

# California's 2000-2019 Greenhouse Gas Emissions Inventory 2021 Edition

## Inventory Updates Since the 2020 Edition of the Inventory

Supplement to the Technical Support Document



Air Quality Planning and Science Division

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## A. Introduction

Assembly Bill (AB) 1803 gave California Air Resources Board (CARB) the responsibility of preparing and updating California's greenhouse gas (GHG) inventory to track the State's progress in reducing GHG emissions. The GHG inventory is one piece, in addition to data from various California Global Warming Solutions Act (AB 32) programs, in demonstrating the State's progress in achieving the statewide GHG targets established by AB 32 (reduce emissions to the 1990 levels by 2020) and Senate Bill 32 (SB 32) (reduce emissions to at least 40% below the 1990 levels by 2030). The 2020 edition of California's GHG inventory covers emissions for 2000 through 2018 and includes inventory improvements and accounting method updates.

The GHG inventory was developed according to the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories ("IPCC Guidelines") (IPCC 2006), which are the internationally recognized standard for developing national GHG inventories. Since the 2020 edition of the inventory (2000-2018 emissions), staff have made improvements to emissions estimation methods and incorporated new data sources. This document provides a description of the inventory updates since the previous edition of the inventory.

Each release of the California inventory incorporates the latest available data sources and emission quantification methodology. The IPCC guidance for GHG inventories states that it is good practice to recalculate historic emissions when methods are changed or refined, when new source categories are included in the inventory, or when errors in the estimates are identified and corrected. Consistent with the IPCC Guidelines, recalculations are made to incorporate new methods or to reflect changes in statistical data supplied by other agencies for all years from 2000 to 2019, to maintain a consistent time-series of estimates within the inventory. Therefore, emission estimates for a given calendar year may be different between editions as methods are updated or if the data source agencies revise their data series.

The 2020 edition of the GHG Inventory expanded the level of details provided to the public for activity data underlying the GHG emissions. From the 2020 edition and onward, the quantities of heat contained in combusted fuels (in units of British Thermal Units (btu)) will be provided in spreadsheet format to allow for a common comparison between fuels, in addition to physical fuel quantities (e.g., gallons and standard cubic feet) that were already provided in the previous editions. The kilowatt-hours (kWh) quantities of imported hydro, solar, wind, and nuclear electricity will also be provided in the Documentation Index website (CARB 2019a).

In addition, CARB is releasing a report on upstream emissions of California's natural gas consumption pursuant to AB 2195. AB 2195 requires CARB "to quantify and publish annually the amount of greenhouse gas emissions resulting from the loss or release of uncombusted natural gas to the atmosphere and emissions from natural gas flares during all processes associated with the production, processing, and

transporting of natural gas imported into the state from out-of-state sources.” Most of the emissions quantified in the AB 2195 report occurred outside of California borders; and therefore, are not added to the GHG Inventory total.

In the sections to follow, a background on each updated category is presented followed by a description of the update. The inventory category code associated with the hierarchical structure of IPCC inventory categorization is shown in the sub-heading title of each section.

## B. Description of Inventory Updates

### B.1 Imported Electricity (IPCC 1A1ai): ACS/MJRP Reported CO<sub>2</sub>e Emissions Disaggregation into CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O

#### B.1.1 Background

Section B.1 of the Inventory Updates published for the 2020 edition of the GHG Inventory (CARB 2020) discussed four cases of electricity imports that are not from a single, specified source: unspecified imports, asset controlling suppliers (ACS), multi-jurisdictional retail providers (MJRP), and California Independent System Operator (CAISO) Energy Imbalance Market (EIM) outstanding emissions. For these four cases, pursuant to MRR, emissions are reported in carbon dioxide equivalent (CO<sub>2</sub>e) rather than individual pollutants. As of the 2020 edition of the GHG Inventory, the CO<sub>2</sub>e emissions were disaggregated to individual pollutants using default natural gas combustion emission factors for all four of these cases.

In the 2021 edition of the GHG Inventory, the disaggregation of CO<sub>2</sub>e emissions to individual pollutants has been updated for ACS and MJRP emissions using supplemental reported data for these resource types.

#### B.1.2 Data and Method

Pursuant to MRR, system-wide emission factors are calculated for an ACS/MJRP based on their net imports and net generation. These net values are calculated as emissions and MWh from the following categories:

*Facility-Owned Generation + Specified Purchases + Unspecified Purchases – Specified Sales*

For each of these categories, an ACS/MJRP may have generation or transactions from multiple resources. Each of these resources has CARB-established emission factors for total CO<sub>2</sub>e, CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. For each resource in each category, emissions are calculated as:

*Resource Emissions = MWh × Transmission Loss Factor (TL) × Emission Factor (EF)*

Emissions are then summed for all resources in each category. For example, total facility-owned generation emissions equal the sum of emissions from each facility-owned resource. Similarly, generation is summed for all resources in each category.

The system emission factor is calculated as:

*System Emission Factor = Sum of System Emissions (MTCO<sub>2</sub>e) / Sum of System MWh*

The system emission factor is calculated as a single CO<sub>2</sub>e factor for MRR reporting. Starting with the 2021 edition of the GHG Inventory, system emission factors for ACS/MJRPs are calculated individually for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O using the reported, CARB-specified emission factors for each pollutant for each resource. These calculations follow the same method as described for the system CO<sub>2</sub>e emission factor, but with reported emissions for each individual pollutant replacing reported CO<sub>2</sub>e emissions.

There are a few instances where emissions are reported only in CO<sub>2</sub>e for a given resource transaction reported by an ACS/MJRP. The first is when an ACS/MJRP manually enters an emission factor rather than using a CARB-specified emission factor for a given resource; manual emission factors are entered in CO<sub>2</sub>e only. The second is when an ACS/MJRP reports unspecified purchases, for which the default unspecified imports emission factor of 0.428 MTCO<sub>2</sub>e/MWh is used. In both cases, the CO<sub>2</sub>e emissions are disaggregated using default natural gas combustion emission factors as described in section B.1 of the 2020 edition Inventory Updates document (CARB 2020).

## **B.2 Off-Road Gasoline and Ethanol Fuel Use (IPCC 1A2k, 1A2m, 1A3a, 1A3dii, 1A4a, 1A4c): Hold the 2019 values the same as 2018**

### **B.2.1 Background**

CARB accounts for on-road gasoline and ethanol fuel use using California Department of Tax and Fee Administration (CDTFA) publicly reported net taxable volumes (CDTFA 2021). This reported volume only includes gasoline and ethanol subject to taxation for use on highways and roads. Any volumes used for non-road or off-road purposes is not reported by CDTFA, as the agency is concerned only with on-road uses subject to taxation.

CARB staff estimate the off-road use of gasoline and ethanol with a fuel balance. MRR holds the full reported amount of gasoline and ethanol used in California. Staff takes this MRR total value and deducts the CDTFA on-road amount to obtain the off-road amount.

### **B.2.2 Data and Method**

For 2019, staff found that CDTFA's total gasoline and ethanol volume for on-road was greater than the verified MRR total gasoline and ethanol volume, which includes both on-road and off-road uses. CARB staff are looking into this discrepancy and will work with CDTFA to reconcile these data sets. In the interim, CARB will use the 2018 estimate of off-road total gasoline and ethanol in the 2020 version of the inventory as the 2019 estimate in the 2021 version; the on-road gasoline and ethanol volumes in the 2021 inventory continue to come from CDTFA data. Once the datasets are reconciled, off-road gasoline and ethanol will be updated for all applicable years.

### B.3 Miscellaneous Data Updates (IPCC 1A1aii, 1B1, 1B4)

In the 2021 edition of the inventory, CARB staff made minor updates to several parts of the inventory. These updates include:

- Use Useful Thermal Output (UTO) data from the U.S. Energy Information Administration (EIA)(EIA 2021) to attribute total emissions from cogeneration units to electricity and UTO for 2019.
- Match emissions data as reported in MRR but continue to use engineering judgment to estimate missing fuel data.

As the result of these minor updates and data corrections, some emissions and fuel data for the same calendar year may be slightly different between the 2021 edition and 2020 edition of the inventory.

## References

- CARB 2020. California Air Resources Board. Inventory Update Document for the 2020 edition of the GHG Inventory. Available at: [https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000\\_2018/ghg\\_inventory\\_00-18\\_method\\_update\\_document.pdf](https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/ghg_inventory_00-18_method_update_document.pdf)
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- EIA 2021. Energy Information Administration. Reporting Form 923 electricity data. Available at: <https://www.eia.gov/electricity/data/eia923/>