

2021 Basis of Preparation



About this document

This document provides an overview of the approach and scope used for data consolidation and form the basis for independent assurance of our 2021 sustainability performance data, as published in Saudi Aramco's 2021 Sustainability Report.

In preparing this document, consideration has been given to following principles:

- Data Preparation: to highlight to readers of this information the primary principles of relevance and reliability of information; and
- Data Reporting: the primary principles are comparability and consistency with other data including previous years and transparency providing clarity to users.

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1. Introduction to Saudi Aramco’s GHG Emissions Basis of Preparation

Saudi Aramco’s Greenhouse gas (GHG) basis for reporting document provides an overview of the reporting boundaries, basic definitions, the basis of calculations, period of reporting, base year, De minimis, and the processes flow, intended to be used for 2021 GHG emissions reporting purposes.

1.1.1 Purpose

The purpose of this document is to provide an overview of Saudi Aramco’s GHG emissions reporting processes, to ensure consistency across the organization, alignment with industry best practice and support internal and external reporting.

The overarching objective of the Saudi Aramco GHG emissions reporting is to:

- Communicate environmental performance trends in a transparent manner, aligned with industry best practice for GHG reporting;
- Provide relevant information at a level of accuracy commensurate with its intended use, upon which internal and external stakeholders can rely;
- Provide data to develop corporate key performance indicators, used to help determine appropriate emission reduction targets; and
- Develop strategies to help shape policy development and comply with all relevant local regulations.

2. GHG Reporting Basis

2.1.1 Reporting Boundaries

Organizational Boundaries

For 2021 GHG emissions reporting purposes Saudi Aramco accounts for its GHG emissions on an operational control basis.

Operational Control definition

An entity is designated to be under Saudi Aramco’s Operational Control, if Saudi Aramco is able to exercise direct operational control over the day-to-day activities of that entity.

For the 2021 GHG emission inventory, reporting boundaries are defined as follows:

- In-Kingdom wholly owned operated assets:
 - Jazan Refinery (excluded for the 2021 GHG emissions inventory since facility was in various phases of startup and commissioning)
- Entities under the Aramco operational control:

- o Saudi Aramco Shell Refinery Company (SASREF) o Motiva Enterprises LLC o Arlanxeo Holding B.V.
- o Aramco Trading Company (ATC) (not accounted for in 2021 GHG inventory due to immateriality of emissions)
- o Aramco Services Company (excluded from the 2021 GHG emissions inventory) o Aramco Overseas Company (excluded from the 2021 GHG emissions inventory) o Saudi Aramco Asia Company (excluded from the 2021 GHG emissions inventory)

The Company generally reports emissions for three out of the seven GHGs required by the UNFCCC/Kyoto Protocol - carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Arlanxeo also report an insignificant amount of HFC, which is also included in the 2021 report.

The remaining Kyoto gases are not accounted to the 2021 GHG emissions inventory.

GHG emissions are converted to total CO₂ equivalent (CO₂e) emissions by multiplying the emissions of a given GHG constituent by its respective Global Warming Potential (GWP)¹. The GWPs used in the Aramco inventory are provided below:

- CO₂ GWP = 1
- CH₄ GWP = 25 □ N₂O GWP = 298

Operationally controlled entities may elect to use different GWPs as long as these are properly documented and justified (local regulatory requirements, consistency with previous years etc.).

2.1.2 Definitions

Operational Boundaries

Operational boundaries involve the specification of the emission sources within, and associated with, each Saudi Aramco facility/asset for GHG accounting and reporting. The goal of prescriptively setting the operational boundaries is to ensure that GHG emissions are reported completely and consistently. Saudi Aramco’s primary GHG emissions are from oil and gas industrial operations in the following sectors:

- Onshore and Offshore Oil and Gas Production
- Natural Gas Processing
- Oil and Natural Gas Transmission and Distribution
- Refining

¹ Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 2007.

- Chemicals

For the year 2021, the Company will report direct (Scope 1) and indirect (Scope 2) emission sources from its operations. Other indirect emissions (Scope 3) associated with raw materials and product lifecycle are not being estimated in the current inventory.

Direct (Scope 1) Emissions

Direct emissions, also referred to as Scope 1, are emissions from sources within assets under Saudi Aramco’s Operational Control. Direct emissions include the following types of emission sources:

- Fuels combusted in stationary sources on-site
- Flaring
- Burn pits
- Process vents
- Fugitive emissions from leaking components

Saudi Aramco has initially focused on the sources with the highest potential to impact the overall inventory, with ambition to expand the scope of emission sources that are included over time.

Indirect (Scope 2) Emissions

Scope 2 accounts for GHG emissions from the generation of purchased electricity and steam consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. The Company account and reports Scope 2 emissions following a location-based method for imported electricity aligned with the World Resources Institute (WRI) guidelines, and the American Petroleum Institute (API) Compendium of Greenhouse Gas Methodologies for the Oil and Natural Gas Industry, 2009.

The Company accounts for and reports its GHG emissions associated with the generation of imported/purchased electricity and steam (Scope 2) separately from Scope 1 emissions, which is consistent with the practice that has evolved in voluntary corporate GHG emissions reporting.

2.1.3 Basis of Calculations

Saudi Aramco follows the guidelines listed below for reporting and managing greenhouse gas (GHG) emissions:

- International Petroleum Institute Environmental Conservation Association (IPIECA) Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions, 2011,² which sets out the accounting guidance for reporting. The IPIECA Guidelines are aligned with international best practices for corporate GHG accounting (see GHG Protocol below).
- World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) Greenhouse Gas (GHG) Protocol: A Corporate Accounting and Reporting Standard, 2015³ (GHG Protocol).
- American Petroleum Institute (API) Compendium of Greenhouse Gas Methodologies for the Oil and Natural Gas Industry, 2009⁴ (referred to as the “API Compendium”) calculation methodologies for quantifying GHG emissions.
- Other GHG emissions accounting and reporting guidelines as required by national GHG emissions reporting schemes.

2.1.4 GHG Inventory Principles

Saudi Aramco follows the generally accepted GHG accounting and reporting principles to ensure:

- (1) Reported data represents a faithful, true, and fair account of the organization’s GHG emissions; and
- (2) Reported information is credible and unbiased in its treatment and presentation of the issues.

2.1.5 Reporting Period

The Company requires that GHG accounting and reporting be carried out in accordance with the principles outlined below. These principles support the quality controls over the GHG data at Saudi Aramco and shall be applied throughout all stages of the reporting process, aligned with the WBCSD GHG Protocol and IPIECA Guidelines.

The GHG emissions reporting period is from January 1st till December 31st for each calendar year.

2.1.6 Base Year

Saudi Aramco for in-kingdom wholly owned and operated assets, has selected calendar year 2018 as the base year for reporting to compare against current year metrics to track performance, as well as set and manage reduction targets. The 2018 calendar year was the first year Saudi Aramco reported GHG emissions with confidence in accuracy across the assets in the Kingdom of Saudi Arabia. As such, 2018 was Aramco’s base year to compare against future years.

² IPIECA, Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions, 2011

³ WRI/WBCSD, Greenhouse Gas (GHG) Protocol: A Corporate Accounting and Reporting Standard, 2015

⁴ API, Compendium of Greenhouse Gas Methodologies for the Oil and Natural Gas Industry, 2009

For entities under Saudi Aramco operational control, 2019 is defined as the base year for reporting to compare against current year metrics to track performance, as well as set and manage reduction targets.

2.1.7 De minimis

As a company’s GHG emissions inventory matures over time, the basis for exclusion of smaller contributors to the overall emissions inventory will evolve from assumptions to calculations to justify exclusion. For example, a source such as a fire water pump is expected to be insignificant, and the data required to justify that assumption is typically not readily available. Therefore, in the initial years of Saudi Aramco’s GHG inventory, key assumptions have been made on the level of materiality of certain source types within the inventory so that the focus can be on collecting accurate data for the largest, most material sources. As the GHG inventory improves over time, the ambition will be to collect some data to justify the exclusion of these smaller, or de minimis, sources.

Sources excluded remain beneath the 1% de minimis threshold for that given source. Collectively, all de minimis sources must be below 5% of the global GHG emissions inventory. Reporting entities may elect to use different de minimis threshold, as long as these are properly documented and justified (local regulatory requirements, consistency with previous years etc.).

2.1.8 Process workflow

2.1.8.1 In-Kingdom wholly owned operated assets

The Essential Suite, Air Module application herein known as Emission Management System (EMS) was selected by Saudi Aramco as the enterprise environmental reporting platform for GHG emissions in 2020 and this was also used for the Year 2021 reporting. In cases, where required, excel sheets shall be used to complement the EMS following the same API Compendium methodologies.

The current methodologies available for GHG reporting are the EMS (source with PI configurations and manual bulk import of datasets) and manual data uploads (primarily Scope 2 and fugitive emissions) using excel template sheets. Both systems utilize equations and emissions factors from the API compendium. However, the EMS is considered the primary reporting process tool, where availability of source equipment PI tags such as, fuel amount, composition etc. are used for GHG calculations coupled with manual import data (where no PI configuration exist). In all data processing, reference equations for GHG accounting is based on API Compendium.

The company’s goal is to transit from excel-based GHG emissions calculations, used for GHG emissions inventories for the year 2018 and 2019, to EMS within a short period of time. However, since the data collection and assurance processes for the excel-based calculations have matured

over the years while those of EMS is still going through maturity, it is expected that the EMS data and processes will be supported by the already proven data and processes for the excel calculations. However, the level of Excel-based support is also expected to reduce with time.

2.1.8.2 Entities under operational control

For entities under operational control, the following processes have been developed by those entities:

- GHG emissions accounting and reporting practices as required by mandatory national GHG emissions reporting schemes.
- Develop a Basis of Reporting (BoR) document describing the context of 2021 GHG emissions reporting data based on a template developed by Saudi Aramco.
- Submit quality assured and quality controlled 2021 GHG emission data and the BoR document to Saudi Aramco through Business Line and Admin Area representatives.

2.1.9 Alignment with Saudi Aramco Processes

The Saudi Aramco GHG accounting are aligned with the following internal processes:

- Corporate Flare Monitoring System (CFMS) Program;
The CFMS allows the facility the ability to monitor their flaring losses in real-time from each individual source in the flare header. CFMS constitutes the basic foundation required to provide opportunity to develop site specific Flare Minimization Plan (FMP) thereby minimizing flaring. CFMS leverages available automation technologies, namely distributed control systems and real-time data historians to translate available real-time measurements of control valves (PCV) openings, pressures, temperatures and other process variables, to flared quantities in standard cubic feet. CFMS flaring figures are validated by the plant engineer and central engineering.
- Leak Detection and Repair (LDAR) Program;
As part of Saudi Aramco's continuous efforts in managing fugitive emissions from its operations, Company's facilities both onshore and offshore, are required to conduct a Leak Detection and Repair (LDAR) program and estimate the associated fugitive emissions annually. The objective of this program is to conduct comprehensive surveys to monitor, repair, estimate, and control fugitive leaks of Volatile Organic Compounds (VOCs), Hazardous Air Pollutant (HAPs), and Methane (CH₄).
- Sulfur Recovery Unit (SRU) Dashboard;
The SRU Dashboard is an integrated platform which provides with the existing Gas Treatment and SRU set-up in Saudi Aramco gas processing plants, and provides GHG emissions from SRU-relevant emissions sources. THE SRU Dashboard leverages available automation technologies to translate available real-time measurements to GHG emissions, associated with carbon dioxide process venting.

- Other individual Programs by entities under Saudi Aramco Operational control as described in their BoR document.

2.1.10 Completeness

Saudi Aramco’s GHG inventory accounts for the GHG emissions from all sources and activities that fall within the organizational and operational boundaries of the company. The completeness principle means in practice that:

- Facilities include all emission sources and activities consistent with the guidance in this document. Sources deemed to be less than the de minimis threshold [5% of emissions (in aggregate, if multiple sources)], and not feasible or cost-effective to collect data on a quarterly or annual basis, can be excluded.
- Acquisitions and divestitures are monitored by Facility Environmental Coordinators and EP and reflected in the inventory (and base year, if appropriate).
- The Company has developed and implemented a comprehensive GHG Emissions inventory plan. This plan incorporates annual changes to the GHG accounting and reporting procedures and/or reporting boundaries, updates to GHG emissions calculation methodologies and improvements in data collection and quality control procedures using excel sheets and/or EMS.

2.1.11 Consistency

Company’s GHG inventory allows for comparisons of GHG emissions across departments and facilities. The consistency principle means in practice that:

- Calculation methods used are consistent across the facilities within the inventory;
- Changes to the boundaries or calculation methodologies used over time need to be consistently applied and transparently documented.
- The Saudi Aramco/Environmental Protection (EP) is responsible for compiling the GHG information from all of the facilities across the corporation in a manner that ensures that the aggregate information is internally consistent and comparable over time.

2.1.12 Transparency

Saudi Aramco’s GHG inventory should be factual, clear, and well documented, such that a third party can review and replicate the calculations. The transparency principle means in practice that:

- A clear data trail must be provided by the Facility-Level Data Coordinators that documents the data flow from source to report;
- Any assumptions used in the estimates are well documented;

- All references to calculation methods or data sources are documented; □ Any data substitutions or exclusions are justified and well documented.

2.1.13 Accuracy

Saudi Aramco’s GHG inventory should be sufficiently accurate to enable intended internal and external users of the data to make informed decisions. The accuracy of the inventory should be improved over time, prioritizing the most material emission sources (i.e., the sources contributing the most to the overall emissions). The accuracy principle means in practice that:

- Emissions data, including measurements and estimates, are systematically neither over nor under the true value, as far as can be judged;
- The most accurate calculation methodology (i.e. activity data from flowmeters, etc.) is used to estimate GHG emissions from sources that are material to the facility level inventory, unless demonstrated to not be feasible or cost effective; and
- Uncertainties in the data are reduced as far as practicable.

3. GHG Emissions Quantification

Per the IPIECA Guidelines, when planning the consolidation of GHG data, it is important to distinguish between GHG accounting and GHG reporting.

- GHG accounting concerns the recognition and consolidation of GHG emissions from operations in which a parent company holds an interest, and linking the data to specific operations, sites, geographic locations, activities and owners.
- GHG reporting concerns the presentation of GHG data in formats tailored to the needs of various reporting uses.

3.1.1 GHG Accounting

Emissions Quantification Methods

The Company will quantify GHG emissions in accordance with calculation methodologies listed in the 2009 API Compendium.

Emissions Reporting Hierarchy

Inventorying of GHG emissions is typically conducted as a ‘bottom-up’ activity by summing emissions from individual sources (or emissions from the total consumption of individual fuel types) at a reporting unit to create an inventory for the reporting unit, and aggregating emissions from the reporting units to create a corporate inventory. Reporting units represent logical groupings of activities and assets for the

purpose of reporting GHG data to the parent company, and typically represent the smallest building block of the corporate inventory.

The Company has chosen to group and aggregate emissions for the following reporting groups:

- By emission source types across all reporting units
- By facility
- By Department
- By Administrative Area
- By Upstream and Downstream Business Lines
- By Saudi Aramco wholly in-Kingdom wholly owned assets
- By Entities under Saudi Aramco operational control □ By Corporate level Scope 1 and Scope 2

4. Energy Intensity Basis of Preparation

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|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition (including unit of measurement) | <p>Energy Intensity (EI) is an index for measuring the total energy consumed to generate a unit of product, represented in thousand BTUs per barrel of oil equivalent (BOE) of hydrocarbon production.</p> |
| Reporting period | <p>The reporting period for this KPI is January 1, 2021 - December 31, 2021. The KPI is also reported internally on quarterly basis.</p> |
| Reporting scope | <p>Saudi Aramco EI calculation is aligned with GRI 302: Energy 2016 standard and the 2020 4th edition IPIECA sustainability reporting guidance for the oil and gas industry.</p> <p>The total energy consumption for calculating the EI is the primary energy utilized by Saudi Aramco in-kingdom wholly owned operated assets. The total energy consumption excludes equivalent primary energy for power that is exported by Saudi Aramco.</p> <p>New facilities will be included in scope for this KPI once they have been operational for a full year.</p> <p>Total hydrocarbon production (in BOE) excludes oil production by Aramco Gulf Operations Company (AGOC) and includes the Kingdom of Bahrain's entitlement to volumes produced from the Abu Sa'fah field.</p> |
| Data consolidation process | <p>Energy Intensity Dashboard solution is utilized as the primary source to consolidate the production and energy consumption values for each Saudi Aramco in-kingdom wholly owned operated facility.</p> <p>After consolidation, the representatives of operating departments validate the data by comparing with locally recorded data. The variances are investigated in order to ensure the accuracy of the reported values.</p> |
| Source | <p>The energy consumption data are extracted from the Energy Intensity Dashboard solution which gathers the data from available PI tags. The data is gathered and validated at the individual energy streams level.</p> <p>For the corporate energy intensity, the production value is provided by Planning and Performance Management Department (P&PMD). P&PMD gathers the production data from multiple organization for reporting the total corporate production in a common unit of million barrel of oil equivalents per day (mboed).</p> |

5. Number of fatalities Basis of Preparation

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|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition (including measurement units) | Number of recordable workforce fatalities |
| Reporting period | The reporting period for this KPI is 1 January 2021 - 31 December 2021. |
| Scope | <p>Aramco reports fatalities for the Total Workforce (which includes employees and contractors). Fatalities are reported for all entities under Aramco’s operational control, which consists of Saudi Arabian Oil Company in-Kingdom wholly-owned operated assets, SASREF, Motiva, ARLANXEO, Aramco Trading Company (ATC), Aramco Services Company (ASC), Aramco Overseas Company B.V. (AOC), and Saudi Aramco Asia Company Ltd. (SAAC).</p> <p>Aramco follows the Occupational Safety and Health Administration (OSHA) Standards for the recording and reporting on incidents.</p> |
| Data consolidation process | <p>SAP EHSM/SafeLife solution is used in Aramco for reporting, consolidating and learning from health and safety incidents. Fatality incidents can be logged into the system by any Aramco employee and contractor with system access. If system access is not available, then fatality incidents can be reported via email.</p> <p>For employees, supervisors may also log incidents on behalf of the employee. For contractor incidents, if the contractor does not have access to the SafeLife solution system, the responsible safety officer or contractor supervisor may log the incident on the system. Line managers are accountable for confirming the completeness and accuracy of the incident record. Aramco’s corporate Loss Prevention determines the classification of an incident (i.e., work-related fatality) using incident data, as well as the investigation report, as needed.</p> |
| Source | <p>Saudi Arabian Oil Company in-Kingdom fatalities are logged into SAP EHSM and SafeLife solution. Aramco’s operationally controlled entities’ fatalities are not logged on the SAP-EHSM/ SafeLife Solution system directly.</p> <p>Instead, the fatality records are received and validated by Saudi Aramco Proponent Organizations and then consolidated by Aramco’s corporate Loss Prevention team for workforce fatality reporting.</p> |

6. Female (%) of total employees' Basis of Preparation

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|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition (including measurement units) | <p>Number of female regular and casual employees as a proportion (%) of total number of regular and casual Saudi Aramco employees</p> <p>Definition of a regular female employee: A full-time female employee in Saudi Aramco Company.</p> <p>Definition of a casual female employee: A wife of a regular expatriate Company employee, including a wife of an Associated Company loanee, who is resident in Saudi Arabia and who has a valid work permit issued by the Saudi Government. She is hired to work for the Company and is employed on the same payroll as her husband.</p> |
| Reporting period | <p>The reported KPI is as of 31 December 2021.</p> |
| Scope | <p>Employees in-scope are regular and casual Saudi Aramco Company employees, who are In-Kingdom.</p> <p>It does not include contractors nor JVs/affiliates. This is consistent with prior year reporting included in the 2021 Sustainability Report.</p> |
| Data consolidation process | <p>A bespoke report in SAP Crystal Reports with defined criteria is developed and checked by senior analysts in Organization Consulting Department (OCD)/Corporate Workforce Analytics Group. The methodology of calculation within the report is then reviewed by the Diversity & Inclusion (D&I) team. Then, the report in SAP Crystal Reports is saved for any future updates. The data from SAP is then exported in to Microsoft Excel for analysis (including review of totals and representation calculations) by D&I.</p> <p>The D&I team reviews and validates the D&I data obtained from OCD for further release to HR management and internal/external reports.</p> |
| Source | <p>Gender classification is logged into the SAP system when the employees is hired. The data is then retrieved from business unit utilizing SAP Crystal Reports.</p> <p>Data is extracted through OCD/Corporate Workforce Analytics Group</p> |

For more information on our sustainability journey and our sustainability reporting, please visit www.aramco.com/sustainability.

