actions seek to eliminate natural gas as an end-use and drive building electrification.
- Energy Efficiency for Buildings: Emission reductions from buildings target onsite and end-use energy consumption. The state and local governments set energy efficiency targets and mandates, including all-electric requirements for new construction and alterations and additions to existing buildings.
- Energy Efficiency for Appliances: Federal and state statutes and regulations set appliance and other equipment energy efficiency standards. These standards determine what products are

[3] 17 California Code of Regulations (CCR) § 95811 (a)–(b).
[4] Ibid.
[5] The Cities of Berkeley, Morgan Hill, San Jose, and Santa Cruz mandated natural gas infrastructure bans either through direct bans or all-electric requirements for new single family, low-rise single family, high-rise multifamily, and commercial buildings in 2019 and 2020.

available for purchase and help to determine the emission reduction that can be achieved from specific energy end-uses. These technologies also help to set emission and energy reduction targets at the state level.

The following sections summarize related legislation and regulation related to the electricity and natural gas emissions category.

2.1 Federal

Federal law and regulation cover electricity generation, natural gas activities, energy efficiency.

2.1.1 Electricity Generation

United States Environmental Protection Agency (U.S. EPA) regulates both criteria pollutants[6] and GHG emissions for both existing power plants and new or modified power plants under the Clean Air Act (CAA). In January 2021, the D.C. Circuit struck down the Affordable Clean Energy (ACE) rule, which regulated emissions from existing power plants.[7] Existing fossil fueled power plants are regulated under Section 111(d)[8] of the CAA. In 2018, U.S. EPA adopted the ACE Rule,[9] which repealed the Clean Power Plan (CPP). The ACE rule required states to allow coal-fired power plants to use prescribed technologies to improve efficiency through better heat rates. The improved heat rate was considered the best system of emission reduction for carbon dioxide under the rule. Consequently, there is no effective federal regulation of CO_2 under the CAA for existing power plants. Emissions limits for existing power plants are now under development pursuant to CAA Section 111(d).

U.S. EPA finalized on January 1, 2021, a revised rule for new, modified, and reconstructed power plants under CAA Section 111(b)[10] that amends existing requirements that set New Performance Source Performance Standards (NSPS) to limit CO_2 emissions from fossil fuel-fueled power plants. Existing requirements set new natural gas power plant CO_2 emissions at no more than 1,000 lbs. of CO_2 per megawatt hour (MWh) for electricity produced, mandating the use of combined cycle technology, and new coal plants limited to no more than 1,400 pounds CO_2/MWh, likely requiring carbon sequestration. The proposed rule would:

- Require best system of emissions reduction for:
    - Newly constructed large units equivalent to a super-critical coal plant: emissions rate of 1,900 lbs CO2/MWh; and
    - Newly constructed small units: 2,000 lbs CO2/MWh.

[6] See 40 Code of Federal Regulations (CFR) Part 60 Subpart Da (Standards of Performance for Electricity Steam Generation Units).
[7] *American Lung Association v. Environmental Protection Agency*, 985 F.3d 914 (2021).
[8] 42 United States Code Annotated (U.S.C.A.) § 7411 (a) & (d).
[9] United State Environmental Protection Agency, Affordable Clean Energy Rule, last visited March 25, 2021: https://www.epa.gov/stationary-sources-air-pollution/affordable-clean-energy-rule.
[10] 42 U.S.C.A. § 7411(f); Federal Register, 86 FR 2542, 2542-2558: https://www.federalregister.gov/documents/2021/01/13/2021-00389/pollutant-specific-significant-contribution-finding-for-greenhouse-gas-emissions-from-new-modified.

- Create separate performance standards for newly constructed and reconstructed coal refuse-fired units at an emissions rate of 2,200 lbs CO2/MWh.
- Revise the standards of performance for reconstructed power plants to be consistent with the emission rates of newly constructed units.[11]

It is likely that this proposed rule will be withdrawn or amended by the new Biden Administration.

2.1.2 Natural Gas Regulation

The U.S. EPA made the following revisions to natural gas regulations over the last four years.

- National Environmental Quality Act (NEPA) Amendments: On July 20, 2020, U.S. EPA finalized a rule that: 1) may limit or eliminate consideration of climate change by removing the distinction between indirect and direct effects and eliminating the cumulative effect requirement; 2) restrict analysis of impacts to "reasonably close relationship" to the proposed project; and 3) redefines "significantly" that may limit environmental review.[12]
- Amendment to Methane Standards for Oil and Gas Facilities: On August 13, 2020, U.S. EPA finalized a rule that: 1) rescinded the New Source Perform Standards (NSPS) for methane emissions related to facilities used in the production, processing, transmission, and storage of oil and natural gas; and 2) rescinded standards for volatile organic compounds (VOC) emission from facilities used in oil and natural gas transmission and storage (VOC standards for production and processing facilities remained in effect).[13]
    - Amendments to VOC standards: On August 13, 2020, U.S. EPA finalized a rule amending various VOC standards with the likely effect of diminishing the effectiveness of controlling pollutions from these sources.[14]

  Please note: On April 28, 2021, the U.S. Senate voted to repeal these rules in Senate Joint Resolution 14 under the Congressional Review Act. The House must still vote on the resolution and, if passed, the resolution must be signed by President Biden.[15]

[11] See Federal Register, 83 FR 65424, 2018–27052: https://www.federalregister.gov/documents/2018/12/20/2018-27052/review-of-standards-of-performance-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed

[12] See Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR Parts 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1515, 1516, 1517, and 1518 (2020): https://www.govinfo.gov/content/pkg/FR-2020-07-16/pdf/2020-15179.pdf; See also CEQ: NEPA.gov, Last Visited February 18, 2021: https://ceq.doe.gov/laws-regulations/regulations.html.

[13] See United States Environmental Protection Agency Final Rule amending 40 CFR Part 60 (2020), EPA-HQ-OAR-2017-0757: https://www.epa.gov/sites/production/files/2020-08/documents/frn_oil_and_gas_review_2060-at90_final_20200812_admin_web.pdf.

[14] See United States Environmental Protection Agency, Final Rule amending 40 CFR Part 60 (2020), EPA-HQ-OAR-2017-0483: https://www.epa.gov/sites/production/files/2020-08/documents/frn_og_reconsideration_2060-at54_final_rule_20200812_admin_web.pdf.

[15] Senate Joint Resolution 14 - A joint resolution providing for congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Environmental Protection Agency relating to "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review": https://www.congress.gov/bill/117th-congress/senate-joint-resolution/14.

- Bureau of Land Management (BLM) Amendment to Methane Waste Prevention Rule: On September 18, 2018, BLM amended this rule to reinstate Pre-2016 regulations (known as NTL-4A). The 2016 version of the rule prevented loss of natural gas through venting, flaring, and leaks on public land. The amended rule affects a large number of oil and natural gas operations, eliminates restrictions on natural gas venting and flaring, delays detection and repair of natural gas leaks. This will likely result in increased methane emissions from venting, flaring, and leaks.[16]
- Pipeline and Hazardous Materials Safety Administration (PHMSA) Relaxing Pipeline Regulations during Pandemic: PHMSA announced March 20, 2020, that it will exercise its discretion to enforcement of pipeline safety regulation, including leak detection and repair.[17] This may result in increased emissions.

It is likely that these rules and actions will be withdrawn or amended by the new Biden Administration.

2.1.3 Energy Efficiency

The U.S. Department of Energy sets various appliance and equipment energy efficiency standards that preempt state and local requirements as authorized by the Energy Policy and Conservation Act (EPCA).[18] These include:

- Residential/Consumer: Furnaces, central air conditioners and heat pumps, refrigerators and freezers, dishwashers, microwave ovens, televisions, battery chargers, ceiling fan;
- Commercial: Commercial package air conditioners and heat pumps, water heating equipment, refrigerated beverage vending machines, walk-in freezers, electric motors;
- Lighting: Compact fluorescent lamps, incandescent lamps, light-emitting diode (led) lamps, illuminated exit signs, traffic signal modules, and pedestrian modules;
- Regional Efficiency Standards: Sets regional minimum efficiency standards for cooling efficiency (central HVAC and heat pump) and heating efficiency (electric heat pump; oil and gas heating furnaces).[19]

2.2 State

The State of California regulates electricity generation, natural gas and hydrogen production and transmission, and energy efficiency.

2.2.1 Electricity Generation

California regulates electric generation both by mandating renewable energy procurement for supply and capping GHG emissions from regulated facilities under Cap-and-Trade. California's

[16] See Bureau of Land Management (BLM) Final Rule Amendment and Rescission of 43 CFR Parts 3160 and 3170, RIN 1004-AE53: https://www.blm.gov/sites/blm.gov/files/Final%20Rule%20-1004-AE53%20-%20%20Ready%20for%20OFR%209.18.18_508%20%281%29.pdf.
[17] See U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, PHMSA Stay of Enforcement – COVID 19, March 20, 2020: https://www.phmsa.dot.gov/news/phmsa-stay-enforcement-covid-19.
[18] See 42 United States Code (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).
[19] See 10 CFR Parts 430, 431, & 429.

Renewable Portfolio Standard (RPS) requires procurement of 60% renewable energy supply by 2030 for all load-serving entities. Senate Bill 100 (De León, Chapter 312, Statutes of 2018) also mandates that load-serving entities procure 100% carbon-free electricity by 2045, building off of a long history of both increasing renewable content and long-term contract requirements for all load-serving entities[20] with specific procurement programs for investor owned utilities (IOUs), particularly for bioenergy and biogas.[21] Notably, because Assembly Bill 327 (Perea, Chapter 611, Statutes of 2013) authorized the California Public Utilities Commission (CPUC) to approve IOU procurement beyond the RPS requirements, SDG&E sought and received approval to procure approximately 50% of the load from renewable energy contracts by 2020.[22] Further, Cap-and-Trade regulates all cogeneration, self-generation of electricity, stationary combustion, and first deliverers of electricity that emit more than 25,000 metric tons of CO_2e.[23]

2.2.2 Natural Gas and Hydrogen

California natural gas policy and requirements both promote stable natural gas supply generally and develop supply from biomethane or renewable natural gas (renewable natural gas is discussed more in Appendix I: Agricultural), including setting procurement targets for IOUs.[24] To this end, California redefined biomethane more broadly to increase supply for existing biomethane procurement policies.[25] Additionally, Cap-and-Trade directly regulates suppliers of natural gas (either distributors or users), suppliers of liquefied petroleum gas, and suppliers of liquified natural gas and compressed natural gas that emit more than 25,000 metric tons of CO_2e.[26]

California regulates natural gas distribution and storage through existing regulations per Assembly Bill 1496 (Thurmond, Chapter 604, Statutes of 2015) for monitoring, Senate Bill 1371 (Leno, Chapter 525, Statutes of 2014) and Senate Bill 887 (Pavley, Chapter 673, Statutes of 2016) for leak abatement, and Senate Bill 605 (Lara, Chapter 523, Statutes of 2014) and Senate Bill 1383 (Lara, Chapter 395, Statutes of 2016) for short-lived climate pollutant methane reduction. Per these mandates, the California Air Resources Board (CARB) is in the process of monitoring and measuring high-emission methane "hot spots" and conducting lifecycle GHG emission analysis for natural gas

[20] See Senate Bill 1078 (Sher, Chapter 516, Statutes of 2002); Senate Bill 107 (Sher, Chapter 516, Statutes of 2006); Assembly Bill 327 (Perea, Chapter 611, Statutes of 2013), Senate Bill 2 (1X) (Simitian, Chapter 1, Statutes of 2011); and Senate Bill 350 (De León, Chapter 547, Statutes of 2015).
[21] See Senate Bill 1122 (Rubio, Chapter 612, Statutes of 2012); Senate Bill 43 (Wolk, Chapter 413, Statutes of 2013); Senate Bill 793 (Wolk, Chapter 587, Statutes of 2015); Senate Bill 820 (Hertzber, Chapter 166, Statutes of 2016); Senate Bill 901 (Dodd, Chapter 626, Statutes of 2018); Assembly Bill 1923 (Wood, Chapter 663, Statutes of 2016); and Assembly Bill 1979 (Bigelow, Chapter 665, Statutes of 2016), among others.
[22] Note that while not all of this renewable energy has been delivered by 2020, the supply is under contract and will likely increase SDG&E renewable power content as customers depart for community choice aggregators or direct access electric service providers subject to sale or allocation of this energy or the underlying contracts to another LSE through the Power Charge Indifference Adjustment (PCIA) rulemaking and approved process.
[23] 17 CCR §§ 95810 & 95812(c).
[24] See Assembly Bill 2313 (Williams, Chapter 571, Statutes of 2016); Senate Bill 1440 (Hueso, Chapter 739, Statutes of 2018); see also Assembly Bill 1900 (Gatto, Chapter 602, Statutes of 2012).
[25] See Senate Bill 1440 (Hueso, Chapter 739, Statutes of 2018); Assembly Bill 3163 (Salas, Chapter 358, Statutes of 2020).
[26] 17 CCR §§ 95810 & 95812(c).

produced in and imported into California.[27] The CPUC is mandated to adopt rules and procedures, in consultation with CARB, to reduce GHG emission from CPUC regulated intrastate transmission and distribution lines.[28] Further, California regulates oil and gas facilities on private, state, and federal land and offshore property by limiting vented gas, unintentional leakage, and fugitive emissions under 17 California Code of Regulations (CCR) §§ 95665 et seq. (Greenhouse Emission Standards for Crude Oil and Natural Gas Facilities).

Finally, California continues to develop policies and rules around the development, procurement, and use of hydrogen. For example, Senate Bill 1369 (Skinner, Chapter 567, Statutes of 2018) designates e-hydrogen[29] procurement as an eligible and carbon-neutral form of energy storage that can be used prospectively in the renewable energy grid or to fuel certain forms of transportation. SB 1369 (2018) authorizes IOU use of this technology to achieve these requirements and state policy.

2.2.3 Energy Efficiency

California's long history with energy efficiency spans decades, with most energy efficiency requirements coming from Title 24 for energy consumption in buildings, Title 20 for energy efficiency in non-preempted appliances, and mandates on electric and natural gas utility administered energy efficiency programs. Over the years, the Legislature further mandated energy efficiency reductions in buildings under Assembly Bill 758 (Skinner, Chapter 470, Statutes of 2009) and by requiring that the CEC and CPUC set targets for statewide energy efficiency to achieve a doubling of energy efficiency savings in electricity and natural gas final end uses of retail customers by 2030 under Senate Bill 350 (De León, Chapter 547, Statutes of 2015). To these ends, Title 24 is updated every three years on a triannual code cycle, while Title 20 is updated regularly for appliance standards.

California also targets specific end-uses for promotion—such as Senate Bill 1414 (Wolk, Chapter 678, Statutes of 2016) to promote energy efficiency compliant HVAC and heat pumps—or to focus energy efficiency priorities on specific sectors through IOU incentives—such as Senate Bill 1131 (Hertzberg, Chapter 562, Statutes of 2018) for customized industrial, agricultural, commercial, residential, and public sector energy efficiency projects. Focused energy efficiency regulations and incentive programs are further implemented through IOU energy programs that are utility territory-specific or that target specific customer classes for demand reduction improvements under legislation such as Assembly Bill 793 (Quirk, Chapter 589, Statutes of 2015). Finally, there are also broad requirements to set energy efficiency standards that include managing energy loads to help maintain electrical grid reliability with implementation through code as well as publicly owned utility (POU) and IOU energy efficiency and demand response or reduction programs.[30]

[27] See Assembly Bill 1496 (Thurmond, Chapter 604, Statutes of 2015).
[28] See Senate Bill 1371 (Leno, Chapter 525, Statutes of 2014).
[29] E-hydrogen is defined as: E-hydrogen is produced by using excess renewable energy to split water to produce hydrogen that can then be stored and used in the future.
[30] See Senate Bill 49 (Skinner, Chapter 697, Statutes of 2019).

2.3 Local

Local governments in the region are acting to require distributed energy resources in the form of rooftop solar for residential and nonresidential new and existing buildings. These measures implement existing Climate Action Plans (CAPs) to reduce GHG emissions onsite. Local governments are also adopting energy efficiency measures to reduce electric and natural gas end uses on residential and nonresidential new and existing buildings. These measures go beyond the Title 24 building energy standards to further reduce emissions. For example, the Cities of Carlsbad and Encinitas have or are in the process of adopting mandates for residential and nonresidential energy efficient and solar PV reach code ordinances. The City of Encinitas is also in the process of developing decarbonization measures in the form of building electrification mandates for both new residential and nonresidential buildings.[31] These are growing trends among local jurisdictions in the state and the San Diego region.

Community Choice Aggregators (CCAs) in the region are also launching to serve large percentages of existing customers in the applicable local government's jurisdictional boundary with higher renewable electricity content power as a base tariff and options for customers to opt up to 100% renewable energy. Many local government CAPs call for 100% renewable energy electricity supply to serve customers by 2030 or 2035.[32] To this end, for example, the City of Encinitas City Council approved "Power 100," a 100% renewable energy power content tariff, as the default electricity service for San Diego Community Power (SDCP) Customers within the City of Encinitas, including municipal accounts.[33] SDCP will phase in municipal accounts in March 2021, commercial and industrial accounts in June 2021, and all residential accounts in January 2022.[34]

Additionally, there are various San Diego Air Pollution Control District (SDAPCD) regulations that address emissions from criteria pollutants with the indirect effect of reducing GHG emissions.[35] These regulations serve as the baseline for emissions reductions already achieved from these types of regulated facilities and equipment.

[31] See City of Encinitas Green Building Ordinances, Draft Ordinance 2021-TBD_revised 5-7-21: https://encinitasca.gov/Government/Departments/City-Manager/Environmental-Services/Climate-Action-Plan/Green-Building-Ordinances.

[32] Example: The City of San Diego is part of five city CCA that will supply customers within the City of San Diego with 100% renewable energy by 2035; City of San Diego Community Choice Aggregator Information, p. 7: https://www.sandiego.gov/sites/default/files/cosd_cca_ppt.pdf.

[33] City of Encinitas, City Council Agenda Report, 2021-02-24, Item #10B, February 24, 2021: https://encinitas.granicus.com/MetaViewer.php?view_id=7&clip_id=2347&meta_id=120211

[34] Id. at p. 2.

[35] See San Diego Air Pollution Control District Rules 68, 68.1, 69, 69.2, 69.2.1, 69.2.2, 69.3, 69.3.1, 69.4.1, 69.5.1, and 69.6.

3 PROTOCOLS

EPIC identified 30 protocols and methodologies related to activities to reduce or eliminate emissions related to electricity and natural gas (Table 2). These activities include carbon capture and storage, energy efficiency, renewable energy, fuel switching, cogeneration/thermal energy, and the other category, which includes two protocols related to improved cookstoves and waste energy recovery. When inactive protocols and those that include activities or geographical requirements not applicable to the San Diego region are screened out, 11 protocols remain. About one-third of the remaining protocols relate to energy efficiency projects.

Table 2 Protocols in the Electricity and Natural Gas Emissions Category

GHG Emissions Subcategory/ Protocol Category	All Protocols Evaluated	Active, Applicable
End-use	**13**	**9**
Energy Efficiency	11	8
Fuel Switching	1	0
Other	1	0
Supply	**17**	**2**
Carbon Capture & Storage	1	0
Fuel Switching	3	0
Other	5	0
Renewable Electricity	1	1
Cogeneration/Thermal Energy Production	7	0
Total	**30**	**11**

Of the total number of identified projects in this category before screening out protocols that are not active or applicable the region, approximately 70% are related to energy efficiency and renewable electricity (Table 3). The vast majority of related projects are in other locations in the U.S., with only three located in California and none in the San Diego region.

Table 3 Projects Related to All Protocols Considered in the Electric and Natural Gas Emissions Category

Protocol Category	US	CA	San Diego Region
Renewable Electricity	28	1	0
Energy Efficiency	20	2	0
Fuel Switching	8	0	0
Carbon Capture & Storage	5	0	0
Cogeneration/Thermal Energy Production	4	0	0
Other	2	0	0
Total	**67**	**3**	**0**

Of the 11 protocols that are active and applicable, there are 20 projects in the U.S., two in California, and none in San Diego. Of the California projects, both are associated with the CAR Climate Forward Pool Cover methodology. The CAR Climate Forward Solar Photovoltaic methodology is on hold pending review and update. This methodology was considered inactive and is thus not shown here.[36]

Table 4 Project Related to Active and Applicable Protocols

Protocol Category	US	CA	San Diego Region
Energy Efficiency	19	2	0
Renewable Electricity	1	0	0
Total	**20**	**2**	**0**

3.1 Verra's Verified Carbon Standard (VCS)

Each carbon offset program has a programmatic standard that sets forth principles and requirements for all aspects of the carbon offset lifecycle—from project eligibility to retirement of carbon offsets. While much of the information in these programs are relevant to project development, key sections are relevant to our analysis here. For example, in some cases, these standards explicitly exclude categories of projects. Verra's VCS excludes projects in non-Least Developed Countries, including the U.S., because these activities are considered financially competitive, no longer need carbon finance, and raise concerns about additionality. In this the Electricity and Natural Gas category, this excludes:

- Grid-connected electricity generation using hydropower plants/units; grid-connected electricity generation using wind, geothermal, or solar power plants/units;
- Utilization of recovered waste heat for, *inter alia*, combined cycle electricity generation and the provision of heat for residential, commercial, or industrial use;
- Generation of electricity and/ or thermal energy using biomass (this does not include efficiency improvements in thermal applications (e.g., cookstoves);
- Generation of electricity and/or thermal energy using fossil fuels, including activities that involve switching from higher carbon content fuel to a lower carbon content fuel;
- Large scale replacement of electric lighting with more energy-efficient electric lighting; and
- Installation and/or replacement of electricity transmission lines and/or energy efficient transformers.[37]

When combined with VCS's requirement that a project demonstrates that its GHG emission reductions and removals are not used by California's Cap-and-Trade Program,[38] many VCS protocols related to electricity and natural gas are eliminated from use in California and the San

[36] See Climate Forward, Methodologies: Solar Photovoltaic, Version 1.0, 2019, last accessed March 5, 2021: https://climateforward.org/program/methodologies/.
[37] Verified Carbon Standard: A VERRA STANDARD, VCS Standard, Version 4.0, 2019, at p. 2–3: https://verra.org/wp-content/uploads/2020/03/VCS-Standard-v4.0_Updated.pdf.
[38] Id. at p. 47.

Diego region. The impact on additionality of these limitations is further shown below in Table 5 in Section 4.4.

4 ADDITIONALITY

This section evaluates whether the protocols listed above or similar activities would lead to GHG reductions that would not have occurred otherwise. In the context of offset credits, it is important to determine whether a project and associated GHG reductions or removals would have happened in the absence of any benefit derived from creating a offset credit; that is, whether the reduction or removal is in addition to what would have otherwise happened. Additionality is a defining characteristic of offset credits, and there are several different ways to determine, or test, whether a project is additional.

California regulation defines "additional" to mean "greenhouse gas emission reductions or removals that exceed any greenhouse gas reduction or removals otherwise required by law, regulation or legally binding mandate, and that exceed any greenhouse gas reductions or removals that would otherwise occur in a conservative business-as-usual scenario."[39] This definition creates a two-part test of additionality: a legal requirement test and a common practice test (sometimes called performance test). Even though this test is developed in the context of CARB's compliance offsets, it is similar to that used by carbon offset programs and thus can serve as a reasonable framework to evaluate whether carbon offset protocols and resulting GHG emission reductions or removals would be considered additional.

Additionality must be determined on a project-by-project basis. For our purposes here, we consider a preliminary screen of protocols and project types (e.g., rooftop solar and energy efficiency) to determine whether, as a group, they could be considered additional. The additionality determination provided here is intended as a preliminary determination, and specific additionality screening would have to be applied to a specific project to determine whether the associated GHG reductions or removals are additional.

A more detailed discussion of additionality is provided in Section 2.3 of the main report.

Additionality Tests

There are several different tests to determine additionality. This report uses two common tests.

- Legal Requirement Test – This test determines whether there are any laws, regulations, policies, or legally-binding mandates that would have required the activity. If the activity does not exceed requirements, related emissions reductions would fail the legal requirement test and be considered not additional.
- Common Practice Test – This test determines whether in the absence of a requirement the activity would have happened anyway due to technological, financial, or other considerations. For example, if the activity is cost effective without the proceeds from carbon offset credits or represents a common practice, it could be considered not additional.

[39] 17 CCR § 95802(a).

4.1 Legal Requirement Test

The legal requirement test, sometimes called the regulatory surplus test, determines whether the activity exceeds regulations in place at the time a project begins. In California and the San Diego region, all projects are limited under this test if that project would be impacted by California's existing Cap-and-Trade Program and Clean Air Act or local air district regulations of emissions; California's procurement requirements around electricity supply under its RPS, SB 100 (2018) and local government electricity supply mandates through CAPs and/or CCAs; end-use energy efficiency and other mandates under Title 20, Title 24, and local jurisdiction energy reach code ordinances; and various federal requirements that directly or indirectly regulate this sector. These various requirements further add issues around emission reduction and offset ownership discussed below in Section 4.3.

Even where a project is not excluded because of these mandates, the impact of the mandates may, in fact, result in small or non-existing emission reductions. For example, cogeneration power plants that are not covered by Cap-and-Trade are likely more carbon intensive than average grid power in the San Diego region. The emissions from cogeneration will become less competitive over time from an emissions standpoint as grid power becomes less carbon intensive and California seeks to achieve 100% carbon-free electricity by 2045. Analysis of individual projects would be needed to determine emissions impacts and additionality.

4.2 Common Practice Test

A project that passes the legal requirement test may be considered not additional for other reasons. The Common Practice Test, also sometimes called the Performance Test, is an industry or sector specific analysis that requires the individual project to either achieve emission reductions in excess of what would have occurred otherwise based on whether there is widespread deployment of the particular project, technology, or practice or whether there is performance achievement that is greater than average within a relevant geographical area.[40] This determines what a common practice in the geographical region is. A project-by-project analysis of what is a common practice to determine whether the applicable project would pass the common practice test was beyond the scope of this document for the San Diego region. However, the following discusses general considerations for Electricity and Natural Gas Sector common practices.

Beyond what is required under Title 20 and Title 24 for energy efficiency, a common practice analysis should consider the impact of SD&GE's and any future CCA energy efficiency program. These programs target specific end uses and provide incentives to achieve them. While the programs change over time, it serves as a baseline of common practice represented by the success of uptake of the individual program and consequent market penetration of the practice. Rooftop solar also represents another activity where there is continuous and growing installations resulting in more penetration in the region. The impact of the next net energy metering successor rule,

[40] See America Carbon Registry, THE AMERICAN CARBON REGISTRY STANDARD: REQUIREMENTS AND SPECIFICATIONS FOR THE QUANTIFICATION, MONITORING, REPORTING, VERIFICATION, AND REGISTRATION OF PROJECT-BASED GHG EMISSIONS REDUCTIONS AND REMOVALS, Version 7.0, 2020, at p. 27–28: https://americancarbonregistry.org/carbon-accounting/standards-methodologies/american-carbon-registry-standard/acr-standard-v7-0_final_dec2020.pdf.

expected sometime in Q3 or Q4 of 2021, would need to be analyzed to determine whether this is or will continue to be a common practice in the region. These are examples of what would need to be analyzed to determine what is, in fact, a common practice in the San Diego region.

4.3 Additional Considerations

When determining whether or not an emission reduction activity is additional to existing or future statutory, regulatory, or policy requirements and the business-as-usual (BAU) scenario, the electric and natural gas sector represents one of the most complex determinations of additionality in California. This can result in limited opportunities for additional emission reductions, depending on how the entity needing reductions is either regulated or acts voluntarily to reduce emissions in this emission category. The following briefly discusses the scenarios under which emissions reductions can be analyzed for offset protocol emission reduction projects. A distributed energy, behind-the-meter rooftop photovoltaic (PV) system and its resulting emission reduction project is used to illustrate each scenario for electricity emissions.

California's electricity supply is highly regulated from both an emissions and supply portfolio (e.g., renewable energy requirement) standpoint. California's Cap-and-Trade program directly regulates the emissions from electricity generators over 25,000 $MTCO_2$ per year, and its RPS mandates that load serving entities (LSE) (e.g., San Diego Gas & Electric) supply customers with 60% renewable electricity by 2030, including interim supply targets from now until 2030, and 100% carbon-free electricity by 2045. Because most emissions sources from electricity are already regulated under Cap-and-Trade or the RPS, an emission reduction will be captured by the mandatory reporting requirement (MRR) for the facilities that emit less because of the decreased consumption of electricity or by the RPS' renewable energy mandate or carbon-free electricity mandate for supply under SB 100 (2018).

This creates both a potential double-counting issue and an emission reduction ownership issue because the Cap-and-Trade program accounts for the reduction, and the respective regulated facility sees a decrease in compliance obligation under Cap-and-Trade. There is no way to avoid double counting of these types of reductions without creating a new, complex ownership accounting system, which is likely impossible based on the physics of the electric grid and the inability to trace where the electrons are consumed. Further, the direct regulation of the GHG emissions of electricity under the RPS and SB 100 (2018) means that opportunities are time-limited for emission reductions as the electricity supply becomes carbon-free over time.

Existing offset program address the double counting and ownership issue through standards that govern their protocols with the effect of prohibiting the generation of carbon offset from emission reduction projects located in jurisdictions with Cap-and-Trade programs. VCS, Climate Action Reserve (CAR),[41] and American Carbon Registry (ACR)[42] are consistent in this practice. For example,

[41] See Climate Action Reserve, Reserve Offset Program Manual, 2021, at p. 11: https://www.climateactionreserve.org/wp-content/uploads/2021/03/Reserve_Offset_Program_Manual_March_2021.pdf.

[42] See America Carbon Registry, THE AMERICAN CARBON REGISTRY STANDARD: REQUIREMENTS AND SPECIFICATIONS FOR THE QUANTIFICATION, MONITORING, REPORTING, VERIFICATION, AND REGISTRATION OF PROJECT-BASED GHG EMISSIONS REDUCTIONS AND REMOVALS, Version 7.0, 2020, at p. 57–59 (Chapter 10: Avoiding Double Counting with Other GHG Programs and Registries, Emission Trading Systems, and National or

VCS does not allow a behind-the-meter rooftop solar project to generate carbon offsets because the emission reduction from this system would already be captured by the emission reduction captured by the Cap-and-Trade program.[43] Without an adjustment in the statewide emission inventory to account for the PV system's emission reduction as well as a written statement from CARB that it will not regulate the PV system's emissions reduction in the future, VCS will not allow offset projects of this type where a Cap-and-Trade regime exists.[44] This eliminates many protocols related to electricity supply and demand because these emission reductions are not considered additional because of California's Cap-and-Trade program.

Additionally, VCS will only allow projects to generate verified offset credits if the project is not also sequentially generating and retiring GHG-related environmental credits such as renewable energy credits (RECs) for the same time period.[45] If a project seeks to sequentially generate both types of credits, the project is required to determine for which time period each type of credit is being used and issued. A project may also need to cancel previously issued GHG-related environmental credits if the project seeks issuance of offset credits for the same period, which may not be possible or add complexity if the other credit was already retired or sold. VCS requires evidence that no double issuance is or has occurred.[46]

4.4 Summary of GHG Opportunities

Federal and California law covers most of the viable emissions from the electricity supply, natural gas supply, and end-uses are likely not additional (Table 5). Consequently, there are limited to no opportunities for GHG reduction projects using existing protocols. Further research would be necessary to determine whether there are new or existing opportunities for offset protocol projects related to this emission category.

Sectoral GHG Emission Reduction Targets) & p. 65–66 (Definitions: Double Counting, Double Claiming, Double Issuance, and Double Use): https://americancarbonregistry.org/carbon-accounting/standards-methodologies/american-carbon-registry-standard/acr-standard-v7-0_final_dec2020.pdf.

[43] See Verified Carbon Standard: A VERRA STANDARD, VCS Standard, Version 4.0, 2019, at p. 47 (Section 3.20.1 Other Forms of Environmental Credit): https://verra.org/wp-content/uploads/2020/03/VCS-Standard-v4.0_Updated.pdf.

[44] Ibid.

[45] Id. at p. 48.

[46] See Verified Carbon Standard: A VERRA STANDARD, Registration and Issuance Process, Version 4.0, 2019: https://verra.org/wp-content/uploads/2019/09/Registration_and_Issuance_Process_v4.0.pdf.

Table 5 Protocol Additionality Determination

GHG Reduction Activity/Protocols	US	CA	SD Region	Additionality Determination
Energy Efficiency	**19**	**2**	**0**	
CAPCOA Boiler Efficiency Protocol	0	0	0	Likely Not Additional
CAPCOA Weatherization of Single and Multi-Family Homes (Verra)	0	0	0	Likely Not Additional
CAR Pool Covers (Climate Forward)	2	2	0	Likely Not Additional
VCS AMS-II.E.: Energy Efficiency and Fuel Switching Measures for Buildings, Version 12.0 (Efficiency only)*	1	0	0	Likely Not Additional
VCS AMS-II.J.: Demand-side Activities for Efficient Lighting Technologies, Version 7.0 (Small-scale only)	1	0	0	Likely Not Additional
VCS VM0008 Weatherization of Single Family and Multi-Family Buildings	4	0	0	Likely Not Additional
VCS VM0018 Energy Efficiency and Solid Waste Diversion Activities within a Sustainable Community*	0	0	0	Likely Not Additional
VCS VM0025 Campus Clean Energy and Energy Efficiency (Efficiency only)*	11	0	0	Likely Not Additional
VCS VMR0005 Methodology for Installation of Low-Flow Water Devices	0	0	0	Not Additional
Renewable Electricity	**1**	**0**	**0**	
CAPCOA Biomass to Energy	0	0	0	Likely Not Additional
VCS ACM0022: Alternative Waste Treatment Processes, Version 2.0*	1	0	0	Likely Not Additional
Total	**20**	**2**	**0**	

*Protocol included in more than one category.

5 CONCLUSION

The electric and natural gas categories account for about 30% of regional emissions.[47] Of this total, about 20% is from electricity and 10% from natural gas. Because of the extent that California and the federal government regulate this emission category, there are limited opportunities for local offset credit projects that can meet the additionality requirement of existing, active offset credit protocols. Consequently, none of the offset credit protocols reviewed are considered additional.

[47] San Diego Association of Governments, San Diego Forward: The Regional Plan, Appendix D 2012 Regional Greenhouse Gas Emission Inventory for the San Diego Region and Projections, 2015, p. 26: https://www.sdforward.com/pdfs/RP_final/AppendixD-2012GreenhouseGasEmissionsInventoryfortheSanDiegoRegionandProjections.pdf. (Note this is the last publicly available estimate of regional emissions.)