

**REGULATION 13**  
**CLIMATE CHANGE POLLUTANTS**  
**RULE 1**  
**PETROLEUM REFINING CARBON INTENSITY LIMITS**  
**OR FACILITY-WIDE GHG EMISSION LIMITS**  
**EFFECTIVE 1/1/2018**  
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(Adopted September XX, 2017)

**13-1-100 GENERAL**

**13-1-101 Description:** The purpose of this rule is to limit Greenhouse Gas (GHG) emissions from petroleum refineries and associated support facilities.

**13-1-102 Exemption, Small Refineries:** This rule shall not apply to any refinery that is limited by an Air District Permit to Operate to a total crude oil throughput or total crude oil processing capacity of 5,000 barrels per day or less.

**13-1-200 DEFINITIONS**

**13-1-201 Baseline Period:** Three-year period of calendar years 2013, 2014, and 2015, based on GHG emissions data available at the time of rule adoption.

**13-1-202 Carbon Intensity:** Carbon Intensity of refinery processing equals the annual Total Refinery CO<sub>2e</sub> Emissions (in Metric tons CO<sub>2e</sub>) as calculated in Section 13-1-302.3, including adjustments as calculated in Section 13-1-302.2; divided by the sum (in thousands of barrels) of annual volume of crude processed plus annual volume of other non-crude oil feedstocks processed.

**13-1-203 CO<sub>2e</sub> Emissions:** Measure of global warming potential in terms of metric tons of equivalent CO<sub>2e</sub>, calculated as described in the most recent Mandatory Greenhouse Gas Reporting Regulation, title 17, CCR, sections 95100-95158.

**13-1-204 Crude Oil:** As defined in Rule 12-15-205.

**13-1-205 Crude Volume:** Annual volume of crude oil processed at refinery crude unit(s), reported as required in Rule 12-15-408.

**13-1-206 Energy Improvement Projects:** Energy efficiency projects documented by each refinery submission of their Energy Efficiency and Co-Benefits Assessment of Large Industrial Facilities to the California Air Resources Board, as required by sections 95600 to 95612 in Title 17 of the California Code of Regulations (CCR), with a simple payback<sup>1</sup> of 10 years or less.

**13-1-207 Greenhouse Gases (GHGs):** The air pollutant that is defined in 40 CFR §86.1818-12(a), which is a single air pollutant made up of a combination of the following six constituents: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. For the purposes of this rule, GHG emissions should be calculated in manner consistent with California Air Resources Board requirements as contained in §95113 of the Mandatory Greenhouse Gas Emissions Reporting Regulation.

**13-1-208 Mandatory Greenhouse Gas Reporting Regulation:** California Air Resources Board Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (title 17, California Code of Regulations (CCR), sections 95100-95158) (MRR) incorporated by reference certain requirements promulgated by the United States Environmental Protection Agency (U.S. EPA) in its Final Rule on Mandatory Reporting of Greenhouse Gases (Title 40, Code of Federal Regulations (CFR), Part 98).

**13-1-209 Net Import of Manufactured Hydrogen:** Net annual Million Standard Cubic Feet (MSCF) of manufactured hydrogen (based on 96% pure H<sub>2</sub>) imported from any support facility or entity

<sup>1</sup> The payback period is the length of time required to recover the cost of an investment. The payback period of a given investment or project is an important determinant of whether to undertake the position or project, as longer payback periods are typically not desirable for investment positions. The payback period ignores the time value of money, unlike other methods of capital budgeting, such as net present value, internal rate of return or discounted cash flow.

<http://www.investopedia.com/terms/p/paybackperiod.asp>

- external to the Petroleum Refinery, beyond any self-generated hydrogen used to operate the petroleum refinery.
- 13-1-210 Net Import of Power:** Net annual megawatt-hours (MW-hr) of power imported from any support facility or entity external to the Petroleum Refinery, beyond any self-generated power used to operate the petroleum refinery.
- 13-1-211 Net Import of Steam:** Net annual pounds, pressure and temperature of steam imported from any support facility or entity external to the Petroleum Refinery, beyond any self-generated steam used to operate the petroleum refinery.
- 13-1-212 NPDES Refinery Peak Crude Volume:** Highest actual volume of crude processed at refinery crude units during any 12-month period, reported to the California Regional Water Quality Control Board every five years as required by 40 CFR. section 122.45(b)(2).
- 13-1-213 Non-crude Oil Feedstock Volume:** Annual volume of non-crude oil feedstocks processed at all other refinery process units (excluding crude units), reported as required in Rule 12-15-408.
- 13-1-214 Permit to Operate:** A written authorization obtained per BAAQMD Regulation 2, Rule 1, Section 301.
- 13-1-215 Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties that processes crude oil to produce more usable products such as gasoline, diesel fuel, aviation fuel, lubricating oils, asphalt or petrochemical feedstocks. Petroleum Refinery processes include separation processes (e.g., atmospheric or vacuum distillation, and light ends recovery), petroleum conversion processes (e.g., cracking, reforming, alkylation, polymerization, isomerization, coking, and visbreaking), petroleum treating processes (e.g., hydrodesulfurization, hydrotreating, chemical sweetening, acid gas removal, and deasphalting), feedstock and product handling (e.g., storage, crude oil blending, non-crude oil feedstock blending, product blending, loading, and unloading), and auxiliary facilities (e.g., boilers, waste water treatment, hydrogen production, sulfur recovery plant, cooling towers, blowdown systems, compressor engines, and power plants).
- 13-1-216 Refinery Peak Processing Volume:** Sum of highest actual annual volumes of crude oil and non-crude oil feedstocks processed at a refinery, calculated as follows:
- 215.1 NPDES Refinery Peak Crude Volume, plus
  - 215.2 Highest actual volume of non-crude oil feedstocks processed at all other refinery process units (excluding crude units) during the baseline period, minus
  - 215.3 Volumes of crude or non-crude oil feedstocks where processing such volume would cause any source to exceed any Permit to Operate limit.
- 13-1-217 Source:** As defined in BAAQMD Regulation 2, Rule 1, Section 221.
- 13-1-218 Support Facility:** For purposes of this rule, a hydrogen plant or electrical generation plant that is not owned or operated by a Petroleum Refinery, and that provides more than 50% of its production output to the Petroleum Refinery.
- 13-1-300 STANDARDS**
- 13-1-301 Carbon Intensity Limit or Annual CO<sub>2</sub>e Emissions Limit:** The owner/operator of any petroleum refinery shall not operate a petroleum refinery unless one of the following is met:
- 301.1 Carbon Intensity Limit:** Carbon Intensity does not exceed the Adjusted Baseline Carbon Intensity Limit, or
  - 301.2 Annual CO<sub>2</sub>e Emissions Limit:** Total Refinery CO<sub>2</sub>e Emissions do not exceed the Annual CO<sub>2</sub>e Emissions Limit.
- Any refinery that fails to comply with either the Carbon Intensity Limit or the Annual CO<sub>2</sub>e Emissions Limit shall investigate the causes of excessive CO<sub>2</sub>e emissions and report the results to the APCO, including proposed corrective actions. A second, and each subsequent failure to comply with either the Carbon Intensity Limit or the Annual CO<sub>2</sub>e Emissions Limit within any five-year period, shall be a violation of 13-1-300 for each day of that calendar year.
- 13-1-302 Carbon Intensity:** The Three-Year Rolling Average Carbon Intensity shown in Section 13-1-302.5 shall be calculated as follows:
- 302.1 Refinery CO<sub>2</sub>e Emissions:** Refinery CO<sub>2</sub>e emissions shall be based on the California Air Resources Board Green House Gas emissions inventory<sup>2</sup> (CARB GHG emissions

<sup>2</sup> Annual GHG emissions, California Air Resources Board Emissions Inventory: Mandatory GHG

inventory) reported near the end of each calendar year for the prior year.

**302.2 Adjustments to Refinery CO<sub>2</sub>e Emissions:** Adjustments to Refinery CO<sub>2</sub>e Emissions are described as follows:

**a. Adjustments to Refinery CO<sub>2</sub>e Emissions for Net Import of Power:** CO<sub>2</sub>e emissions for each refinery in Section 13-1-302.1 shall be adjusted to include CO<sub>2</sub>e emissions from any refinery net import of power from any support facility or external entity during the calendar year. The CO<sub>2</sub>e emissions data shall be obtained from the CARB GHG emissions inventory.

CO<sub>2</sub>e emissions from net import of power from a support facility shall be calculated as follows:

$$\text{Import Power CO}_2\text{e} = \frac{\text{Total Metric Tons CO}_2\text{e from Support Facility Source}}{\text{Total Megawatt-hrs Power from Support Facility Source}} \times \text{Megawatt-hrs of Import Power}$$

CO<sub>2</sub>e emissions from net import of power from an external entity shall be calculated as follows:

$$\text{Import Power CO}_2\text{e} = \text{GHG Emission Factor (in Metric Tons CO}_2\text{e / Megawatt-hr)}^3 \times \text{Megawatt-hrs of Import Power}$$

**b. Adjustments to Refinery CO<sub>2</sub>e Emissions for Net Import of Manufactured Hydrogen:** CO<sub>2</sub>e emissions for each refinery in Section 13-1-302.1 shall be adjusted to include CO<sub>2</sub>e emissions from any refinery net import of manufactured hydrogen from any support facility or external entity during the calendar year. The CO<sub>2</sub>e emissions data shall be obtained from the CARB GHG emissions inventory.

GHG CO<sub>2</sub>e emissions from net import of manufactured hydrogen from a support facility or external entity shall be calculated as follows:

$$\text{Import Hydrogen CO}_2\text{e} = \frac{\text{Total Metric Tons CO}_2\text{e from Hydrogen Mfg Source}}{\text{Total Million SCF Hydrogen Produced from Mfg Source}} \times \text{Million SCF of Import Hydrogen}$$

**c. Adjustments to Refinery CO<sub>2</sub>e Emissions for Net Import of Steam:** CO<sub>2</sub>e emissions for each refinery in Section 13-1-302.1 shall be adjusted to include CO<sub>2</sub>e emissions from any refinery net import of steam from any support facility or external entity during the calendar year. The CO<sub>2</sub>e emissions data shall be obtained from the CARB GHG emissions inventory.

CO<sub>2</sub>e emissions from net import of steam shall be calculated as follows:

1. Quantify pounds, pressure and temperature of imported steam.
2. Determine heat content (enthalpy) of steam for the pressure (psia) and temperature of the imported steam from steam tables<sup>4</sup>, in BTU/pound of steam.
3. Calculate Millions of BTU's heat imported via steam as follows:

$$\text{Import Steam - Millions of BTU's} = \text{Pounds of Import Steam} \times \text{Enthalpy of Steam at that pressure}$$

4. Calculate CO<sub>2</sub>e for import steam as follows:

Reporting - Reported Emissions, ARB Calculated Covered Emissions (metric tons CO<sub>2</sub>e) - <https://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm>

<sup>3</sup> 2013 (most recent available) GHG Emission Factor = 0.194 Metric Tons CO<sub>2</sub>e / Megawatt-hr [https://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge\\_ghg\\_emission\\_factor\\_info\\_sheet.pdf](https://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf), November 2015

<sup>4</sup> <http://www.che.ksu.edu/docs/imported/SteamTable.pdf>

$$\text{Import Steam CO}_2e = \frac{\text{Total Metric Tons CO}_2e \text{ from Steam Source}}{\text{Total Millions of BTU's of Steam from Steam Source}} \times \text{Millions of BTU's of Import Steam}$$

**302.3 Total Refinery CO<sub>2</sub>e Emissions:** Total refinery CO<sub>2</sub>e emissions each year shall be calculated as follows:

$$\text{Total Refinery CO}_2e \text{ Emissions} = \text{CARB GHG Reported CO}_2e + \text{Import Power CO}_2e + \text{Import Hydrogen CO}_2e + \text{Import Steam CO}_2e$$

**302.4 Carbon Intensity:** Total Refinery CO<sub>2</sub>e Emissions for each refinery in Section 13-1-302.3 shall be divided by the sum of actual crude volume plus actual non-crude oil feedstock volume during that calendar year.

Carbon Intensity (CI) shall be calculated as follows:

$$\text{Carbon Intensity} = \frac{\text{Total Refinery CO}_2e \text{ Emissions in Metric Tons CO}_2e \text{ for Calendar Year (a)}}{\text{Actual Crude Volume (K bbls) plus Actual Non-crude Oil Feedstock Volume (K bbls) for Calendar Year}}$$

(a) including adjustments cited in Sections 13-1-302.2.

**302.5 Three-Year Rolling Average Carbon Intensity:** Three-year Rolling Average Carbon Intensity shall be calculated as follows:

$$\text{Three-year Rolling Average Carbon Intensity} = \frac{\text{CI: previous year} + \text{CI: 2 years ago} + \text{CI: 3 years ago}}{3}$$

**13-1-303 Baseline Period - Alternate Year Substitution for Abnormal Refinery Operations:** An alternate year may be identified and substituted into the three-year baseline period if any refinery has abnormal operations during any baseline calendar year where crude volume is less than 70% of the crude volume in either of the other two years. The determination of an appropriate alternate year shall be in the sole discretion of the APCO.

**13-1-304 Baseline Carbon Intensity:** Average Carbon Intensity from the three-year baseline period of 2013, 2014, and 2015 shall define the basis for each refinery's carbon intensity limit, effective the beginning of the calendar year after rule adoption. The Baseline Carbon Intensity shall be calculated as follows:

$$\text{Baseline Carbon Intensity} = \frac{\text{CI: 2013} + \text{CI: 2014} + \text{CI: 2015}}{3}$$

**304.1 Adjustment to Baseline Carbon Intensity for Energy Improvement Projects:** The Baseline Carbon Intensity for each refinery in Section 13-1-304 shall be adjusted based on expected CO<sub>2</sub>e emission benefits from each Energy Improvement Project with a simple payback of 10 years or less that have not been implemented during the Baseline Period. Unrealized CO<sub>2</sub>e emissions benefits shall be subtracted from the refinery's Total Refinery CO<sub>2</sub>e Emissions for each baseline year to establish the Adjusted Baseline Carbon Intensity Limit as follows:

$$\begin{aligned} \text{Adjusted Baseline Carbon Intensity Limit} = & \frac{1}{3} \\ & * \left\{ \frac{\text{Total Refinery CO}_2e \text{ Emissions}_{2013} - \text{Unrealized CO}_2e \text{ Emission Benefits from Energy Improvement Projects}_{2013}}{\text{Refinery Throughput}_{2013}} \right\} \\ & + \left\{ \frac{\text{Total Refinery CO}_2e \text{ Emissions}_{2014} - \text{Unrealized CO}_2e \text{ Emission Benefits from Energy Improvement Projects}_{2014}}{\text{Refinery Throughput}_{2014}} \right\} \end{aligned}$$

$$+ \left[ \frac{\text{Total Refinery CO}_2\text{e Emissions}_{2015} - \text{Unrealized CO}_2\text{e Emission Benefits from Energy Improvement Projects}_{2015}}{\text{Refinery Throughput}_{2015}} \right]$$

- 13-1-305 Alternate Compliance Option – Annual CO<sub>2</sub>e Emissions Limit:** Compliance with the Annual CO<sub>2</sub>e Emissions Limit is an alternate to compliance with the Carbon Intensity Limit in Section 13-1-301.

Annual CO<sub>2</sub>e Emissions Limit shall be calculated as follows:

$$\text{Annual CO}_2\text{e Emissions Limit} = \text{Adjusted Baseline Carbon Intensity Limit} \times \text{Refinery Peak Processing Volume}$$

- 13-1-306 Provide Information Needed for CO<sub>2</sub>e Emissions Adjustments:** The owner/operator of any petroleum refinery shall obtain and provide verified GHG data and supporting Verification Reports (as required by the Mandatory Greenhouse Gas Reporting Regulation) from the previous year to the APCO by December 31 of each calendar year. This data shall include CO<sub>2</sub>e emissions and other supporting information for the refinery, and for each support facility and each external entity that provides power, manufactured hydrogen or steam, as needed to satisfy the requirements of Section 13-1-401.
- 13-1-307 Provide Information Needed for CO<sub>2</sub>e Emissions Benefits from Energy Improvement Projects:** The owner/operator of any petroleum refinery shall provide status of Energy Improvement Projects implemented during the previous calendar year to the APCO by December 31 of each calendar year. This status report shall include actual CO<sub>2</sub>e emissions benefits and other supporting information as needed to satisfy the requirements of Section 13-1-403.
- 13-1-400 ADMINISTRATIVE REQUIREMENTS**
- 13-1-401 Information Needed for CO<sub>2</sub>e Emissions Adjustments:** The owner/operator of any petroleum refinery shall obtain and provide to the APCO the (i) CO<sub>2</sub>e emissions information from CARB GHG emissions inventory, (ii) information regarding the net import of power, (iii) information regarding the net import of manufactured hydrogen, and (iv) information regarding the net import of steam, as required to satisfy the requirements of Section 13-1-302.
- 13-1-402 CO<sub>2</sub>e Emissions Adjustments:** CO<sub>2</sub>e emissions adjustments in Section 13-1-302 shall be implemented each year based on power, manufactured hydrogen and steam imports during the previous year. The procedure for determining any CO<sub>2</sub>e emissions adjustments are as follows:
- 402.1 Preliminary Refinery Submission and APCO Review:** By December 31 of each calendar year, each refinery will submit proposed CO<sub>2</sub>e emissions adjustments. The APCO will complete a preliminary review of the proposed adjustments by March 31 of the following year to identify any deficiencies. If the APCO determines that the proposed CO<sub>2</sub>e emissions adjustments are deficient, the APCO will notify the owner/operator in writing. The notification will specify the basis for this determination.
- 402.2 Owner/Operator Corrective Action:** Upon receipt of such notification in Section 402.1, the owner/operator shall have the opportunity correct the identified deficiencies and resubmit the proposed CO<sub>2</sub>e emissions adjustments within 30 days. If the APCO determines that the owner/operator failed to correct any deficiency identified in the notification, the APCO shall propose necessary corrections to the CO<sub>2</sub>e emissions adjustments and shall notify the owner/operator of any such adjustments.
- 402.3 APCO Reconciliation Action:** If the APCO proposes adjustments pursuant Section 402.2, the owner/operator shall have the opportunity to re-submit proposed CO<sub>2</sub>e emissions adjustments within 30 days of notification of APCO-proposed adjustments. If, at the end of this 30-day period, the APCO determines that the owner/operator has failed to submit an accurate CO<sub>2</sub>e emissions adjustment, the APCO will notify the owner/operator of the CO<sub>2</sub>e emissions adjustment that will be used for purposes of Section 13-1-301.1.
- 402.4 Public Inspection:** Within 15 days of the approval of CO<sub>2</sub>e emissions adjustments,

the APCO shall post the approved CO<sub>2e</sub> emissions adjustments and supporting rationale on the Air District's website. The Air District shall consider any written comments submitted within 15 days regarding this report, and will make any corrections needed to ensure accuracy and completeness of the report. The information will include a short description of the methodology used but will not include detailed calculation methodologies for individual sources, and will provide aggregated rather than source specific emissions information for CO<sub>2e</sub> emissions adjustments, Adjusted Baseline Carbon Intensity Limits and Annual CO<sub>2e</sub> Emission Limits.

**13-1-403 CO<sub>2e</sub> Emissions Benefits from Energy Improvement Projects:** Estimated CO<sub>2e</sub> emissions benefit adjustments to the Adjusted Baseline Carbon Intensity Limit in Section 13-1-304 shall be made each year based on implementation status of each Energy Improvement Project. The procedure for determining unrealized CO<sub>2e</sub> emissions benefit adjustments shall follow the same process and deadlines described in Sections 13-1-402.1 – 402.4.

**13-1-500 MONITORING AND RECORDS**

**13-1-501 Investigation Report and Corrective Actions Required for Non-Compliance:** Any refinery that fails to comply with either the Carbon Intensity Limit or Annual CO<sub>2e</sub> Emissions Limit (Section 13-1-301) during the same calendar year shall submit an investigation report, including proposed corrective actions to the APCO, by no later than 120 days after receiving a Notice to Comply from the Air District.

**13-1-502 Records:** The owner/operator of a petroleum refinery shall keep the following records, in a form suitable for inspection for a period of at least five (5) years. Such records shall be retained for a minimum of sixty (60) months from date of entry and made available to the APCO upon request. These records shall include, but are not limited to the following:

**502.1 Refinery CO<sub>2e</sub> Emissions:** the total refinery CO<sub>2e</sub> emissions in a calendar year.

**502.2 Verification Reports:** reports from a third-party verifier validating refinery CO<sub>2e</sub> emissions submission to CARB.

**502.3 Carbon Intensity:** The carbon intensity calculations of Section 13-1-602.

**502.4 Net Import Power:** The total quantity of power imported to the refinery in a calendar year as well as the total quantity of CO<sub>2e</sub> emissions from imported power.

**502.5 Net Import of Hydrogen:** The total quantity of hydrogen imported to the refinery in a calendar year as well as the total quantity of CO<sub>2e</sub> emissions from imported hydrogen.

**502.6 Net Import of Steam:** The total quantity of steam imported to the refinery in a calendar year as well as the quantity of CO<sub>2e</sub> emissions from imported steam.

**502.7 Baseline Carbon Intensity:** The information used to calculate the Baseline Carbon Intensity per Section 13-1-604.

**502.8 Refinery Peak Processing Volume:** The information listed in Section 13-1-217.

**502.9 Energy Improvement Projects:** The quantity and calculations of CO<sub>2e</sub> emissions resulting from energy improvement projects per Section 13-1-604.1.

**502.10 Excessive CO<sub>2e</sub> Emissions Report:** Any report and underlying information used to comply with Section 13-1-301 and Section 13-1-501.

**13-1-600 MANUAL OF PROCEDURES**

**13-1-601 Determination of Compliance Procedure:** Compliance with Section 13-1-300 shall be determined using Manual of Procedures (MOP) Volume II, Engineering Permitting Procedures; Part 5, Assessment of Refinery CO<sub>2e</sub> Emissions and Carbon Intensity establishes the procedure for:

- Calculating the annual CO<sub>2e</sub> emissions for each refinery, including adjustments for net import of power, manufactured hydrogen, and steam.
- Calculating Carbon Intensity for each refinery each year.
- Calculating Three-Year Rolling Average Carbon Intensity for each refinery each year.,
- Calculating Baseline Carbon Intensity.
- Calculating the Adjusted Baseline Carbon Intensity Limit based on unrealized CO<sub>2e</sub> emissions benefits from Energy Improvement Projects not yet implemented.
- Calculating Annual CO<sub>2e</sub> Emissions Limit, and

- Determining whether each refinery is in compliance with either the Adjusted Baseline Carbon Intensity Limit or the Annual CO<sub>2e</sub> Emissions Limit as follows:
  - A refinery complies with the Carbon Intensity Limit when the refinery Three-Year Rolling Average Carbon Intensity (13-1-302.5) for the calendar year is less than the refinery's Adjusted Baseline Carbon Intensity Limit (13-1-304.1).
  - A refinery complies with the Annual CO<sub>2e</sub> Emissions Limits when the refinery Total Refinery CO<sub>2e</sub> Emissions (13-1-302.3) for a calendar year is less than the refinery's Annual CO<sub>2e</sub> Emissions Limit (13-1-305).

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