

Review of Potential for Resource Shuffling in the Electricity Sector

Key Findings

Analysis of California and Western Electricity Coordinating Council (WECC)-wide electricity emissions indicate that both California and WECC greenhouse gas (GHG) emissions are decreasing. These decreases in emissions and the corresponding increases in zero-GHG and natural gas generation are key indicators that to date the California Cap-and-Trade Program has not resulted in Resource Shuffling. The closure and planned retirements of coal generation facilities in the WECC that were previously affiliated with California is further evidence that Resource Shuffling is not occurring. Two-thirds of the coal plant capacity previously contracted to California has retired, and the remaining coal plants are scheduled to retire or switch fuels.

California Cap-and-Trade Program and Resource Shuffling

Resource Shuffling is a plan to substitute lower GHG emission power for higher GHG emission power in order to reduce a compliance obligation for GHG emissions from imported electricity in the Cap-and-Trade Program (Program).¹ Resource Shuffling is a type of emissions leakage, which is a decrease in GHG emissions in California that has a corresponding increase in out-of-state GHG emissions as a result of the Program.² Not all emissions leakage is Resource Shuffling.

Per AB 32 direction, CARB designed the Program to minimize the potential for emissions leakage. After discussions with stakeholders and the Federal Energy Regulatory Commission, CARB adopted strict prohibitions against Resource Shuffling in the Cap-and-Trade Regulation (Regulation). Safe harbor provisions describe allowable electricity deliveries that do not constitute Resource Shuffling.³ Safe harbor provisions exist for compliance with the Renewables Portfolio Standard (RPS) and Emissions Performance Standard (EPS), short-term dispatch in California Independent System Operator (CAISO) markets,⁴ and grid reliability requirements, among others.

CARB's Regulation for the Mandatory Reporting of GHG Emissions requires annual reporting of all GHG emissions from the generation of electricity delivered to and consumed in California, whether that electricity is generated in-State or imported. Specified imported electricity must have a specified source contract, and meet requirements for direct-delivery to California, among other requirements.⁵ Reported GHG emissions are annually verified by independent CARB-accredited verification bodies and verifiers.

¹ See section 95802 of the [Cap-and-Trade Regulation](#).

² See [2016 ISOR, Appendix E](#)

³ Section 95852(b)(2)(A) of the Regulation

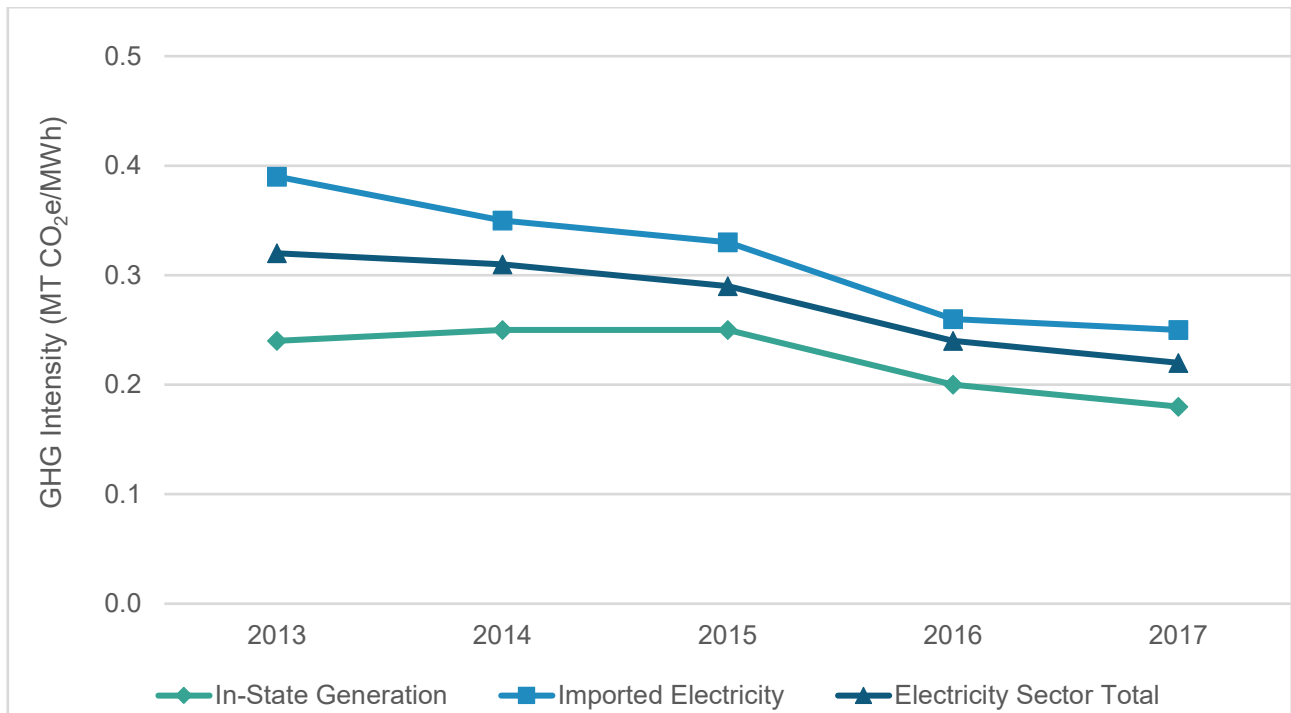
⁴ This includes economic or self-schedule bids in CAISO's real-time or day-ahead markets.

⁵ See section 95852(b)(3) of the [Regulation](#) and sections 95102 and 95111(a)(4) of the [Mandatory Reporting Regulation](#) for specific requirements.

How have California’s electricity GHG emissions changed since the start of the Cap-and-Trade Program?

GHG emissions from electricity generation to serve California load have decreased thirty percent since the start of the Program in 2013 through 2017. Figure 1 shows the GHG intensity of California electricity (metric tons of carbon dioxide equivalent per megawatt-hour of electricity generated) during this period. The decrease in GHG emissions from imported electricity is due to reported and verified changes in the mix of generation imported to California. Figure 2 shows California electricity imports by generation type over time. Coal and unspecified imports declined and zero-GHG⁶ electricity imports into California increased. Total electricity imports also declined by approximately eight percent as California built and used more in-State renewable electricity.⁷

Figure 1. GHG Intensity of California Electricity 2013-2017⁸

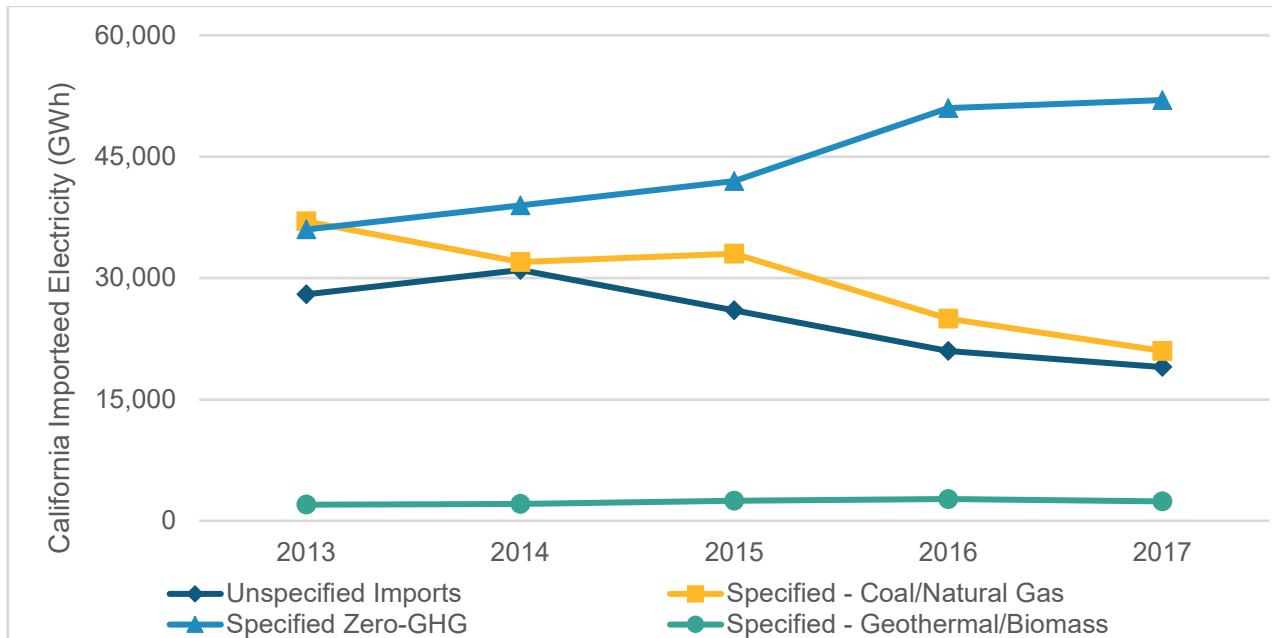


⁶ "Zero-GHG" includes solar, wind, (small and large) hydro, and nuclear.

⁷ CARB [2000-2017 GHG Emissions Trends Report Data](#), Figure 11b.

⁸ *Ibid*, Figure 9. GHG intensities account for renewables and zero-GHG sources and exclude biogenic CO₂ emissions.

Figure 2. California Imported Electricity (GWh) by Generation Type⁹



California’s suite of energy and climate policies, combined with declining costs of natural gas and renewable generation, have driven year-over-year decreases in California electricity GHG emissions from both imports and in-State generation. In-State renewables more than doubled since 2013 and renewable generation in the WECC increased year-over-year.¹⁰ California’s evolving imported electricity profile reflects compliance with the State’s RPS and EPS requirements and the response to the carbon price signal from the Program.

How have GHG emissions in the western U.S. changed since the start of the Cap-and-Trade Program? ¹¹

Total WECC-wide GHG emissions have decreased.¹² This is important because if WECC emissions were increasing this could be a sign of emissions leakage. By excluding California’s in-State GHG emissions from this assessment, we can differentiate WECC and California in-State emissions trends. What we find is that non-California emission intensity has also decreased – further indication that electricity emissions leakage is not occurring. Figure 3 shows that GHG intensity of both California electricity imports and all electricity generation in the WECC (excluding California in-State generation) are following a similar downward trajectory. Coal emissions in the WECC dropped year-over-year from 2013 through 2018 as more than 3,600 megawatts (MW) of coal capacity came offline due to

⁹ *Id.*, Figure 11b.

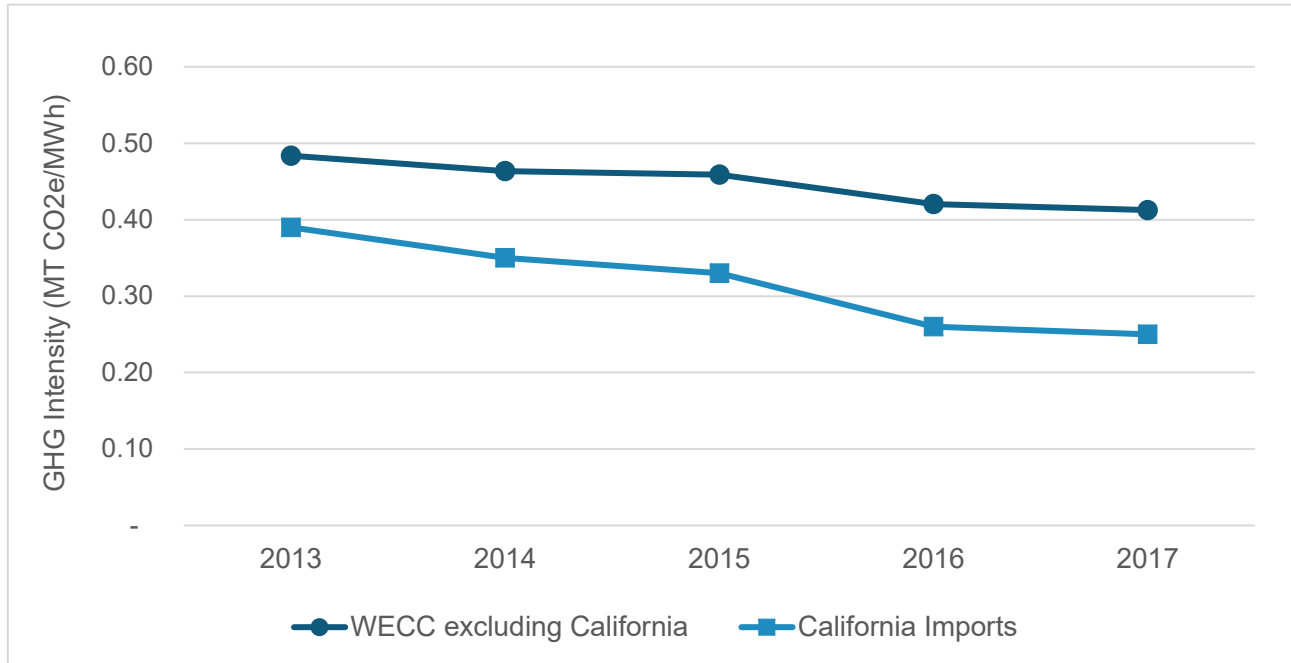
¹⁰ *Id.*, Figure 10 and EIA electricity generation data for U.S. WECC: [EIA electricity data browser](#).

¹¹ U.S. Western Electricity Coordinating Council (WECC) (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, California, Oregon, Washington)

¹² U.S. EIA, Electric Power Industry Estimated Emissions: [EIA Detailed State Data](#).

plant retirements and fuel switching.¹³ Total coal generation in the WECC also declined by about twenty-five percent, while renewable generation increased year-over-year during the same period.¹⁴

Figure 3. GHG Intensity of California Imports and Electricity Generation in the WECC (excluding California) 2013-2017¹⁵



Ongoing Program Monitoring

CARB actively monitors and enforces the prohibitions on Resource Shuffling and the requirements for reporting electricity emissions. To date, CARB has not found any evidence that Resource Shuffling is occurring. CARB also monitors for other types of potential electricity emissions leakage and addresses issues when they arise. In 2015, CARB found that the design of the CAISO Energy Imbalance Market (EIM) does not account for the full GHG emissions experienced by the atmosphere from electricity imported to California under the EIM and results in emissions leakage. Since then, CAISO has implemented an improvement to ensure greater GHG accounting accuracy in the EIM, and CARB has adopted provisions to its regulations to ensure any EIM emissions leakage is fully accounted for and addressed. Since CAISO's new EIM provisions went into effect in late 2018, electricity deemed to serve California load in the EIM better reflects the real-time dispatch of power plants into California in the EIM.

¹³ *Id.*, WECC Summer Capacity Retirement: U.S. EIA. "[Monthly Update to Annual Electric Generator Report \(Form 860m\)](#)" and CARB survey of utility integrated resource plans and public announcements.

¹⁴ U.S. EIA electricity generation data for WECC: [EIA electricity data browser](#).

¹⁵ U.S. EIA, Electric Power Industry Estimated Emissions for WECC (excluding CA) and generation from the [EIA Detailed State Data and EIA electricity data browser](#). Due to differences data availability, WECC reflects CO₂ and CA imports reflects CO₂e. CA data from: [CARB GHG Emissions Trends Report Data](#), Fig. 9.