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U.S. POLICY

# CALIFORNIA CAP-AND-TRADE PROGRAM SUMMARY



California's program represents the first multi-sector cap-and-trade program in North America. Building on lessons from the northeast Regional Greenhouse Gas Initiative (RGGI) and the European Union Emission Trading Scheme (EU-ETS), the California program blends proven market elements with its own policy innovations.

## SUMMARY

In 2013, California launched its cap-and-trade program, which uses a market-based mechanism to lower greenhouse gas emissions. California's program is second in size only to the European Union's Emissions Trading System based on the amount of emissions covered. In addition to driving emission cuts in the ninth largest economy in the world, California's program will provide critical experience in how an economy-wide cap-and-trade system can function in the United States.

California's emissions trading system will reduce greenhouse gas emissions from regulated entities by more than 16 percent between 2013 and 2020. It is a central component of the state's broader strategy to reduce total greenhouse gas emissions to 1990 levels by 2020.

The cap-and-trade rules came into effect on January 1, 2013 and apply to large electric power plants and large industrial plants. In 2015, they will extend to fuel distributors (including distributors of heating and transportation fuels). At that stage, the program will encompass around 360 businesses throughout California and nearly 85 percent of the state's total greenhouse gas emissions.

Under a cap-and-trade system, companies must hold enough emission allowances to cover their emissions, and are free to buy and sell allowances on the open market. California held its first auction of greenhouse gas allowances on November 14, 2012. This marked the

beginning of the first greenhouse gas cap-and-trade program in the United States since the group of nine Northeastern states in the Regional Greenhouse Gas Initiative (RGGI), a greenhouse gas cap-and-trade program for power plants, held its first auction in 2008.

## CAP AND TRADE BASICS

A cap-and-trade system is one of a variety of policy tools to reduce the greenhouse gas emissions responsible for climate change. A cap-and-trade program sets a clear limit on greenhouse gas emissions and minimizes the total costs to emitters while achieving the target. This limit is translated into tradable emission allowances (each allowance typically equivalent to one metric ton of carbon dioxide or carbon dioxide equivalent), which are auctioned or allocated to regulated emitters on a regular basis. At the end of each compliance period, each regulated emitter must surrender enough allowances to cover its actual emissions during the compliance period. The total number of available allowances decreases over time to reduce the total amount of greenhouse gas emissions. By creating a market, and a price, for emission reductions, the cap-and-trade system offers an environmentally effective and economically efficient response to climate change.

Ultimately, cap-and-trade programs offer opportunities for the most cost-effective emissions reductions. However,

many challenging issues must be addressed before initiating a cap-and-trade program. Once established, a well-designed cap-and-trade market is relatively easy to implement, can achieve emission reductions goals in a cost-effective manner, and drives low-greenhouse gas innovation.

### CALIFORNIA CAP-AND-TRADE DETAILS

California’s program represents the first multi-sector cap-and-trade program in North America. Building on lessons from the northeast Regional Greenhouse Gas Initiative (RGGI) and the European Union Emission Trading Scheme (EU-ETS), the California program blends proven market elements with its own policy innovations. These policy elements, and other relevant details of California’s cap-and-trade program, are summarized in Table 1 below.

The California Air Resources Board (CARB) adopted the state’s cap-and-trade rule on October 20, 2011, and will implement and enforce the program. The cap-and-trade rules will first apply to electric power plants and

industrial plants that emit 25,000 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) per year or more. In 2015, the rules will also apply to fuel distributors (including distributors of heating and transportation fuels) that meet the 25,000 metric ton threshold, ultimately affecting a total of around 360 businesses throughout California. The program imposes a greenhouse gas emission limit that will decrease by two percent each year through 2015, and by three percent annually from 2015 through 2020 (Figure 2).

Emission allowances will be distributed by a mix of free allocation and quarterly auctions. The portion of emissions covered by free allowances will vary by industry, but initially will account for approximately 90 percent of a business’s overall emissions. The percentage of free allowances allocated to the businesses will decline over time. A business may also buy allowances from other entities that have reduced emissions below the amount of allowances held. These policy elements, and other relevant details of California’s cap-and-trade program, are summarized in Table 1 below.

**TABLE 1: California Cap-and-Trade Details**

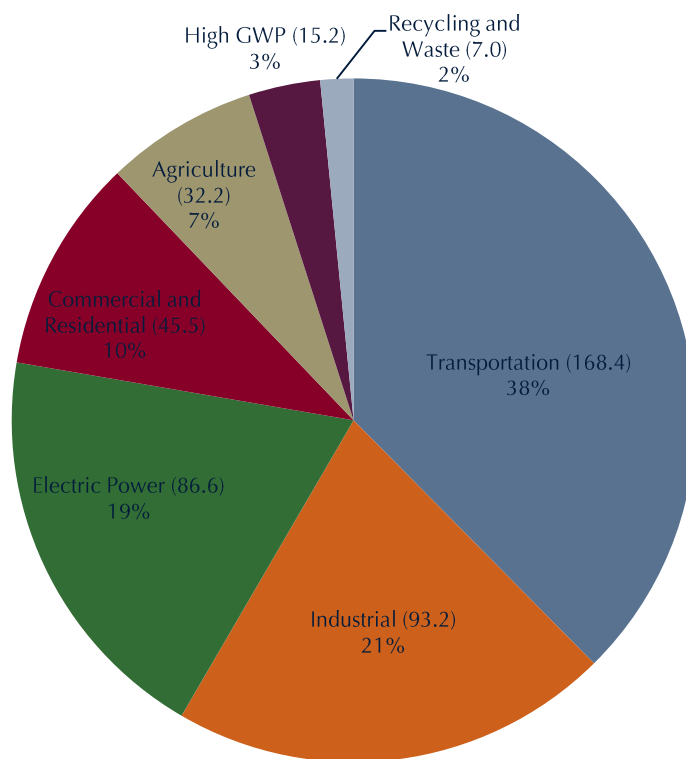
ISSUE	DETAILS AND DISCUSSION
<i>Status of Regulation</i>	
<i>Legal Status</i>	California Air Resources Board (CARB) adopted final regulations on October 20, 2011. An amended regulation, featuring a variety of minor adjustments, was adopted on September 12, 2012.
<i>Legal Authority</i>	Authorized by California Global Warming Solutions Act of 2006 (AB 32) AB 32 requires California to return to 1990 emission levels by 2020 (427 million metric tons (MMT) of carbon dioxide equivalent (CO <sub>2</sub> e) whereas business-as-usual would be 507 MMT)
<i>Lawsuit: Regulation does not go far enough</i>	The Association of Irrigated Residents (AIR) sued CARB, claiming cap and trade was not fully justified as a policy decision relative to a carbon tax or direct emission limits. After adding justification to the regulatory record, the court approved CARB’s approach.
<i>Lawsuit: Allowance auctions constitute a tax</i>	Immediately preceding California’s first allowance auction, the California Chamber of Commerce filed a lawsuit alleging that AB 32 does not give CARB the authority to raise revenue from allowance auctions, and that all allowances must therefore be freely allocated. Alternatively, the California Chamber of Commerce argues that if AB 32 did attempt to grant this authority, it would constitute a tax, which requires approval from two-thirds of the legislature. AB 32 did not receive two-thirds approval.

<i>Lawsuit: Regulation goes too far</i>	A lawsuit is anticipated that claims CARB is unconstitutionally attempting to regulate interstate commerce because the program will look outside of state borders to assign greenhouse gas reduction obligations to imported electricity.
<i>Start Date</i>	Regulation went into effect on January 1, 2012 The first auction took place on November 14, 2012 Compliance obligations began on January 1, 2013
<i>Regulation Coverage</i>	
<i>Threshold of Coverage</i>	Sources that emit at least 25,000 metric tons CO <sub>2</sub> e/year are subject to regulation
<i>Gases Covered</i>	The six gases covered by the Kyoto Protocol (CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> ) Plus NF <sub>3</sub> and other fluoridated greenhouse gases
<i>Sectors Covered: Phase 1 (2013-2014)</i>	Electricity generation, including imports Industrial sources Covers approximately 35% of California’s total greenhouse gas emissions (approximately 160 MMT) (See Figures 1 and 2 below)
<i>Sectors Covered: Phase 2 (2015-onward)</i>	Includes sectors covered in Phase 1, plus: Distributors of transportation fuel Distributors of natural gas Distributors of other fuel Covers approximately 85% of California’s total greenhouse gas emissions (approximately 395 MMT) (See Figures 1 and 2 below)
<i>Point of Regulation</i>	Electricity generators (within California) Electricity importers Industrial facility operators Fuel distributors
<i>Allowance Allocation</i>	
<i>Distribution Method</i>	Free allocation for electric utilities (not generators), industrial facilities, and natural gas distributors Free allocation amount declines over time Other allowances must be purchased at auction or via trade
<i>Allocation Methodology</i>	Industry: Based on output and sector-specific emissions intensity benchmark that rewards efficient facilities, initially set at about 90% of average emissions and declining over time; free allocation to leakage-prone industries declines relatively less over time Electricity: Based on long-term procurement plans Natural gas: To be determined by CARB before 2015; proposed to be based on 2011 emissions

<i>Auction</i>	Quarterly, single round, sealed bid, uniform price Price minimum: \$10 in 2012, rising 5% annually over inflation Investor-owned utilities (both gas and electric) must consign their free allowances to be sold at auction; must use proceeds for ratepayer benefit
<i>Emission Targets / Allowance Availability</i>	162.8 MMT in 2013 (electricity and industry) 394.5 MMT in 2015 (includes all covered sectors) 334.2 MMT in 2020 (15% reduction between 2015 and 2020) (See Figure 2 below)
<i>Market Flexibility</i>	
<i>Banking</i>	A participating entity may bank allowances for future use and these allowances will not expire. However, regulated entities are subject to holding limits, restricting the maximum number of allowances that an entity may bank at any time. The holding limit quantity is based on a multiple of the entity's annual allowance budget
<i>Borrowing</i>	Borrowing of allowances from future years is not allowed
<i>Offsets: Quantity</i>	Allowed for 8% of total compliance obligation. Note that 8% refers to the total amount of allowances held by an entity; not the amount of reduction required by an entity. Thus more than 8% of the program's reductions can occur through offsets
<i>Offsets: Protocols</i>	Offsets must comply with CARB-approved protocols. Protocols currently exist for: forestry, dairy digesters, ozone depleting substances projects, and urban forestry. Initially limited to projects in the U.S.; framework in place for international expansion. All offset projects developed under a CARB Compliance Offset Protocol must be listed with a CARB-approved Offset Project Registry. To date, the American Carbon Registry (ACR) and Climate Action Reserve (CAR) are the two approved registries.
<i>Strategic Reserve</i>	A percentage of allowances, which increases over time from 1% to 7%, will be held in a strategic reserve by CARB in three tiers with different prices: \$40, \$45, \$50 in 2013, rising 5% annually over inflation. Since these prices are not subject to market forces, the strategic reserve will help constrain compliance costs.
<i>Compliance Period</i>	3-year compliance periods (following 2-year Phase 1)
<i>Emissions Reporting and Verification</i>	
<i>Reporting</i>	Capped entities must report annually (as required since 2008)
<i>Registration</i>	Capped entities must register with CARB to participate in allowance trading market
<i>Verification</i>	Reported emissions will be verified by a third party.
<i>Compliance and Enforcement</i>	
<i>Annual Obligation</i>	Entities must provide allowances and/or offsets for 30% of their previous year's emissions
<i>Compliance Period Obligation</i>	At the end of every compliance period, entities must provide allowances and/or offsets for balance of emissions from the entire compliance period (2 years for the first period, 3 years for the next 2 periods).

<i>Noncompliance</i>	If a deadline is missed or there is a shortfall, four allowances must be surrendered for every metric ton not covered in time.
<i>Trading and Enforcement</i>	The regulation expressly prohibits any trading involving a manipulative device, a corner of or an attempt to corner the market, fraud, attempted fraud, or false or inaccurate reports. Violations of the regulations can result in civil or criminal penalties. Perjury statutes apply. The program includes mechanisms to prevent market manipulation.
<i>Linking</i>	
<i>Quebec</i>	California’s program is linked with that of Quebec as of January 1, 2014.
<i>Western Climate Initiative (WCI)</i>	Other WCI partners (British Columbia, Manitoba, Ontario) plan to eventually join the linked program as well.
<i>Other Jurisdictions</i>	CARB is open to linking with additional state or regional programs.

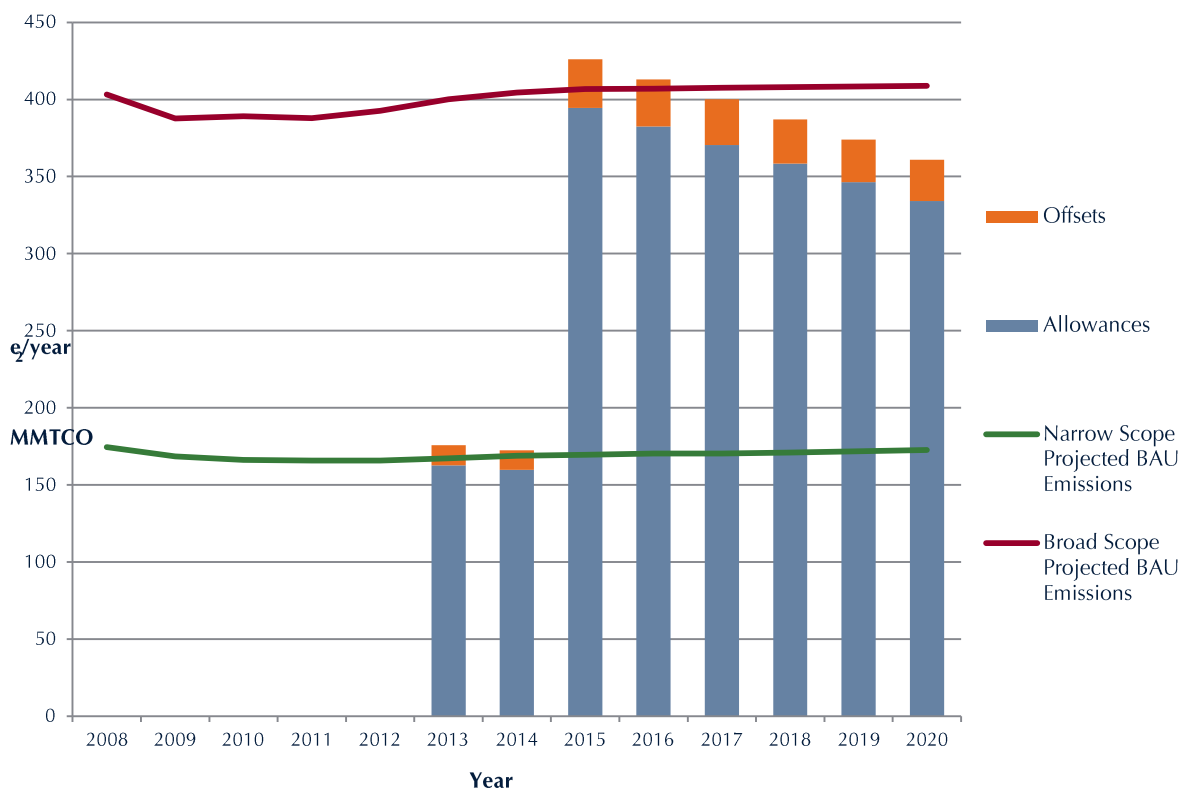
**FIGURE 1: California Greenhouse Gas Emissions by Sector in 2011**



Emissions are expressed in million metric tons of carbon dioxide equivalent (MMT CO<sub>2</sub>e) and percent of total. Total 2011 gross emissions were 448.1 MMT CO<sub>2</sub>e. Note that “Residential and Commercial” equates to heating fuel consumption, which is covered starting in 2015.

Source: CARB, Greenhouse Gas Inventory Data – Graphs, [http://www.arb.ca.gov/cc/inventory/data/tables/ghg\\_inventory\\_scopingplan\\_00-11\\_2013-08-01.pdf](http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-11_2013-08-01.pdf)

**FIGURE 2: California’s greenhouse gas emission cap and business-as-usual (BAU) projections**



The cap-and-trade program has a “narrow” scope in 2013 and 2014 that encompasses the electricity and industrial sectors. The program expands in 2015 to encompass transportation and heating fuels. Offsets can be used for up to eight percent of each regulated entity’s compliance obligation.

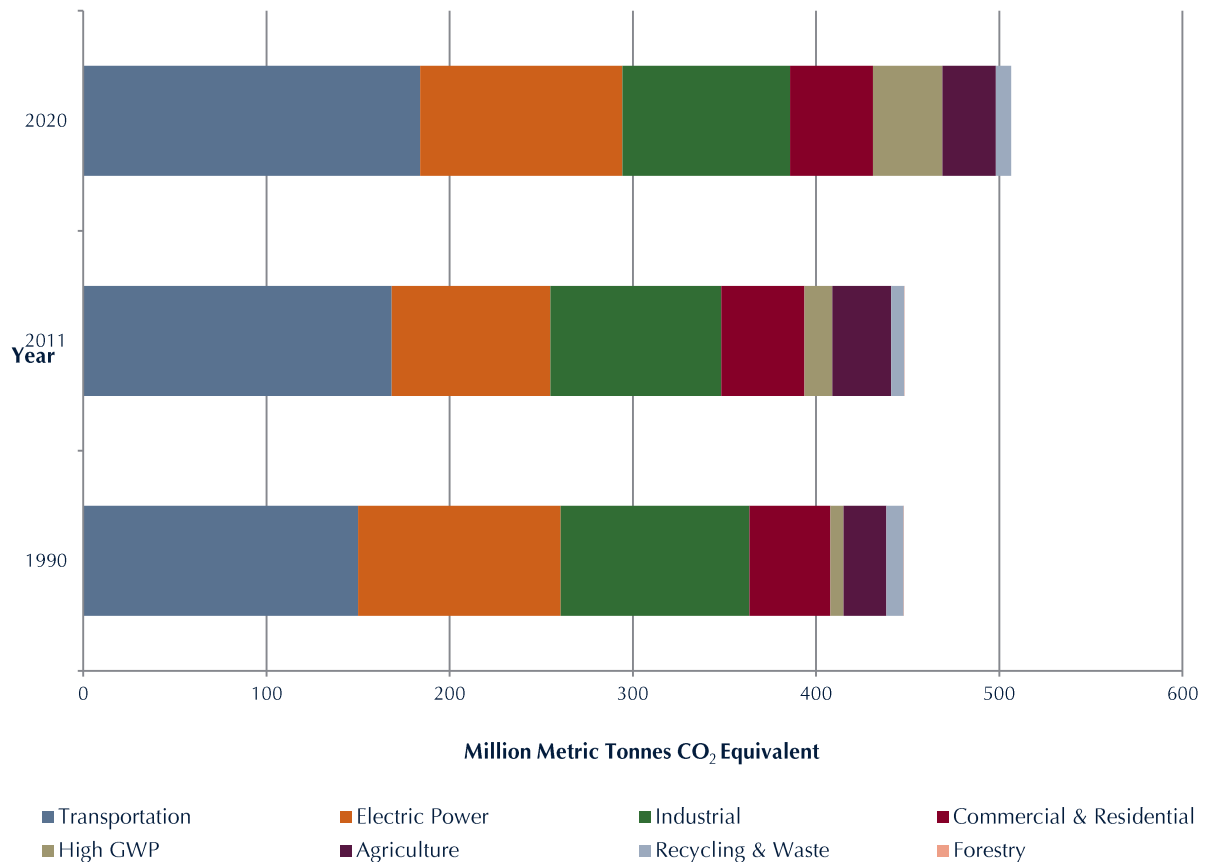
Source: CARB, California Cap-and-Trade Regulation Initial Statement of Reasons, Appendix E: Setting the Program Emissions Cap, <http://www.arb.ca.gov/regact/2010/capandtrade10/capv3appe.pdf>

## CALIFORNIA’S OVERALL CLIMATE CHANGE PROGRAM

California’s cap-and-trade program is only one element of its broader climate change initiative, as authorized in the California Global Warming Solutions Act of 2006 (AB 32). AB 32 seeks to slow climate change through a comprehensive program reducing greenhouse gas emissions from virtually all sources statewide. The Act requires CARB to develop regulations and market mechanisms that will cut the state’s greenhouse gas emissions to 1990 levels by 2020—a 25 percent reduction statewide. Figure 3 shows California’s projected greenhouse gas emissions growth in the absence of cap and trade.

AB 32 also requires CARB to take a variety of actions aimed at reducing the state’s impact on the climate. CARB has adopted a portfolio of measures to reduce greenhouse gas emissions in the state, including a Low Carbon Fuel Standard and a variety of energy efficiency standards. The cap under CARB’s cap-and-trade rule is flexible and can be tightened if CARB’s other measures reduce greenhouse gas emissions less than anticipated. California’s cap-and-trade program therefore acts as a backstop to ensure its overall 2020 greenhouse gas target is met. Figure 4 shows the programs CARB is implementing to achieve the goals of AB 32 and the projected impact of each.

**FIGURE 3: California Greenhouse Gas Emissions in 1990, 2011, and 2020 under Business-as-Usual**



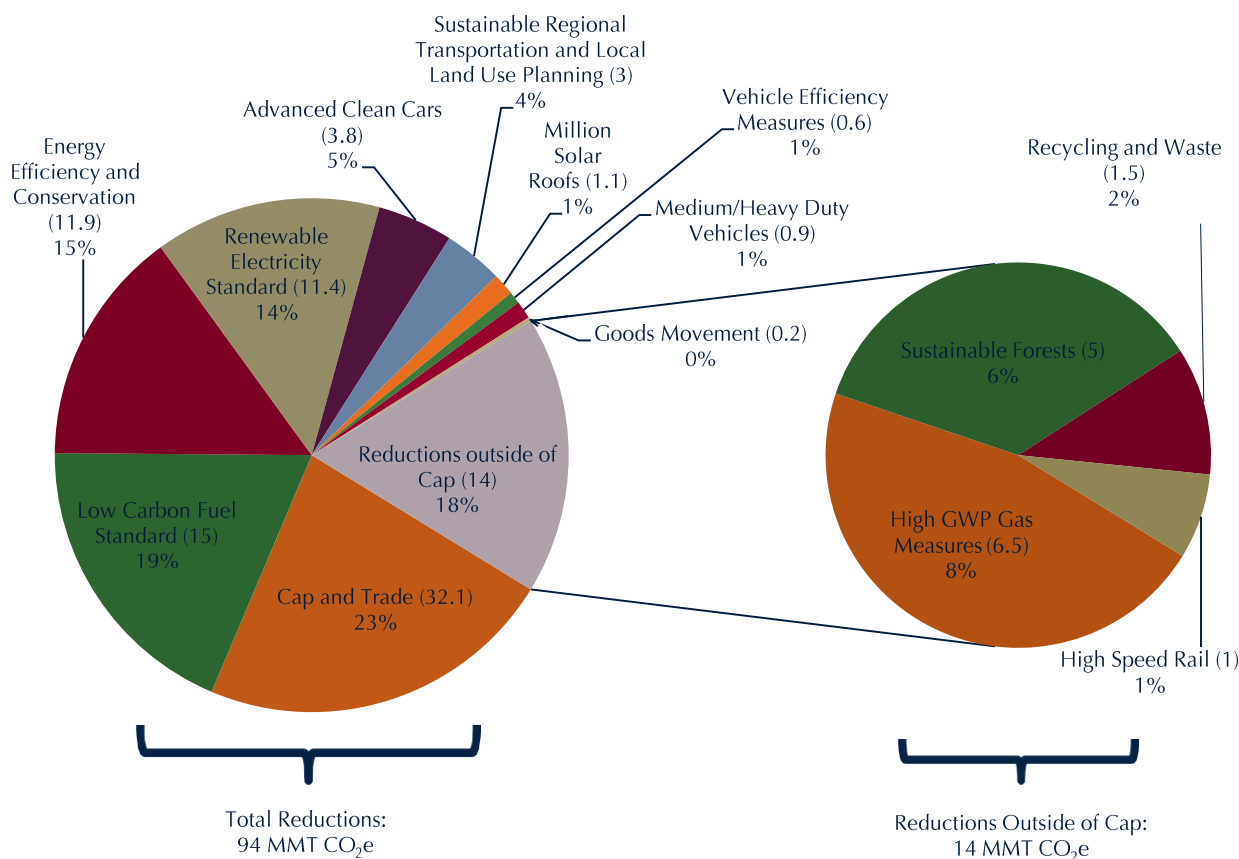
Sources:

1990: California Energy Commission, *Inventory of Greenhouse Gas Emissions and Sinks: 1990 to 2004*, <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-...> CARB, *California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit*, [http://www.arb.ca.gov/cc/inventory/pubs/reports/staff\\_report\\_1990\\_level.pdf](http://www.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf)

2011: CARB, *California Greenhouse Gas Inventory for 2000-2011 – by Category as Defined in the Scoping Plan*, [http://www.arb.ca.gov/cc/inventory/data/tables/ghg\\_inventory\\_scopingplan\\_00-11\\_2013-08-01.pdf](http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-11_2013-08-01.pdf)

2020: CARB, *Greenhouse Gas Emission Forecast for 2020: Data Sources, Methods, and Assumptions*, [http://www.arb.ca.gov/cc/inventory/data/tables/2020\\_forecast\\_methodology\\_2010-10-28.pdf](http://www.arb.ca.gov/cc/inventory/data/tables/2020_forecast_methodology_2010-10-28.pdf)

**FIGURE 4: Projected Reductions (in MMT CO<sub>2</sub>e) Caused by AB 32 Measures by 2020 and Share of Total**



Source: CARB, *Greenhouse Gas Reductions from Ongoing, Adopted and Foreseeable Scoping Plan Measures*, [http://www.arb.ca.gov/cc/inventory/data/tables/reductions\\_from\\_scoping\\_plan\\_measures\\_2010-10-28.pdf](http://www.arb.ca.gov/cc/inventory/data/tables/reductions_from_scoping_plan_measures_2010-10-28.pdf)

## AUCTION REVENUE

Although a significant number of emission allowances will be freely allocated in California’s program, many will also be sold at auction. The first year of auctions generated over \$525 million in revenue for the state. The state anticipates annual auction revenue to rise over time. On September 30, 2012, Governor Jerry Brown signed two bills into law, establishing guidelines on how this annual revenue will be disbursed. The two laws do not identify specific programs that will benefit from the revenue, but they provide a framework for how the state will invest cap-and-trade revenue into local projects. California’s first quarterly cap-and-trade GHG allowance auction took

place on November 14, 2012. About 29 million greenhouse gas allowances, each representing one metric ton of carbon dioxide, were auctioned off in this first auction to more than 600 approved industrial facilities and electricity generators.

The first law, AB 1532, requires that the revenue from allowance auctions be spent for environmental purposes, with an emphasis on improving air quality. The second, SB 535, requires that at least 25 percent of the revenue be spent on programs that benefit disadvantaged communities, which tend to suffer disproportionately from air pollution. The California Environmental Protection Agency will identify disadvantaged communities for investment opportunities, while the



state’s Department of Finance will develop a three-year investment plan and oversee the expenditures of this revenue to mitigate direct health impacts of climate change.

Australia, New Zealand, and in nine Northeastern states (the Regional Greenhouse Gas Initiative, or RGGI). As of 2013, California and Quebec have operating programs as well. Table 2 below compares key elements of the California, RGGI, EU-ETS, and Quebec cap-and-trade systems.

## CALIFORNIA CAP AND TRADE IN CONTEXT

Prior to California’s program, greenhouse gas cap-and-trade programs were operating in the European Union,

**TABLE 2: Comparison of cap-and-trade programs in California, RGGI, EU-ETS, and Quebec**

	CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM	REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)	EU'S EMISSIONS TRADING SYSTEM	QUEBEC'S CARBON MARKET
<i>Population</i>	38 million	41 million	500 Million	8 Million
<i>Gross Regional Product</i>	US \$1.9 trillion	US \$2.3 trillion	US \$16 trillion	US \$304 billion
<i>Participating Jurisdictions</i>	California	9 US States: CT, DE, MA, MD, ME, NH, NY, RI, VT	Mandatory for all 27 EU members plus Norway, Iceland and Lichtenstein	Quebec
<i>Greenhouse Gases Covered</i>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, SF <sub>6</sub> , PFCs, NF <sub>3</sub> , other fluorinated greenhouse gases	CO <sub>2</sub> only	CO <sub>2</sub> , plus N <sub>2</sub> O and PFCs starting in 2013	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, SF <sub>6</sub> , PFCs, NF <sub>3</sub> , other fluorinated greenhouse gases

	<b>CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM</b>	<b>REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)</b>	<b>EU'S EMISSIONS TRADING SYSTEM</b>	<b>QUEBEC'S CARBON MARKET</b>
<i>Sectors Covered</i>	Electricity (including imports) and industry in 2013; plus ground transportation and heating fuels in 2015	Fossil fuel-fired power plants (does not include imports)	Electricity, heat and steam production, oil, iron and steel, cement, glass, pulp and paper in 2005-2012; plus CO <sub>2</sub> from petrochemicals, ammonia, aviation and aluminum, N <sub>2</sub> O from acid production, and PFCs from aluminum starting in 2013	Electricity (including imports) and industry in 2013; plus ground transportation and heating fuels in 2015
<i>Emissions Threshold</i>	Emitters of at least 25,000 metric tons CO <sub>2</sub> e annually	Fossil fuel-fired power plants generating 25 MW or greater located within the RGGI States	Any combustion installation over 20 MW; sector-specific threshold for other sources	Emitters of at least 25,000 metric tons CO <sub>2</sub> e annually
<i>Target</i>	Approximately 17% below 2013 emissions by 2020	15% below 2013 emissions by 2020	21% cut below 2005 levels by 2020	20% below 1990 levels by 2020. Considering raising target to 25%
<i>2013 Allowance Budgets (Millions of Allowances)</i>	162.8	165	2039	23.7
<i>Maximum Emissions Covered in million metric tons of CO<sub>2</sub>e equivalent (Year of Maximum Allowance Availability)</i>	394.5 (2015)	171 (2009) (includes New Jersey, which has since exited the program)	2039 (2013)	63.3 (2015)

	<b>CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM</b>	<b>REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)</b>	<b>EU'S EMISSIONS TRADING SYSTEM</b>	<b>QUEBEC'S CARBON MARKET</b>
<i>Emissions Target in million metric tons of CO<sub>2</sub>equivalent (Target Year)</i>	334.2 (2020)	71 (2020)	1643 (2020) - Target may become more aggressive	51 (2020)
<i>Status</i>	First auction on November 14, 2012; compliance obligations began January 1, 2013	Compliance obligations began on January 1, 2009	Compliance obligations began on January 1, 2005	Compliance obligations began January 1, 2013
<i>Allocation Method</i>	Mixed – some free allocations for industry; auctions for others	Approximately 90% available for sale at auction, remainder up to states	Mixed - some free allocation for industry based on benchmarking; auction for power sector and others that can pass on costs; EU sets broad harmonization rules, but members have some flexibility; approximately 50% auction in 2013	Free allocation for some sectors, auctions for others
<i>Price Floor at Auction</i>	\$10 per metric ton for both 2012 and 2013 before rising 5% per year (plus inflation) starting in 2014.	\$1.93 in 2012; increasing with consumer price index (CPI)	No Price Floor	\$10 per metric ton price floor starting in 2012 and rising 5% for each year thereafter (plus inflation)
<i>Affiliations</i>	Helped establish Western Climate Initiative in 2007	None	UNFCCC, Kyoto Protocol	Joined Western Climate Initiative in 2008

	<b>CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM</b>	<b>REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)</b>	<b>EU'S EMISSIONS TRADING SYSTEM</b>	<b>QUEBEC'S CARBON MARKET</b>
<i>Linkage Status</i>	Linked with Quebec starting in 2014	No current plans to link	Plans to link with Australia in 2018. Also helping China design their market	Linked with California in 2014
<i>Offset Limit</i>	Can account for 8% of a regulated entity's compliance obligation	Can account for 3.3% of a regulated entity's compliance obligation	No limit; considering setting limits after 2020	Can account for 8% of a regulated entity's compliance obligation
<i>2013 Offset Use Limit (Millions of Offset Credits)</i>	13	5	No limit; considering setting limits after 2020	2.1
<i>Types of Offset Categories</i>	<ul style="list-style-type: none"> <li>1) Forestry;</li> <li>2) Urban forestry;</li> <li>3) Dairy digesters;</li> <li>4) Destruction of ozone-depleting substances</li> </ul>	<ul style="list-style-type: none"> <li>1) Landfill methane destruction;</li> <li>2) Reduction in emissions of SF<sub>6</sub> in the power sector;</li> <li>3) Sequestration of carbon due to afforestation;</li> <li>4) Reduction of CO<sub>2</sub> emissions from natural gas, oil, or propane end-use combustion in buildings;</li> <li>5) Avoided methane emissions from agricultural manure management</li> </ul>	<ul style="list-style-type: none"> <li>1) Clean Development Mechanism (CDM) and Joint Implementation (JI) project types, except those from land use, land-use change and forestry activities; Starting in 2013 (third phase), HFC and adipic acid credits will be excluded.</li> </ul>	<ul style="list-style-type: none"> <li>1) Covered manure storage facilities – CH<sub>4</sub> destruction;</li> <li>2) Landfill sites – CH<sub>4</sub> Destruction;</li> <li>3) Destruction of ozone depleting substances contained in insulating foam recovered from appliances</li> </ul>

## CAP AND TRADE LINKAGE

California is part of the Western Climate Initiative (WCI), which also includes British Columbia, Manitoba, Ontario and Quebec. WCI partners are working together with a goal of eventually creating a linked cap-and-trade program that covers each jurisdiction. When Governor Schwarzenegger signed an agreement establishing the initiative on February 26, 2007, California became one of the original participants of the initiative. WCI Partners have developed a comprehensive initiative to reduce regional greenhouse gas emissions to 15 percent below 2005 levels by 2020. Quebec is currently the only other jurisdiction in WCI that is implementing cap and trade in the near-term, and its first compliance period began on January 1, 2013.

In October 2013 CARB and the Quebec Ministry of Sustainable Development, Environment, Wildlife, and Parks officially linked their greenhouse gas cap-and-trade programs. As a result, greenhouse gas emission allowances from California and Quebec are interchangeable for compliance purposes as of January 1, 2014. California and Quebec's link represents the first multi-sector cap-and-trade program linkage in North America. The partnership aims to create a gateway and framework for greater international greenhouse gas reductions.

This step came after years of work to coordinate the two programs. CARB had to align its program with Quebec's and prove to Governor Brown that Quebec's program is stringent enough to meet California's requirements. Quebec also had to draft amendments to its regulations in order to harmonize with California's reporting scheme. Both CARB and its parallel agency in Quebec adopted regulations necessary to link their programs in spring 2013.

## GLOSSARY

**Allowance:** A government-issued authorization to emit a certain amount. In greenhouse gas markets, an allowance is commonly denominated as one ton of CO<sub>2</sub>e per year. The total number of allowances distributed to all entities in a cap-and-trade system is determined by the size of the overall cap on emissions.

**Allowance distribution:** The process by which emissions allowances are initially distributed under an emissions cap-and-trade system. Authorizations to emit can initially be distributed in a number of ways, either through some form of auction, free allocation, or some of both.

**Auctioning:** A method for distributing emission allowances in a cap-and-trade system whereby allowances are sold to the highest bidder. This method of distribution may be combined with other forms of allowance distribution.

**Banking:** The carry-over of unused allowances or offset credits from one compliance period to the next.

**Benchmarking:** An allowance allocation method in which allowances are distributed based upon a specified level of emissions per unit of input or output.

**Borrowing:** A mechanism under a cap-and-trade program that allows covered entities to use allowances designated for a future compliance period to meet the requirements of the current compliance period. Borrowing may entail penalties to reflect a programmatic preference for near-term emissions reductions.

**Business-as-Usual:** In the absence of the regulation being discussed. This term is used to assess the future impacts of a regulation.

**Cap and Trade:** A cap-and-trade system sets an overall limit on emissions, requires entities subject to the system to hold sufficient allowances to cover their emissions, and provides broad flexibility in the means of compliance. Entities can comply by undertaking emission reduction projects at their covered facilities and/or by purchasing emission allowances (or credits) from the government or from other entities that have generated emission reductions in excess of their compliance obligations.

**Carbon Dioxide Equivalent (CO<sub>2</sub>e):** Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example, the global warming potential for methane over 100 years is 21. This means that emission of one million metric tons of methane is equivalent to emission of 21 million metric tons of carbon dioxide.

**Compliance period:** The time frame for which regulated emitters surrender enough allowances to cover their actual emissions during that time frame.

**Credits:** Credits can be distributed by the government for emission reductions achieved by offset projects or by achieving environmental performance beyond a regulatory standard.

**Emissions Cap:** A mandated constraint in a scheduled timeframe that puts a “ceiling” on the total amount of anthropogenic greenhouse gas emissions that can be released into the atmosphere.

**Emissions Trading:** The process or policy that allows the buying and selling of credits or allowances created under an emissions cap.

**Global Warming Potential (GWP):** A measure of the total energy that a gas absorbs over a particular period of time (usually 100 years), compared to carbon dioxide.

**Greenhouse Gases (GHG):** Greenhouse gases include a wide variety of gases that trap heat near the Earth’s surface, slowing its escape into space. Greenhouse gases include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and water vapor and other gases. While greenhouse gases occur naturally in the atmosphere, human activities also result in additional greenhouse gas emissions. Humans have also manufactured some greenhouse gases not found in nature (e.g., hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).

**High GWP:** Gases with high global warming potential (GWP). There are three major groups or types of high GWP gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). These compounds are the most potent greenhouse gases. In addition to having high global warming potentials, SF<sub>6</sub> and PFCs have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere once emitted.

**Kyoto Protocol:** An international agreement signed at the Third Conference of the Parties to the UN Framework Convention on Climate Change in Kyoto, Japan (December 1997). The Protocol sets binding emission targets for industrialized countries that would reduce their collective emissions by 5.2 percent, on average, below 1990 levels by 2012.

**Leakage:** A reduction in emissions of greenhouse gases within a jurisdiction that is offset by an increase in emissions of greenhouse gases outside the jurisdiction. For example, if a regulated facility moves across the border to continue operations unchanged rather than reducing its emissions

**Linking:** Authorization by the regulator for entities covered under a cap-and-trade program to use allowances or offsets from a different jurisdiction’s regulatory regime (such as another cap-and-trade program) for compliance purposes. Linking may expand opportunities for low-cost emission reductions, resulting in lower compliance costs.

**Offset:** Projects undertaken outside the coverage of a mandatory emissions reduction system for which the ownership of verifiable greenhouse gas emission reductions can be transferred and used by a regulated source to meet its emissions reduction obligation. If offsets are allowed in a cap and trade program, credits would be granted to an uncapped source for the net emissions reductions a project achieves. A capped source could then acquire these credits as a method of compliance under a cap.

**Price Trigger:** A general term used to describe a price at which some measure will be taken to stabilize or lower allowance prices. For example, through 2013 RGGI used price triggers to expand the amount of offsets that could be used for compliance.

**Program Review (RGGI):** The Memorandum of Understanding among RGGI states calls for a 2012 Program Review. This Program Review, now complete, was a comprehensive evaluation of program success, program impacts, additional reductions, imports and emissions leakage, and offsets.

**Scope:** The coverage of a cap-and-trade system, i.e., which sectors or emissions sources will be included.

**Sealed Bid (Auction):** A type of auction process in which all bidders simultaneously submit sealed bids to the

auctioneer, so that no bidder knows how much the other auction participants have bid.

**Single Round (Auction):** Bids for allowances are all solicited and settled in a single round. Auction participants can submit multiple bids for this single round. For example, a participant could bid \$15 per allowance for 10,000 allowances and \$20 per allowance for a separate 20,000 allowances.

**Source:** Any process or activity that results in the net release of greenhouse gases, aerosols, or precursors of greenhouse gases into the atmosphere.

**True-up:** A submission of emission allowances equivalent to a regulated entity's emissions during a compliance period, less what the entity has already submitted at interim deadlines.

**Uniform Price (Auction):** All allowances awarded in a single auction will be the same price. Allowances will be sold to bidders, beginning with the highest bid price and moving to successively lower priced bids, until all of the available allowances are sold. The bid at which all available allowances are sold becomes the settlement price and this is the price per allowance that all bidders will be charged for the allowances won in the auction. Bids submitted at prices below the settlement price will not win any allowances.

**Western Climate Initiative (WCI):** A collaboration launched in February 2007 to meet regional challenges raised by climate change. WCI is identifying, evaluating and implementing collective and cooperative ways to reduce greenhouse gases in the region. Membership in the WCI presently consists of California, British Columbia, Manitoba, Ontario, and Quebec.