

Greenhouse Gas (GHG) emissions

Saudi Aramco believes that, for the foreseeable future, hydrocarbon-based energy will remain indispensable to supporting continued economic expansion and higher living standards.

The Company established a GHG emissions management program to account for Scope 1 and 2 GHG emissions from the Company's operations and assets, develop relevant KPIs, identify initiatives that could further reduce its already low carbon intensity, and support reporting requirements based on industry guidelines. The program follows the widely-accepted IPIECA industry guidelines and aligns with the GHG protocol developed by the World Resources Institute and the World Business Council for Sustainable Development, as well as the American Petroleum Institute Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industries (API Compendium).

The Company's full year 2018 GHG emissions were verified for the first time by a certified third party and an independent limited assurance opinion was issued. The GHG emissions include carbon dioxide, methane and nitrous oxide.

The following table provides the Company's direct (Scope 1) and indirect (Scope 2) emissions for the in-Kingdom wholly owned operated assets, based on estimates available at the time of publication of this Annual Report. The 2019 data reflects estimates for the fourth quarter of 2019. Hence, metrics are subject to change pending third party verification in 2020.

	2019	2018
Scope 1 emissions*	44.7	46.6
Scope 2 emissions*	13.2	14.7

* Million metric tons of CO₂e.

The Company is pursuing various initiatives to manage the carbon footprint of its operations and assets by implementing flare gas recovery systems, energy efficiency programs, leak detection and repair programs and evaluating the potential utilization of carbon dioxide in various applications, such as enhanced oil recovery.

Minimizing flaring

Since the 1970s, the Company has acted to mitigate the negative environmental impacts of systematic flaring of associated gas by utilizing gas for power generation and petrochemicals production, which also has positive economic benefits to the Company. The Company has grown the MGS, which supplies gas for use in the electric power facilities located in the Kingdom and in the Kingdom's rapidly growing petrochemical sector. The development of the MGS reduced the Company's environmental impact and GHG emissions arising from flaring, in addition to supporting national economic growth.

In addition to the MGS, the Company established a flaring minimization plan in 2006 to further improve its environmental performance. The Company also invested in Company-wide Flaring Minimization Roadmap, and a Fourth Industrial Revolution Center, designed to monitor flaring and other operations in real time. The following table provides flaring intensity for the in-Kingdom wholly owned operated assets in 2018 and 2019.

	2019	2018
Flaring intensity (standard cubic feet per barrel of oil produced)	5.54	5.77

The reduction in flaring intensity in 2019 is mainly attributed to improvements in flare gas recovery systems, enhanced equipment reliability, and improved flare management practices.

In 2019, Saudi Aramco formally endorsed and signed the World Bank's "Zero Routine Flaring by 2030" initiative, with the objective of sharing best practices and knowledge in flaring minimization, reporting progress and demonstrating its efforts in reaching zero routine flaring. The following table provides volume of flared gas for the in-Kingdom wholly owned operated assets in 2018 and 2019.

	2019	2018
Flared gas (mmscf)	26,551	27,783

Low carbon intensity

The proven low carbon intensity of Saudi Aramco's upstream operations, a product of both the unique geology of the Kingdom's reserves as well as its focus on innovation and smart reservoir management practices, positions Saudi Aramco to remain a supplier of choice throughout future energy transitions.

Saudi Aramco has strengthened its operational performance through continuous improvement of its business processes, systems and policies. The Company's legacy and framework for operational excellence and its capacity to deliver at scale have driven efficiency and reliability across its operations.

The upstream process improvements are designed to maintain the low carbon intensity of the Company's operations and flaring reduction commitments. The following table provides the upstream carbon intensity for the in-Kingdom wholly owned operated assets, based on total verified GHG emissions and total hydrocarbon deliveries, applying estimates available at the time of publication of this Annual Report. The 2019 data reflects estimates for the fourth quarter of 2019. Hence, metrics are subject to change pending third party verification in 2020.

	2019	2018
Upstream carbon intensity (kg of CO ₂ e/boe)	10.1	10.2

