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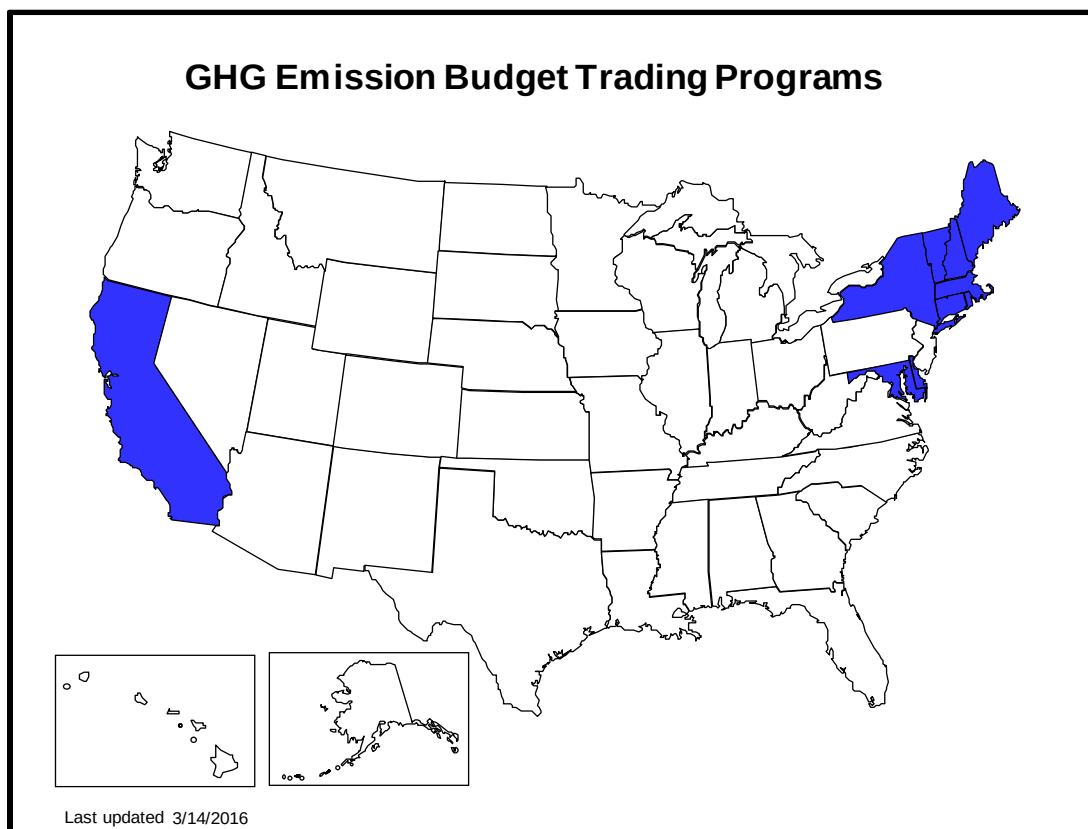
i. Market-based Emissions Limits

Description

An emissions budget trading program is a market-based tool for reducing pollution. The basic approach, which involves the allocation and trade of a limited number of environmental permits, has been used across environmental media, including air pollution control, clean water regulation, and land-use applications.

As of March 2016, ten states have implemented emissions budget trading programs addressing CO₂ and other GHG emissions. As shown in Figure 2 below, these include California's emissions budget trading program and the nine northeast and mid-Atlantic states participating in the Regional Greenhouse Gas Initiative (RGGI), consisting of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.^{9,10}

Figure 2: States with Active Greenhouse Gas Emissions Budget Trading Programs



⁹ Regional Greenhouse Gas Initiative Inc. Website Homepage, accessed March 10, 2016. Available at: <http://www.rggi.org/>.

¹⁰ "Cap-and-Trade Program," California Air Resources Board, accessed March 10, 2016. Available at: <http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>.

Policy Mechanics

Design

An emissions budget trading program establishes an aggregate limit on pollution through an emissions cap that specifies the total allowable emissions over a specified time period for all of the emissions sources subject to the program. To comply with the emissions limitation, each emissions source must surrender emissions allowances equal to its reported emissions at the end of each compliance period.

Allowances may be traded among both regulated and non-regulated parties, creating a market for emissions allowances. In turn, the allowance market establishes a price signal for emissions (a market price for emitting a unit of pollution), which triggers broad economic incentives for reducing emissions across the covered sector(s) and encourages innovation in developing emissions control strategies and new pollution control technologies.

There are several key design elements that may vary from program to program:

- Scope of coverage (e.g., sectors and types of facilities covered)
- Applicability (criteria for inclusion of emitting facilities and units in the program)
- Initial emissions budget (i.e., the aggregate emissions limitation for covered emissions sources) and emissions reduction schedule
- Flexibility provisions, in addition to ability to trade emissions allowances, including:
 - Multi-year compliance periods
 - Allowance banking
 - Offsets (e.g., project-based emissions reductions occurring outside the capped sector/sources)
- Additional provisions to mitigate price volatility and overall costs
 - Auction reserve price
 - Cost containment reserve of allowances provided for sale at set price thresholds; Once the allowance price hits a threshold, an extra supply of allowances are made available

Table 1 summarizes some of the key design elements of the RGGI and California programs.

Table 1: Comparison of RGGI and California Emissions Budget Trading Programs

Element	RGGI	California
Applicability	All fossil fuel-fired EGUs with a capacity of 25 MW or greater.¹¹	All facilities in covered sectors, either directly emitting or distributing fossil fuels with potential combustion emissions, of at least 25,000 metric tons CO₂-equivalent (CO₂e) or greater (with no minimum¹² for emissions from imported electricity).¹³
Scope	Facilities in electric power sector.¹⁴	Facilities in electric power, large industrial sectors, and distributors of gasoline, certain diesel fuels, liquefied petroleum gas, and natural gas.^{15,16}
Emissions budget	Recently reduced 45 percent to 91 million tons of CO₂ in 2014. Beginning in 2015, the budget will decline 2.5 percent per year to 2020.¹⁷	Set at 2 percent below expected 2012 emissions in 2013 (162.8 million tons of CO₂), declining by 2 percent in 2014 and 3 percent annually from 2015 (394.5 million tons of CO₂)¹⁸ to 2020 (334.2 million tons of CO₂).^{15,19}
Compliance period	EGUs must demonstrate compliance every three years and hold allowances equal to 50 percent of reported CO₂ emissions at the end of the first two years of every three-year compliance period.²⁰	Facilities must demonstrate compliance every three years. On an annual basis, facilities must also hold allowances and offsets covering 30 percent of the previous year's emissions.²¹

¹¹ Regional Greenhouse Gas Initiative Inc., *Overview of RGGI CO₂ Budget Trading Program* (RGGI Inc., October, 2007). Available at: http://www.rggi.org/docs/program_summary_10_07.pdf.

¹² As of January 1, 2015, all electricity imports, regardless of the size of the generating station of origin, are covered under the emissions trading system.

¹³ California Air Resources Board, *Cap and Trade Regulation Instructional Guidance, Chapter 2: Is My Company Subject to the Cap-and-Trade Regulation* (CARB, September, 2012). Available at: <http://www.arb.ca.gov/cc/capandtrade/guidance/chapter2.pdf>.

¹⁴ "Regulated Sources," Regional Greenhouse Gas Initiative Inc., accessed March 10, 2016. Available at: http://www.rggi.org/design/overview/regulated_sources.

¹⁵ California Air Resources Board, *Overview of ARB Emissions Trading Program* (CARB, October, 2011). Available at: http://www.arb.ca.gov/newsrel/2011/cap_trade_overview.pdf.

¹⁶ California Air Resources Board, *Information for Entities That Take Delivery of Fuel for Fuels Phased into the Cap-and-Trade Program Beginning on January 1, 2015* (CARB, 2015). Available at: http://www.arb.ca.gov/cc/capandtrade/guidance/faq_fuel_purchasers.pdf.

¹⁷ Regional Greenhouse Gas Initiative Inc., "RGGI States Make Major Cuts to Greenhouse Gas Emissions from Power Plants," Regional Greenhouse Gas Initiative Press Release (January 13, 2014). Available at: http://www.rggi.org/docs/PressReleases/PR011314_AuctionNotice23.pdf.

¹⁸ The large cap increase in 2015 is due to the inclusion of transportation, natural gas, and other fossil fuel distributors in the emissions trading program.

¹⁹ Center for Climate and Energy Solutions (C2ES), *California Cap and Trade* (C2ES, 2015) accessed March 10, 2016. Available at: <http://www.c2es.org/us-states-regions/key-legislation/california-cap-trade>.

²⁰ "Compliance" Regional Greenhouse Gas Initiative Inc., accessed March 10, 2016. Available at: <http://www.rggi.org/market/tracking/compliance>.

²¹ "Regulated Sources," Regional Greenhouse Gas Initiative Inc., accessed March 10, 2016. Available at: http://www.rggi.org/design/overview/regulated_sources.

Element	RGGI	California
Allowance allocation method	Each state distributes allowances from its established budget in an amount and manner determined by its applicable statutes and regulations. Approximately 90 percent of CO₂ allowances are distributed through auction.²²	Allowances are both allocated and auctioned off according to provisions established by the program. More information is available from CARB (see footnote).¹⁵
Cost containment provisions	- A Cost Containment Reserve (CCR) of CO₂ allowances provides a fixed additional supply of allowances that are only available if the auction price exceeds a set threshold (\$4 in 2014 rising to \$10 in 2017 and 2.5 percent per year to 2020).²³ - An additional five million allowances became available March 2014 when market price exceeded the current price trigger of \$4 per ton.²⁴ - CCR allowances increase from five million in 2014 to 10 million in 2015 and beyond.²⁵	A strategic reserve is included, providing an Allowance Price Containment Reserve of 1 percent of allowances for 2013-2014, 4 percent of allowances for 2015-2017, and 7 percent of allowances for 2018-2020. Shares of allowances held in the reserve will be released at three price trigger points; \$40, \$45, and \$50 per ton and rise by 5 percent per year including inflation.²⁶
Banking	Allows unlimited allowance banking.²⁷	Allows unlimited allowance banking, but regulated entities are subject to holding limits, which are a function of the entity's annual allowance budget.^{28,29}

²² Regional Greenhouse Gas Initiative Inc., "2015 Allowance Allocation." Available at: www.rggi.org/design/overview/allowance-allocation.

²³ Regional Greenhouse Gas Initiative Inc., "The RGGI CO₂ Cap," accessed March 10, 2016. Available at: <http://www.rggi.org/design/overview/cap>.

²⁴ Regional Greenhouse Gas Initiative Inc., "CO₂ Allowances Sold at \$4.00 at 23rd RGGI Auction," Regional Greenhouse Gas Initiative Press Release (March 7, 2014). Available at: http://www.rggi.org/docs/Auctions/23/PR030714_Auction23.pdf.

²⁵ Regional Greenhouse Gas Initiative Inc., *Summary of RGGI Model Rule Changes* (Regional Greenhouse Gas Initiative, Inc., 2013). Available at: http://www.rggi.org/docs/ProgramReview/FinalProgramReviewMaterials/Model_Rule_Summary.pdf.

²⁶ "California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms to Allow for the Use of Compliance Instruments Issued by Linked Jurisdictions," California Code of Regulations, Title 17, §95800-96023, July 2013. Available at: <http://www.arb.ca.gov/cc/capandtrade/ctlinkqc.pdf>.

²⁷ "Cap-and-Trade Program," California Air Resources Board, accessed March 10, 2016. Available at: <http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>.

²⁸ CARB *Proposed Regulation to Implement the California Cap-and-Trade Program* (California Air Resources Board, 2010). Available at: <http://www.arb.ca.gov/regact/2010/capandtrade10/capisor.pdf>.

²⁹ The large cap increase in 2015 is due to the inclusion of transportation, natural gas, and other fossil fuel distributors in the emissions trading program.

Element	RGGI	California
Offsets	EGUs subject to RGGI are allowed to use offsets within the RGGI region to meet 3.3 percent of their compliance obligation, increasing to 5 and 10 percent if allowance prices exceed price thresholds of \$7 and \$10 per allowance, respectively.^{30, 31,32}	Facilities may use domestic offsets for up to 8 percent of their compliance obligation.³³ A framework has been established to include international offsets but these are currently not allowed in the program.³⁴

Authority

State and regional GHG emissions budget trading programs are authorized through individual state legislation and implemented through state regulations. For example, California implemented its emissions budget trading program under the authority of its 2006 Global Warming Solutions Act, which requires the state to reduce its 2020 GHG emissions to 1990 levels.³⁵ Each RGGI state has separate authorizing legislation, and in some cases, its legislation specifically directs the use of auction proceeds. For example, Maine authorized its participation in RGGI through Statute 580-A, Title 38 Chapter 3B: Regional Greenhouse Gas Initiative. This statute also requires that 100 percent of auction proceeds go toward carbon reduction and energy conservation efforts.³⁶ RGGI is implemented through individual state CO₂ budget trading program regulations.³⁷

³⁰ Regional Greenhouse Gas Initiative Inc., "CO₂ Offsets," accessed March 10, 2016. Available at: <http://www.rggi.org/market/offsets>.

³¹ Eligible offsets under RGGI include: landfill methane capture and destruction, sulfur hexafluoride (SF₆) reduction from power transmission, U.S. forest projects (reforestation, improved forest management, and avoided conversion) or afforestation (in Connecticut and New York only), end use energy efficiency, and agricultural manure management. "Offset Categories" Regional Greenhouse Gas Initiative, Inc., accessed March 10, 2016. Available at: <http://www.rggi.org/market/offsets/categories>.

³² Regional Greenhouse Gas Initiative Inc., *Fact Sheet: RGGI Offsets*. Available at: http://www.rggi.org/docs/Documents/RGGI_Offsets_FactSheet.pdf.

³³ California Air Resources Board, *Overview of ARB Emissions Trading Program* (CARB, October, 2011). Available at: http://www.arb.ca.gov/newsrel/2011/cap_trade_overview.pdf. Offsets are initially limited to forestry, urban forestry, livestock methane capture and destruction, and destruction of ozone depleting substances. However, rice cultivation and coal mine methane are proposed for inclusion in the program. See: CARB – Potential New Compliance Offset Projects at: <http://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm> for more information; accessed March 10, 2016.

³⁴ California Air Resources Board, *Overview of ARB Emissions Trading Program* (CARB, 2011). Available at: http://www.arb.ca.gov/newsrel/2011/cap_trade_overview.pdf.

³⁵ Assembly Bill 32, California Global Warming Solutions Act of 2006, Division 25.5 (September 27, 2006). Available at: [http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf](http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_0001-0050_ab_32_bill_20060927_chaptered.pdf).

³⁶ Maine revised statutes, Title 38, Chapter 3-B, section 580-B, the Regional Greenhouse Gas Initiative Act of 2007, accessed March 10, 2016. Available at: <http://www.mainelegislature.org/legis/statutes/38/title38sec580-B.html>.

³⁷ Regional Greenhouse Gas Initiative Inc., "State Statutes and Regulations," accessed March 10, 2016. Available at: <http://www.rggi.org/design/regulations>.

The state regulatory authority issues individual authorizations to emit a specific quantity of emissions (“allowances”), which represent one (metric or short) ton of a pollutant, in an amount no greater than the established emissions budget.

Obligated Parties

Obligated parties in emissions budget trading programs are generally the covered emissions sources. The emissions sources are responsible for surrendering emissions allowances equal to their reported emissions at the end of each compliance period. For example, as stated above, RGGI covers fossil fuel-fired EGUs 25 megawatts or larger in size.³⁸ The California emissions budget trading program covers electricity generators, distributors of transportation, natural gas, and other fuels, and industrial facilities with emissions³⁹ greater than 25,000 metric tons CO₂-e. The program also covers all importers of electricity.⁴⁰

Measurement and Verification

Emissions budget trading programs include requirements for emissions monitoring and reporting by affected emissions sources, holding and transfer of allowances, and surrender of allowances (and offset allowances or credits) in an amount equal to reported emissions. Allowance surrender in an amount equal to reported emissions is often referred to, generally, as the program “compliance obligation.”

For example, EGUs subject to the RGGI program must report CO₂ emissions quarterly pursuant to state regulations, which are generally consistent with EPA regulations for reporting of CO₂ emissions from EGUs under 40 CFR 75.⁴¹ Emissions are reported quarterly to EPA, using the Emissions Collection and Monitoring Plan System (ECMPS), and data is transferred to the RGGI CO₂ Allowance Tracking System (RGGI COATS). GHG emissions reporting for affected sources under the California program is addressed through the California mandatory GHG reporting regulations, using a modified version of the reporting platform administered through the EPA Greenhouse Gas Reporting Program.⁴² Affected emissions sources must report emissions annually and provide third party verification of reported emissions.

³⁸ “Regulated Sources,” Regional Greenhouse Gas Initiative Inc., accessed March 10, 2016. Available at: http://www.rggi.org/design/overview/regulated_sources.

³⁹ Fossil fuel distributors are liable for combustion emissions that occur downstream of their operations.

⁴⁰ California Air Resources Board, *Overview of ARB Emissions Trading Program* (CARB, 2011). Available at: http://www.arb.ca.gov/newsrel/2011/cap_trade_overview.pdf.

⁴¹ Regional Greenhouse Gas Initiative Inc., *Overview of RGGI CO₂ Budget Trading Program* (RGGI Inc., 2007). Available at: http://www.rggi.org/docs/program_summary_10_07.pdf.

⁴² California Air Resources Board, *Overview of ARB Emissions Trading Program* (CARB, 2011). Available at: http://www.arb.ca.gov/newsrel/2011/cap_trade_overview.pdf.

Penalties for Non-compliance

Failure to submit allowances in an amount equal to reported emissions result in automatic emissions penalties in the form of additional allowance submission requirements (e.g., three-to-one submission requirements to account for any shortfall in RGGI, and a four-to-one submission requirement for any shortfall under the California program). States may also apply other administrative fines and penalties, pursuant to their implementing regulations.

Implementation Status

The RGGI program was established in 2009. From 2009 through 2014, the nine current RGGI participating states invested auction proceeds of more than \$1.3 billion in programs that lower costs for energy consumers and reduce CO₂ emissions, including more than \$750 million in energy efficiency programs and more than \$300 million in renewable energy.⁴³ The participating RGGI states estimate that all of their investments are providing benefits of \$4.67 billion in lifetime energy savings to energy consumers in the region.⁴⁴

Between 2005, when agreement to implement RGGI was first announced, and 2014, power sector CO₂ emissions in the RGGI participating states fell by more than 40 percent while GDP in the region grew by more than 8 percent (see Figure 3).⁴⁵

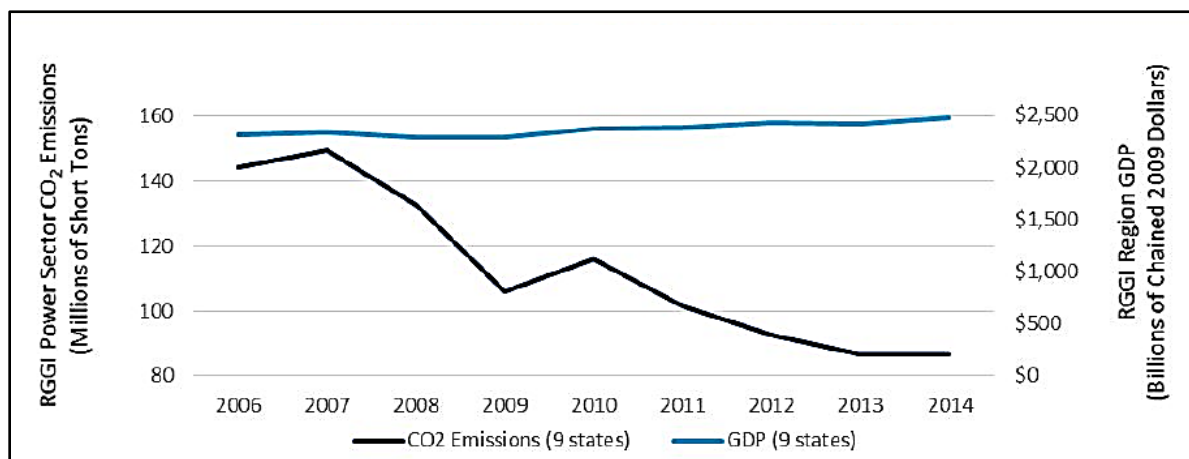
⁴³ Regional Greenhouse Gas Initiative Inc., *Investment of RGGI Proceeds Through 2014* (RGGI Inc., 2016). Available at: https://www.rggi.org/docs/ProceedsReport/RGGI_Proceeds_Report_2014.pdf. Programs include residential, commercial, and industrial programs. Of the \$1.37 billion in auction proceeds invested by RGGI participating states through 2014, approximately 58 percent supported end-use energy efficiency programs and approximately 23 percent supported renewable energy programs.

⁴⁴ Fossil fuel distributors are liable for combustion emissions that occur downstream of their operations.

⁴⁵ Regional Greenhouse Gas Initiative Inc., *Investment of RGGI Proceeds Through 2014* (RGGI Inc., 2016). Available at: https://www.rggi.org/docs/ProceedsReport/RGGI_Proceeds_Report_2014.pdf.

By contrast, total U.S. power sector CO₂ emissions fell by 15 percent during the same period of time. See 2015 U.S. Greenhouse Gas Inventory for more detail: U.S. EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013* (U.S. Environmental Protection Agency, 2015), Available at: <https://www3.epa.gov/climatechange/ghgemissions/usinventoryreport/archive.html>.

Figure 3: Historical GDP and Greenhouse Gas Emissions in the RGGI Region



Source: "Investment of RGGI Proceeds through 2014" (Regional Greenhouse Gas Initiative, Inc.). Available at: https://www.rggi.org/docs/ProceedsReport/RGGI_Proceeds_Report_2014.pdf.

The RGGI program, which began in 2009, was not a primary driver for these emissions reductions in RGGI states, but the lower emissions led participating states to adjust the multi-state CO₂ emissions limit.⁴⁶ In January 2014, the RGGI participating states lowered the overall allowable CO₂ emissions level in 2014 by 45 percent, setting a multi-state CO₂ emissions limit for affected EGUs of 91 million short tons of CO₂ in 2014, falling to 78 million short tons of CO₂ by 2020, approximately 50 percent below 2005 levels.^{47,48} Actual 2014 emissions were 85 million short tons of CO₂, slightly below the cap.⁴⁹

The California economy-wide market-based GHG emissions budget trading program, which addresses GHG emissions from multiple sectors, was implemented in 2012 with emissions limits beginning in 2013.^{50,51} While California's emissions budget trading program, like its state

⁴⁶ U.S. Energy Information Administration (EIA), *Lower emissions cap for Regional Greenhouse Gas Initiative takes effect in 2014* (EIA, 2014). Available at: <http://www.eia.gov/todayinenergy/detail.cfm?id=14851>. The first three-year control period under RGGI, establishing CO₂ emissions limits for EGUs, began on January 1, 2009. Low gas prices, increased renewables, decreased electric demand and weather are considered four primary drivers of the reductions through 2010, as reported by Environment Northeast in May 2011.

⁴⁷ Regional Greenhouse Gas Initiative Inc., "RGGI States Make Major Cuts to Greenhouse Gas Emissions from Power Plants," Regional Greenhouse Gas Initiative Press Release (January 13, 2014). Available at: http://www.rggi.org/docs/PressReleases/PR011314_AuctionNotice23.pdf.

⁴⁸ Regional Greenhouse Gas Initiative Inc., "The RGGI CO₂ Cap," accessed March 10, 2016. Available at: <http://www.rggi.org/design/overview/cap>.

⁴⁹ Regional Greenhouse Gas Initiative Inc., *Annual Report on the Market for RGGI CO₂ Allowances: 2014*, (Regional Greenhouse Gas Initiative, May 2015). Available at: http://rggi.org/docs/Market/MM_2014_Annual_Report.pdf. Cumulative CO₂ emissions for the second control period (2012-2014) rose from 179 to 264 million short tons throughout 2014, a difference of 85 million short tons.

⁵⁰ "Cap-and-Trade Program," California Air Resources Board, accessed March 10, 2016. Available at: <http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>.

⁵¹ The California program was developed in coordination with U.S. state and Canadian province WCI partners.

emissions limit, is multi-sector in scope, the state projects that the emissions trading program and related complementary measures will reduce power sector GHG emissions to less than 80 million metric tons of CO₂-e by 2025, a 25 percent reduction from 2005 power sector emissions levels.⁵² Prior to the implementation of the emissions trading program, California reports that it reduced power sector CO₂ emissions by 16 percent from 2005 to a 2011-2013 averaging period, a reduction of 16 million metric tons of CO₂-e.⁵³

⁵² State environmental agency leaders from CA, CO, DE, IL, ME, MD, MA, MN, NH, NY, OR, RI, VT, WA, Open Letter to the EPA Administrator Gina McCarthy on Emission Standards under Clean Air Act Section 111(d), December 16, 2013. Available at: http://www.eenews.net/assets/2013/12/16/document_gw_06.pdf.

Preliminary California Air Resources Board analyses, based in part on CARB 2008 to 2012 Emissions for Mandatory GHG reporting Summary (2013), cited in this letter.

⁵³ California Greenhouse Gas Inventory. 2000-2013 Inventory by Economic Sector – Full Detail. Available at: http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_sector_all_2000-13_20150831.pdf.