



Investing in growth
Innovating for sustainability

aramco



We are Aramco, one of the world's largest integrated energy and chemicals companies

Our approach to sustainability reporting

In this Sustainability Report, we provide an overview of how we have integrated sustainability within our corporate strategy and operations; the material sustainability issues that impact our business and stakeholders; and a summary of key initiatives and sustainability performance during 2022.

Reporting standards

The following sections of this report have been prepared with reference to and guidance from the following frameworks, standards and guidelines:

- Reporting guidelines for our Environment, Social and Governance (ESG) disclosures: **Ipieca**;
- For developing and reporting our materiality matrix: **Global Reporting Initiative (GRI) Sustainability Reporting Principles**;
- For measuring and reporting on our greenhouse gas (GHG) emissions: **Greenhouse Gas Protocol**; and
- For developing and reporting our health and safety performance metrics: **Occupational Safety and Health Administration (OSHA) Standards and the American Petroleum Institute Recommended Practices**.

Reporting boundaries, scope and basis of preparation

This report contains data for the full year 2022 (January 1 – December 31). Where available, we have compared 2022 performance with 2021 and 2020 data.

We have followed industry guidance on defining the boundary scope for performance data. For clarity and transparency, the specific reporting boundaries of each metric for 2022, 2021, and 2020 data have been noted in detail on page 86 in the Data section of this report.

As we progress on our reporting journey and our controls around ESG data mature, we have expanded the scope of our reporting for some metrics, which were limited to the Kingdom of Saudi Arabia in 2021, to cover our operational control reporting boundary for 2022.

Acquisitions made during the year will not be reportable until after the first full year of operation. Therefore, acquisitions made during 2022 will be reportable from FY2024 onwards. Any site that is not fully operational will be excluded from reporting to ensure effective data controls and systems are in place.

The basis of preparation on how we measure and report on the sustainability performance metrics that undergo external independent assurance can be found [online here](#).

For the avoidance of doubt, SABIC and S-Oil's non-financial performance data are not in the scope of this report. Both subsidiaries are publicly listed and issue separate annual sustainability reports.

Internal controls and data validation

All figures in this report represent the latest available, internally validated data, unless specifically referenced. Some of the totals presented may reflect the rounding-down or rounding-up of subtotals.

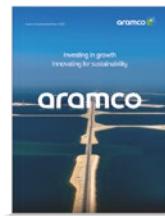
Aramco's internal reporting systems capture and record the data used in this report. All data has been subject to internal validation, including data reviews by the reporting businesses and internal subject matter experts.

Independent assurance

Third-party independent assurance has been sought against 16 prioritized performance metrics, including GHG emissions and fatalities, in accordance with the revised International Standard on Assurance Engagements 3000 (ISAE 3000 revised). Data that has undergone assurance has been referenced throughout the report and the assurance statements can be found [online here](#).



More information on assured data and assurance statements can be found [online here](#)



Cover image:
To protect the highly sensitive ecosystem in Manifa, we followed strict environmental policies enforcing drilling, land, and air protection measures. We also designed a causeway to improve and increase the density of marine life. Learn more about [Manifa oil field](#).

Investing in growth Innovating for sustainability

Our vision

Aramco's vision is to be the world's preeminent integrated energy and chemicals company, operating in a safe, sustainable and reliable manner.

Our mission

Aramco strives to provide reliable, affordable, and more sustainable energy to communities around the world, and to deliver value to its shareholders through business cycles by maintaining its preeminence in oil and gas production and its leading position in chemicals, aiming to capture value across the energy value chain and profitably growing its portfolio.

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Our business in 2022

| | |
|------------------------------------------------------|------------------------------------------------------|
| Net income | Total hydrocarbon reserves¹ |
| \$161 (billion) | 258.8 (billion boe) |
| Total hydrocarbon production² | Net chemicals production capacity³ |
| 13.6 (MMboed) | 56.3 (MMtons/year) |
| Net refining capacity | Capital expenditures |
| 4.1 (MMbpd) | \$38 (billion) |
| Maximum Sustainable Capacity (MSC) | Employees |
| 12.0 (MMbpd) | 70,496 as at December 31, 2022 |
| R&D spend⁴ | Upstream carbon intensity⁵ |
| \$1.2 (billion) | 10.3 (Kg CO ₂ e/boe) |
| Lost time injuries/illnesses rate⁵ | Countries |
| 0.014 (per 200,000 work hours) | 50+ in which we operate |
| Nationalities | |
| 85+ globally | |

1. Hydrocarbon reserves of Saudi Arabian Oil Company (the Company) as at December 31, 2022, under the Concession agreement.
2. Total hydrocarbon production (mboed) is derived from MMscfd (for natural gas and ethane) by dividing the relevant product production by 5.400 (in the case of natural gas) and 3.330 (in the case of ethane).
3. Excludes SABIC Agri-Nutrients and Metals (Hadeed) businesses.
4. Total Group R&D including SABIC.
5. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

\$1.5 billion Sustainability Fund

As part of a long-term strategy of investing (e.g., via our contribution to the Oil and Gas Climate Initiative (OGCI)) in innovative solutions to achieve lower carbon and lower energy intensity, Aramco established a new \$1.5 billion Sustainability Fund to invest in technologies needed to address climate challenges.



Circular economy

For the first time in the Middle East and North Africa (MENA) region, Aramco and its partners produced International Sustainability and Carbon Certification + (ISCC+) certified circular polymers from plastic waste derived oil at SATOP.

Voluntary carbon market

Aramco participated in the first carbon credit auction held in the MENA region through the Regional Voluntary Carbon Market.



Maximizing liquids-to-chemicals value chain

As part of plans to utilize more hydrocarbons for non-combustion uses, Aramco agreed to develop one of the world's largest refinery-integrated petrochemical steam crackers in South Korea through its S-Oil affiliate, which will convert crude oil into petrochemical feedstock.

Manifa field development

The Manifa field development project was recognized as the Upstream Project of the Year at the 2022 Middle East Energy Awards for its development, management, and production, and its innovative solutions for protecting the fragile marine ecosystem in Manifa Bay.



Blue ammonia and blue hydrogen certification

As we explore the development of blue hydrogen as a commercial opportunity that could support emissions reductions in hard-to-decarbonize sectors, two Aramco subsidiaries (SASREF and SABIC Agri-Nutrients (AN)) received the world's first independent certification for production of blue ammonia and blue hydrogen.

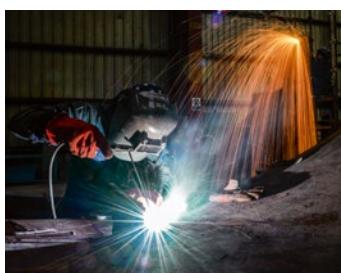
Building one of the world's largest carbon capture and storage hubs

A joint development agreement between Aramco, SLB and Linde was signed to construct one of the world's largest planned carbon capture and storage (CCS) hubs, in Jubail, Saudi Arabia, with a capacity target of 9 MMtpa by 2027.



Reinforced supply chain

Through its In-Kingdom Total Value Add (iktva) program, Aramco signed over 90 corporate procurement agreements valued at \$17.3 billion (SAR 64.9 billion) with manufacturers in Saudi Arabia, which are expected to reinforce Aramco's robust supply chain.



Our Jafurah unconventional gas field

Containing an estimated 200 trillion standard cubic feet (scf) of natural gas, the Jafurah unconventional gas field development is now underway, targeting one of the largest liquid-rich shale gas plays in the Middle East. The Jafurah facility is expected to play a key role in the Saudi Arabian domestic energy sector, displacing significant volumes of oil with gas and in turn lowering emissions.

Positioning Aramco for the future

Increasing shareholder and societal value sustainably

Aramco supports the aims of the Paris Agreement; all of us have a vested interest in protecting the world from human-caused climate change while pursuing economic and social sustainable development.

As one of the world's largest integrated energy and chemicals companies, we have an important role to play along our value chains.

As the world emerges from the effects of COVID-19 lockdowns and deals with the on-going impacts of the conflict in Ukraine, we are facing significant global energy challenges. In Aramco's view, these challenges have confirmed the world's need to increase oil and gas investments, especially capacity development. Importantly, investing in conventional resources does not mean that alternative energy resources and technologies should be ignored.

We believe that any energy transition requires a new global energy consensus built on three long-term strategic pillars:

- Recognition by policy makers and other stakeholders that supplies of affordable conventional energy will continue to be required over the longer term;
- Further reductions in the carbon footprint of conventional energy and improved energy intensity across the economy are priorities, and technology will be a critical enabler for this; and
- New, lower carbon energy sources, steadily complementing proven conventional resources.

At Aramco, we are addressing all three.

We are investing to increase our maximum sustainable oil production capacity to 13 million barrels per day by 2027. We are also growing our gas production, potentially increasing it by more than half through 2030 with a mix of conventional and unconventional gas.

At the same time, we are working to lower our upstream carbon intensity, our gas flaring intensity, and our methane intensity, which are already among the lowest in the world. We are also intensifying efforts to advance key enabling technologies, particularly CCS, which is mission-critical to a sustainable future.

Importantly, we are gradually adding new, lower carbon energy products to our own portfolio, such as blue hydrogen and blue ammonia, renewables, and low carbon synthetic fuels. Meanwhile, chemicals will become a much larger and more strategic part of our portfolio, growing the non-combustible, and lower emission, uses of oil. This is our plan to be part of a practical, stable, and orderly energy transition.

We must partner to drive innovation and value on an unprecedented scale and speed to deliver results across the three pillars successfully. In our view, technologies of the Fourth Industrial Revolution are ripe for such partnerships, especially the rapid digital transformation of our industry. The right digital investments now could help deliver greater efficiency, lower costs, lower emissions, higher reliability, and higher profits over decades.

Transforming the massive existing worldwide energy system, and delivering a secure and sustainable future for everyone, is a truly formidable task that will require both individual and collaborative efforts across industries, along value chains and involve governments, regulators and consumers.

Our strategy

Our strategic themes

Aramco focuses on four strategic themes across its businesses:



Upstream preeminence

As the principal engine of value generation, the Company intends to maintain its position as the world's largest crude oil company by production volume and one of the lowest cost producers. The Company's vast reserves base, spare capacity, and unique operational flexibility allow it to effectively respond to changes in demand.



Downstream integration

The Company has a dedicated linkage to domestic and internationally wholly-owned and affiliated refineries and chemicals operations that are critical to monetizing its upstream production. Through continued strategic integration, the Company captures additional value across the hydrocarbon chain.



Lower carbon initiatives

The Company plans to reduce the net carbon emissions of its operations and to support the global energy transition through the development of lower carbon products and solutions across the energy, chemicals, and materials sectors.



Localization and the promotion of national champions

The Company facilitates the development of a diverse, more sustainable and globally competitive in-Kingdom energy ecosystem to underpin the Company's competitiveness and support the Kingdom's economic development.

Our key enablers

Aramco's strategy requires a number of enablers to be successful, including:

People

Aramco recognizes the need to prepare its workforce for the future, thereby ensuring its capabilities match the requirements of its strategies, by advancing technical and professional skills, developing commercial and leadership competencies and supporting the progress of localization, and focusing on diversity and inclusion.

Technology

Aramco's technology program strives to develop new solutions for its Upstream and Downstream businesses, and to help in diversifying its product portfolio, grow its business sustainably and achieve its net zero ambition.

Portfolio optimization

Aramco seeks to unlock value, enhance its capital structure and reallocate capital to higher growth and return investments. Aramco has a comprehensive and disciplined internal approval process for capital expenditures, new projects and debt issuance.

Our sustainability focus areas



Climate change and the energy transition

≡ See page 19



Safe operations and people development

≡ See page 43



Minimizing environmental impact

≡ See page 57



Growing societal value

≡ See page 71

Investing in growth



When we talk about sustainability at Aramco, we understand that it is about balancing the economic benefits to our owners, the social value and utility that our activities and products generate for customers and consumers, and minimizing any negative environmental and social impacts, to build something that will last: a company that will still be standing strong, generations from now.

At Aramco, we recognize the challenge of sustaining our business and supporting the world's climate ambitions. As we set out in this report, all plausible pathways to global net zero show that ample supplies of conventional energy will still be needed in 2050 and beyond. With one of the lowest upstream carbon intensities per barrel of oil equivalent and an ambition for near zero routine flaring, Aramco is ideally placed to help meet that demand. Demand continues to rise, though not always reliably matched by global supply.

2022 provided an unwelcome reminder that high and volatile energy prices are deeply damaging to the global economy. This could also impede the energy transition itself by raising the costs related to energy policies as well as the cost of material inputs needed for a lower carbon energy system. At a time of great geopolitical stress and underinvestment across our industry, we view our commitment to invest in new upstream production as a responsible course.

However, ensuring security of supply is not where Aramco's responsibilities end. We also have a responsibility to the environment and to the communities in which we are privileged to operate.

In 2022, we took further action to reduce Aramco's emissions impact, by enhancing our energy efficiency, participating in the Kingdom's inaugural carbon credit auction, and unlocking the Kingdom's first large-scale carbon sequestration opportunity. All of these activities are designed to ensure that as long as oil is needed, a barrel of Aramco crude will be among the least carbon intensive on the market.

We are also continuing to support a global orderly energy transition towards a lower carbon emissions future, as we seek to develop blue hydrogen, advanced fuel combustion systems and lower carbon synthetic fuels.

While the climate challenge remains central, for Aramco, sustainability also means having a robust local supply chain, operating in resilient local communities, and being part of a vibrant Saudi economy that excels in many other fields besides crude oil. As you will see in this report, we continue to make progress in all these areas. The Company's recent achievements in supply chain localization — including the first ever "made in Saudi Arabia" drilling rigs — are a personal highlight for me.



We are also continuing to support a global orderly energy transition towards a lower carbon emissions future, as we seek to develop blue hydrogen, advanced fuel combustion systems and lower carbon synthetic fuels."

As ever, our gratitude goes out to The Custodian of the Two Holy Mosques King Salman bin Abdulaziz Al Saud, and His Royal Highness Prince Mohammed bin Salman Al-Saud, Crown Prince and Prime Minister of the Kingdom of Saudi Arabia. Guided by their vision, Aramco is a global energy and chemicals powerhouse — securing our future as the world's indispensable energy supplier.

H.E. Yasir O. Al-Rumayyan
Chairman of the Board of Directors

Innovating for sustainability



Over the last year, there has been increasing acceptance of the fact that there needs to be a better balance between maintaining energy security, energy affordability and environmental sustainability. As you will see in this year's Sustainability Report, Aramco has strengthened its unique and central role in providing the world the reliable energy it requires for an orderly energy transition.

In 2022, we made significant progress on interim targets toward our net zero ambition. We also proudly established a \$1.5 billion Sustainability Fund through Aramco Ventures, which will invest in technologies that will make a difference in addressing the challenge of balancing energy security and sustainability. In addition, we announced plans for one of the largest scale CCS hubs in the world. Aramco, in partnership with SABIC Agri-Nutrients, shipped 25,000 metric tonnes of the world's first commercially accredited blue ammonia to South Korea in 2022. We have made significant strides in increasing diversity in the workplace, employing more women and people with disabilities, including a 23% increase in the number of women in leadership roles at Aramco.

As the world seeks to strike the right balance with the energy transition, Aramco is maintaining positive momentum through our ambitious chemicals program and a focus on the materials transition. We are striving to convert up to 4 million barrels of liquids-to-chemicals per day by 2030. In addition to significant advancements in CCS and hydrogen, we are also investing in renewables.

We are also placing an enhanced focus on innovation and technology to maintain our leadership position as one of the lowest average upstream carbon intensive producers in the world, along with seeking to improve on our upstream methane intensity of 0.05% which is already well below the Oil and Gas Climate Initiative ambition (0.20% by 2025).

Safety is one of Aramco's core values, and each health and safety incident must be reported and investigated to avoid recurrence. While we recorded enhancements in a number of safety metrics in 2022, unfortunately, we suffered the loss of five lives from our dedicated team of employees and contractors. These incidents underscore the critical importance of focusing on safety above all else, and we are fully committed to ensuring that we learn from these incidents, and that each and every person returns home safely, every day.



Aramco has strengthened its unique and central role in providing the world the reliable energy it requires for an orderly energy transition."

As you will see in the following pages of this report, Aramco continues to make significant progress in key areas of sustainability, biodiversity, localization and more. These improvements are a direct result of the talented people who work for Aramco, and credit goes to them for their commitment, passion and drive to succeed. While our Company has plentiful oil and gas reserves, our number one asset is our people. Our successes are their successes, and I look forward to achieving and reporting continued progress as we advance on our sustainability journey together.

Amin H. Nasser
President and CEO

Our sustainability performance

Our focus areas

Aramco has an important role in helping the world navigate the energy transition. What we do as a global community will determine the legacy we leave for future generations. Our intention is to be a part of the solution that creates a stable energy environment which fosters innovation and growth opportunities in developing and developed countries.

We are also committed to providing a healthy, safe, and rewarding environment for our people, our suppliers and communities where we operate while rehabilitating and mitigating the impact on our natural environment.

We have identified four focus areas:

Climate change and the energy transition

Safe operations and people development

Minimizing environmental impact

Growing societal value

Each of these focus areas support Aramco's strategic themes and align with both Saudi Arabia's Vision 2030 and the UN Sustainable Development Goals (SDGs), directly and indirectly. These elements form our sustainability framework, which is presented on page 12.

As part of ongoing materiality reviews and engagement with our stakeholders, we continue to build on this framework, and in 2022 we have measured and added an additional 25 ESG metrics (5 environmental metrics, 17 social metrics and 3 governance metrics) to the 36 metrics we reported in 2021.

These metrics allow us to continue to prioritize key issues most material to our Company and our stakeholders, which we discuss further on page 10.

Climate change and the energy transition



In line with our ambition to achieve net zero Scope 1 and Scope 2 GHG emissions across wholly-owned operated assets by 2050, we strive to provide reliable energy while maintaining leadership as one of the lowest carbon intensity producers of hydrocarbon products.

For more details, see page 19

- Committed to build one of the world's largest CCS hubs (capacity target of 11 MMtpa by 2035)
- Established a \$1.5 billion Sustainability Fund to invest in technology to address climate challenges
- An ambition to reduce our emissions by ~52 MMtCO₂e and lower our upstream carbon intensity by 15% by 2035
- Delivered an upstream methane intensity of 0.05%, well below the OGCI ambition (0.20% by 2025)
- Participated, and purchased credits, in the first carbon credit auction through the Regional Voluntary Carbon Market

Scope 1 emissions²

(MMtCO₂e)

55.7

(2021: 52.3)

Scope 2 emissions²

(MMtCO₂e)

16.1

(2021: 15.5)

Upstream carbon intensity¹ (kg CO₂e/boe)

10.3

(2021: 10.7)

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. The Jazan Refinery (our downstream refinery) is excluded from our current GHG reporting because in 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the Company's commitment to operational transparency.

Safe operations and people development



We are committed to providing a safe and respectful working environment for all, on-site and within the community, supported by appropriate safety procedures, policies and resources. We strive to support, diversify, and empower our workforce.

[For more details, see page 43](#)

- 28% of direct hires were female
- 50% of enrollment in Aramco's college preparatory programs were female
- 23% increase in female employees in leadership positions
- 26% increase in apprentices (1,728 in 2022 versus 1,369 in 2021)
- 66% increase in interns (3,190 in 2022 versus 1,922 in 2021)
- Conducted over 1,100 exercises for emergency preparedness

Fatalities¹
(number)

5
(2021: 1)

Tier 1 process safety events
(number)

11
(2021: 11)

Female employees
(%)

6.4
(2021: 5.6)

Minimizing environmental impact



We strive to conserve natural resources, apply circular models across our value chain, and to have a legacy of projects that improve both natural habitats and shared resources.

[For more details, see page 57](#)

- Launching refurbishment and recycling programs for material streams and equipment
- Over 20 initiatives incorporating circular economy principles
- Ambition to deliver net positive biodiversity and ecosystem impacts
- Continued investments in tail gas treatment facilities
- ISO 14001 certification for 98% of applicable facilities in 2022, with a view to complete coverage in 2023
- Pursuing a water neutrality strategy
- Planted 11 million mangroves and an additional one million trees

Freshwater consumption
(million m³)

93.6
(2021: 94.6)

Hydrocarbon spills
(number)

15
(2021: 13)

Net positive impact on biodiversity^{1,2}
(%)

53
(2021: N/A)

Growing societal value



We seek to grow value wherever we operate. With our biggest footprint in Saudi Arabia, we have invested in the Kingdom's oil and gas ecosystem to enhance the reliability of our supply chain, providing employment and economic opportunities to thousands of Saudi nationals.

[For more details, see page 71](#)

- Aramco entered into over 90 agreements with an estimated value of \$17.3 billion to build long-term collaborative relationships with strategic local suppliers
- Via our investments, encouraged suppliers to have an aggregate investment of over \$600 million in capex, which also created over 4,000 jobs in our supply chain in Saudi Arabia
- Via iktva, facilitated creation of 31 new local manufacturers
- Spent \$370 million on a range of global socio-economic and environmental initiatives

iktva spend
(% in-Kingdom)

63
(2021: 59)

Saudi nationals employed
(%)

90.9
(2021: 90.5)

Social investment*
(\$ million)

370
(2021: N/A)

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. The Net positive impact (NPI) metric is a new KPI developed in 2022 and there is no prior year comparative. The purpose of the NPI is to aspire to achieve net gains for biodiversity and ecosystem services. This is when overall negative impacts on biodiversity are outweighed by the biodiversity gains that are achieved through conservation projects. For the formula of the metric, please refer to page 86 in the Data section of this report.

* Metric reported for the first time externally.

Stakeholder engagement

Aramco recognizes that there is a social contract between our Company and the society within which it operates. Aramco interacts with a range of stakeholders to ensure that their perspectives are considered in the development of our business plans, sustainability plans and objectives; from project planning, to execution, long-term operations and of course, customer service.

During the year, we engaged with key stakeholders on a diverse range of topics.

Our people

Communication channels and examples of engagement:

- Town halls
- Employee engagement surveys
- Employee networks
- Young Leaders Advisory Board
- Training
- Intranet
- Human Resources
- Recognition events
- Senior leadership meetings
- Safety meetings
- Quarterly engagement talks on current events

Discussion topics:

- Our vision and mission
- Corporate ethics and values
- Professional development
- Career progress
- Our strategy
- Sustainability
- Remuneration
- HSE performance
- Industry trends, current events
- Community support/volunteering



Our customers

Communication channels and examples of engagement:

- Customer feedback forms
- Face-to-face meetings
- Regular engagement between sales teams and our business customers
- Customer service centres
- Trade shows and conferences
- Email/newsletters



Discussion topics:

- Sustainability
- Health and safety performance
- Quality control

Our suppliers, partners and contractors



Communication channels and examples of engagement:

- Business performance reviews
- On-boarding program
- Supplier facility visits
- Workshops
- Training programs

Discussion topics:

- Engagement on supply chain disruption and mitigation plans
- Safety requirements
- Agreeing ESG initiatives with suppliers to improve their capabilities
- Performance on quality, delivery and price
- Supplier Code of Conduct
- iktva

Investors, financial institutions, rating agencies, and insurers



Communication channels and examples of engagement:

- Semi-annual earnings calls
- External disclosures
- Direct investor communication
- Annual General Meeting
- Annual insurance renewals
- Revolving credit facility meetings
- Engagement with ClimateAction100+
- Conferences and non-deal roadshows

Discussion topics:

- Climate change and the energy transition
- Environmental performance
- Human capital management
- Financial and operational performance and outlook
- Sustainability (including GHG emissions) related targets and performance
- Risk management

Local charities and nonprofit organizations



Communication channels and examples of engagement:

- Volunteer events
- Student mentoring
- Community events
- Citizen Advisory Panel meetings
- Employee service on community boards

Discussion topics:

- Corporate donations
- Matching contributions
- Community needs

Regulators and industry associations



Communication channels and examples of engagement:

- Business20 (B20) Energy, Sustainability and Climate Task Force under G20 Indonesia 2022
- Saudi ministries and regulators
- Various working groups in Ipieca
- US Environmental Protection Agency (EPA)
- American Petroleum Institute
- International Emissions Trading Association (IETA)
- American Fuel and Petrochemical Manufacturers
- American Society for Testing and Materials
- Community of ESG Practitioners Working Group within the World Economic Forum (WEF)
- OSHA
- International Sustainability Standards Board (ISSB)
- Saudi Organization for Chartered and Professional Accountants (SOCPA)
- OGCI
- Saudi Exchange, Capital Market Authority, London Stock Exchange

Discussion topics:

- Standards setting
- Compliance with regulatory standards
- Project specific discussions
- Supply disruptions
- Balancing the energy transitions
- Permits
- Knowledge sharing on best practices
- Collaboration on industry standards



What are we doing?

Aramco's Co-Chairmanship

Aramco's Co-Chairmanship of the Energy, Sustainability, and Climate Task Force was demonstrated through the year-long active negotiations that led to the publishing of a [policy paper](#) proposing three policy recommendations as part of the B20 communique to the G20, which were centred around enhancing global cooperation to:

- Reducing carbon intensity of energy use through multiple pathways;
- Ensuring a just, orderly, and affordable transition to sustainable energy use across developed and developing countries; and
- Enhancing consumer level access and ability to consume clean, modern energy.

Aramco B20 Co-Chairmanship's message:

"Meeting the world's energy needs in a sustainable manner, without compromising energy security, reliability and affordability, is more essential today than ever before. The B20 Energy, Sustainability, and Climate Task Force plays a key role in leveraging existing capacities and aligning collectively to solve energy transition challenges."

Our local communities



Communication channels and examples of engagement:

- Volunteer events
- Student mentoring
- Community events
- Citizen Advisory Panel meetings
- City Council meetings
- School board meetings
- Economic development associations
- Local industry groups meetings
- Quarterly community newsletters
- Plant tours
- Direct mailings
- Conferences

Discussion topics:

- Social impacts of operations and expansion plans
- Pipeline awareness
- Workforce development
- Local content
- Community development and outreach
- Economic and social investments
- Charitable giving
- Emergency response and preparedness
- Environmental stewardship
- Health and wellness programs
- Mentoring programs and scholarships
- Small business support

Our sustainability framework

Our sustainability framework sets out the areas that hold the greatest potential for our business to have long-term positive impacts, connecting

the UN SDGs and Vision 2030 to our four focus areas, and which encapsulate the material ESG topics stakeholders expect us to address.



Our material ESG topics

During 2022, we performed an annual materiality¹ refresh to assess whether our sustainability focus areas, ESG material topics, prioritized SDGs and metrics remain relevant and appropriate.

The materiality assessment is an in-depth analysis of the risks and opportunities that we face in our stakeholders' topics of interest and serves as an essential process for selecting key sustainability topics for Aramco.

The exercise consisted of:

- External stakeholder engagement (details on pages 10 and 11);
- Internal stakeholder engagement (details on page 10);
- Review of existing (e.g., Ipieca sustainability guidelines) and upcoming standards (particularly the ISSB); and
- Peer benchmarking.

From our benchmarking, internal analysis, and stakeholder engagement, we identified and evaluated over 150 ESG topics. The outcomes of these assessments were tested with external and internal stakeholders to evaluate the relative significance of multiple topics impacts on our business. Prioritizing topics enables us to focus on where we can make meaningful differences.

Upon completion of our materiality refresh exercise and extensive stakeholder engagement, a summary of conclusions and subsequent actions, where appropriate, are provided below:

- Our four focus areas and 13 material topics (plus our focus on corporate governance²) remain relevant and appropriate;
- Greater quantitative and qualitative information is required on some material topics, e.g., biodiversity and human rights, which had no metrics in the prior year. Therefore, for this report, we have introduced metrics and more information on our approach toward biodiversity and human rights;
- Reconfirmed that Aramco's roadmap to establish additional metrics to better monitor and report on our performance under each focus area and material topic is correct. Due to the increasing maturity of existing KPIs and new metrics, we have increased the number of KPIs and metrics in this report to 61 (an increase of 25 metrics from the 36 metrics in the 2021 Sustainability Report);
- Ensure our metrics present a more complete picture of our total footprint. Therefore, various metrics (e.g., water consumed and waste generated) have expanded in scope from Company in-Kingdom to the operational control boundary level;
- Increase our prioritized SDGs from 10 to 12 by including SDG 4 (Quality Education) and SDG 17 (Partnerships for the Goals) — more details on how we've contributed to these are provided over the next few pages; and
- Increasing the number of our metrics in our Sustainability Report undergoing external assurance; from 6 metrics in 2021 to 16 metrics in 2022.

1. The concept of "materiality" refers to the guidance on external reporting from the Global Reporting Initiative, and does not necessarily correspond to the concept of materiality used in connection with Aramco's financial reports.

2. For more information on our governance, relevant material topics and our governance metrics, please refer to page 83 in this report and also page 90 in the [2022 Aramco Annual Report](#).

Mapping our material ESG topics

| Focus area | Relevant metric to monitor performance against each material topic |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Climate change and the energy transition  ☰ For more details, see page 19 | <p>Climate change (including GHG emissions)</p> <ul style="list-style-type: none"> Scope 1 emissions (million metric tonnes of CO₂e) Scope 2 emissions (million metric tonnes of CO₂e) Upstream carbon intensity (kg CO₂e/boe) Upstream methane emissions (metric tonnes of CH₄) Upstream methane intensity (%) Flaring intensity (scf/boe) Flared gas (MMscf) Energy intensity (thousand Btu/boe) |
| Material topics | Impact |
| Climate change (including GHG emissions) |  |
| | <p>7 AFFORDABLE AND CLEAN ENERGY</p> <p>Investing in more than 12 GW in solar and wind energy by 2030, expanding CO₂ storage capacity (e.g., CCS and CCUS) to support clean and affordable energy production, as well as investing in innovative flaring reduction technologies contribute to improved access to affordable, reliable and sustainable energy for all.</p> |
| | <p>8 Decent work and economic growth</p> <p>Given the material impact climate change can have on human life and economic opportunities, Aramco continuously invests in lower carbon energy and alternative energy sources. This will create jobs and contribute to economic growth.</p> |
| | <p>13 CLIMATE ACTION</p> <p>Being one of the world's lowest upstream carbon intensity major producers in line with the Kingdom of Saudi Arabia's Vision 2030 toward cleaner energy, having an ambition to reach net zero emissions by 2050 from wholly-owned operated assets, and also leveraging our influence in non-operated assets, within the timeframe set by the Paris Agreement.</p> |
| | <p>15 LIFE ON LAND</p> <p>As part of our commitment to this SDG in 2022, we planted 11 million mangroves and have set a target to plant another 31 million mangroves by 2025 along the Arabian Gulf and Red Sea shorelines.</p> |
| | <p>17 PARTNERSHIPS FOR THE GOALS</p> <p>Partnering with organizations with a climate focus, such as the OGCI, Ipieca and WEF, via collaboration with governments, the private sector across the different industries and civil society.</p> |

Impact on our business



Impact on our stakeholders

Focus area

Safe operations and people development



(For more details, [see page 43](#)

| Material topics | Impact |
|------------------------------------|--------|
| Workforce protection | |
| Process safety and asset integrity | |
| Human rights | |
| Labor practices | |

Impact on our business



Impact on our stakeholders

* Metric reported for the first time externally.

Relevant metric to monitor performance against each material topic

Workforce protection

- Number of fatalities
- Lost time injuries/illnesses rate (number of LTI cases x 200,000/total work hours)
- Total recordable case frequency (total recordable incidents x 200,000/total work hours)
- Health performance* (number of overdue major health findings) x (100)/total number of open major health findings)

Process safety and asset integrity

- Number of Tier 1 process safety events

Human rights

- Number of grievances raised*
- Sites with a grievance mechanism in place* (%)

Labor practices

- Attrition rate* (%)
- Number of company employees
- Number of female employees*
- Female (%) of total employees
- Female (%) of total number of new hires*
- Number of female employees in leadership positions*
- Female employees (%) in leadership positions
- Number of contractor employees*
- Employee engagement score* (%)
- Employees receiving regular performance reviews (%)
- Number of hired graduates
- Number of apprentices
- Number of interns
- Total hours of training and development*
- Average hours of training and development* (per employee)

Examples of our contributions to UN SDGs



Aramco has various health and safety and well-being programs for our employees (mental health initiatives, workplace standards and technology to minimize exposing our workers to unnecessary risk).



Aramco believes in lifelong learning and development and continues to provide world-class learning experiences that drive personal growth and effective operations at all levels of the Company through innovative platforms such as corporate e-Learning, the Hosted University Programs, Advance Development Programs and others.



Aramco is improving the gender balance of its workforce via a range of female empowerment initiatives. In Saudi Arabia, Aramco funds the STEMania program for school-age girls, offering university scholarships for science, technology, engineering and mathematical degrees.



We have strong policies and processes to manage our ethics, bribery and corruption risks, and ensure a decent working environment for our workforce.

Mapping our material ESG topics

| Focus area | Relevant metric to monitor performance against each material topic |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Minimizing environmental impact  (≡) For more details, see page 57 | <p>Local environmental impact</p> <ul style="list-style-type: none"> Number of hydrocarbon spills Volume of hydrocarbon spills (bbl) Recovered hydrocarbon* (%) Hydrocarbon discharge to water (barrels) SO₂ emissions (kilotonnes) Number of sites with ISO 14001 certification* (%) <p>Biodiversity and ecosystems</p> <ul style="list-style-type: none"> Net positive impact (%)* <p>Water management</p> <ul style="list-style-type: none"> Freshwater consumption (million m³) Freshwater withdrawal (million m³) <p>Product stewardship and waste management</p> <ul style="list-style-type: none"> Industrial waste generated (metric tonnes) Industrial waste recycled* (%) |
| Material topics | Impact |
| Local environmental impact | |
| Biodiversity and ecosystems | |
| Water management | |
| Product stewardship and waste management | |
| <p>Examples of our contributions to UN SDGs</p> | |
| <p> Given water scarcity in Saudi Arabia, the Company has a large seawater treatment and injection network of facilities. Seawater is used as the primary source of water for oil production and to ensure clean water is available for our workforce and local communities.</p> | |
| <p> Embracing circular economy (reduce, reuse, recycle and remove) principles and business models across our operations and activities. For example, our recent scrap-to-commodity program successfully recycled over 200,000 drum containers and over 80,000 tons of steel. Reintroducing these materials to local manufacturers as feedstocks eases the pressure on raw materials extraction and allowed us to recover over \$30 million of value. For more information, please refer to Aramco's circular economy section on our website.</p> | |
| <p> Aramco has systems in place to manage all discharged water to the sea, meeting Government requirements by investing in maintenance and monitoring systems while proactively managing operations to avoid hydrocarbon leaks and spills by maintaining asset integrity throughout the life cycle.</p> | |
| <p> Committed to delivering biodiversity net gain in support of SDG15, Vision 2030 and the Saudi Green Initiative.</p> | |
| <p> Partnering with organizations, such as Ipieca, WEF and others, to help promote good industry practice and better environmental performance. We are also working closely with our suppliers and creating incentives to reward them for improvements in their environmental performance.</p> | |

Impact on our business



Impact on our stakeholders

* Metric reported for the first time externally.

Focus area

Growing societal value



For more details, [see page 71](#)

Material topics Impact

| | |
|-----------------|--|
| Labor practices | |
|-----------------|--|

| | |
|------------------|--|
| National content | |
|------------------|--|

| | |
|-----------------------------|--|
| Human rights (supply chain) | |
|-----------------------------|--|

| | |
|-----------------------|--|
| Community and society | |
|-----------------------|--|

| | |
|-----------------------|--|
| Economic contribution | |
|-----------------------|--|

Impact on our business



Impact on our stakeholders

Relevant metric to monitor performance against each material topic

Labor practices

- Number of people on Aramco sponsored programs*¹

National content

- Saudization (%)
- Saudization of construction contracts (%)
- Saudization of service contracts (%)
- iktva procurement spend in-Kingdom (%)

Human rights (supply chain)

- % of active suppliers signed up to Aramco's Supplier Code of Conduct*
- Number of active suppliers*

Community and society

- Social investment* (\$ million)
- Number of volunteers*
- Number of volunteer hours*

Economic contribution

- Direct economic value generated and distributed (\$ million)
- Total R&D spend (\$ million)

Examples of our contributions to UN SDGs



Aramco has various social investment programs, which look to improve the health and well-being of our host communities around the world.



Aramco believes in lifelong learning and development and continues to provide world-class learning experiences in our community. With a mission to equip the Saudi market with a highly motivated and qualified Saudi workforce, the Company has historically been building and maintaining schools for children and is also creating market/demand driven national training centers, which offer high standard vocational training programs to sponsored trainees.

The Company also has a history of supporting the community via financing various education centers for people with development disabilities, such as Hiba Center for Down Syndrome and the Abdullatif AlFozan Autism Center (the first community center of its kind in Saudi Arabia's Eastern Province to support children on the autism spectrum).



Supporting the economic development of our employees and communities in Saudi Arabia via our iktva spend, various home ownership and Aramco initiatives to seed micro industries (e.g., Roseyar, beekeeping in al-Baha, fisheries in Yanbu' and Baish, olive products in al-Jouf, coffee cultivation in Jazan).



Industry: Creating a world-class local supply chain to serve the needs of the Company and its partners, facilitating the development of a diverse, sustainable, and globally competitive energy sector in the Kingdom.

Innovation: At the heart of our business lies a commitment to innovate and maximize production from our resources, to deliver energy as efficiently as possible from the wellhead to customers.

Infrastructure: The Kingdom's Master Gas System delivers natural gas to industry across Saudi Arabia; while Aramco has also built various roads, educational facilities, cultural centers (e.g., Ithra, which delivered over 8,000 programs and welcomed more than one million visitors during 2022) and numerous other facilities across the Kingdom.

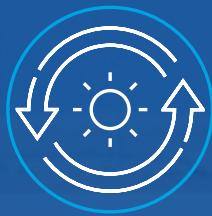


Partnership with governments, suppliers, non-profit organizations and education institutions. During 2022, \$370 million was invested in various social initiatives, supporting more than 30 non-profit organizations around the world.

* Metric reported for the first time externally.

1. These programs include the Vocational College Internship Program (VCIP), University Internship Program (UIP), Summer enrichment program, Tomooh program, Advantage program, and ACCEL International Ajyal Center.





Climate change and the energy transition

As one of the world's largest integrated energy and chemicals company, we have an important role to play to support energy security and promote sustainable practices in response to climate change.

We are investing in technology needed for a stable energy transition that utilizes all sources of energy to meet the world's growing energy demand while reducing GHG emissions.

Our focus is on leading in lower carbon intensity energy production and supporting the development of non-fuel applications for crude oil, targeting the highest impact solutions across our value chain.

The challenge is to develop and deploy technology solutions at speed and scale, to provide the benefits of oil and gas for future generations, while minimizing emissions. It is a complex, multidimensional, and capital intensive challenge that will span generations.

Material topics

Climate change (including GHG emissions)

Relevant metrics

Scope 1 emissions (million metric tonnes of CO₂e)
Scope 2 emissions (million metric tonnes of CO₂e)
Upstream carbon intensity (kg CO₂e/boe)
Upstream methane emissions (metric tonnes of CH₄)
Upstream methane intensity (%)
Flaring intensity (scf/boe)
Flared gas (MMscf)
Energy intensity (thousand Btu/boe)

Relevant UN SDGs



For more details on relevant metrics, see page 86.

Learn more about Aramco's [GHG emissions management program](#).



Scan here

Navigating the energy transition

Toward a low carbon system

Aramco supports the aims of the 2015 Paris Agreement to limit global temperature increase in this century to 2 degrees Celsius, while pursuing efforts to limit the increase even further to 1.5 degrees, and the commitment of the Kingdom of Saudi Arabia to achieve net zero emissions in its economy by 2060. This requires a transition of the global energy system toward a low carbon system, requiring thousands of large-scale projects across multiple sectors. This presents unprecedented design, engineering, and implementation challenges. The McKinsey Global Institute has estimated that a net zero world will cost around \$275 trillion by 2050¹.

Policymakers, industrial suppliers and customers recognize that this transition will not be uniform across geographies. What might be achievable today in more developed economies will be distinct from what is appropriate and effective in emerging markets. Growing markets, particularly in developing countries, face additional challenges to their ability to achieve sustainable development while meeting their needs for affordable, reliable energy. Reduction in GHG emissions across Europe and North America will proceed at a different pace from developing countries.

What does unite all economies and societies is not only the desire to address the impacts of climate change, but also the need for affordable, reliable energy. Across any society, higher energy prices are a burden that disproportionately impacts lower income households.

Balancing energy security, affordability and emissions

Events of the last few years, particularly COVID-19 and the conflict in Ukraine, have highlighted the risks of under-investment in energy sources and underlined the importance of energy security and energy access.

Alternatives to traditional hydrocarbon-based energy sources are progressing, but on their own will be insufficient to meet the world's energy demands today and ensure an orderly energy transition. As COP27 in Sharm El Sheikh highlighted, many developing economies depend upon the low-cost and reliability of hydrocarbons to avoid energy shortages and cost inflation — and they need realistic solutions now to ensure economic security, even while the energy transition develops in parallel.

Although global energy systems are becoming more efficient each year, requiring less energy to meet the same level of economic activity, the demands of a growing middle-class and facilitating access to economies and communities that lack access to energy is leading to a growing energy demand.

The definition of "affordable, reliable energy" diverges depending on the society and its position in the development index. Accordingly, prudent solutions will require a variety of energy sources and technologies. For example, around 800 million people do not have access to electricity and some 3 billion people still depend on indoor fires for cooking² — their requirements differ substantially from those living in a highly advanced economy.

With the focus on energy security and affordability, Aramco's continued investment and capital expenditure to increase supply, combined with our high level of reliability and low carbon intensity of production, will support a global orderly energy transition.

Our 2050 net zero ambition and 2035 GHG emissions reduction targets keep us focused on advancing in lower carbon intensity and abatement technologies and supporting the development of non-fuel applications for crude oil. We also continue to invest in the ability to meet the world's need for energy sourced from hydrocarbons. This includes expanding the gas supply in Saudi Arabia, and exploring new markets, including for blue hydrogen and additional non-combustible uses for oil.

A parallel materials transition

At the same time, the global economy is facing the realities of having to invest in new supply chains for minerals, metals, and materials. Without adequate investment in oil and gas, there remains the risk of raising the cost of the critical inputs needed for any transition.

Hydrocarbons will increasingly be used without combustion or where carbon emissions can be captured and removed. Fuels, such as blue hydrogen, using CCS technologies, are projected to increase in demand. Petrochemicals will provide feedstock essential to the development of new materials that will play a significant role in the energy transition — advanced, durable materials are essential for manufacturing wind turbines, solar panels, all modes of transportation,

McKinsey Global Institute has estimated that a net zero world will cost around

\$275 trillion by 2050¹

1. McKinsey Report: "The Net Zero Transition", January 2022.

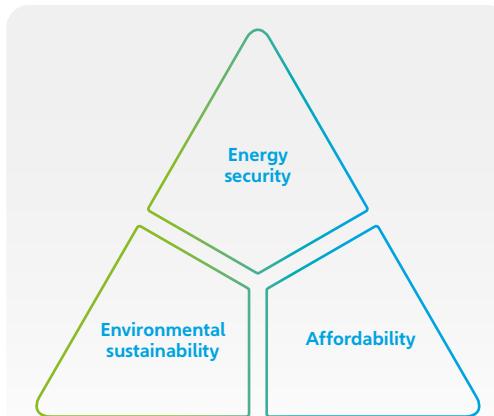
2. Overseas Development Institute '[Oil and gas, poverty and energy access](#)'.

storage devices, and infrastructure. The faster we accelerate the transition, the more of these materials we will need. Today, chemical products made from oil and gas enable over 90% of all manufactured goods.

Energy transition scenarios

Scenario planning has been integral to Aramco's decision-making process for around a decade. The first scenarios were developed in 2014, depicting four pathways to the future energy landscape our business operates in. We have updated the scenarios five times since the start of this journey, each time successively incorporating the increasingly complex nature of our business amid a fast-paced transition. During this decade, the energy world has endured a major downturn in oil price cycles, a pandemic, and several geopolitical events. Scenarios and outlooks have been critically important to strategic dialogues within our Company.

The Company employs in-house expert economists and analysts to develop these scenarios. A wide range of internal and external stakeholders are engaged to determine the drivers of future energy landscapes, our strategies, and investment decisions. These and other important determinants, such as policy developments and climate goals, and technological progress form the basis of our scenario pathways.



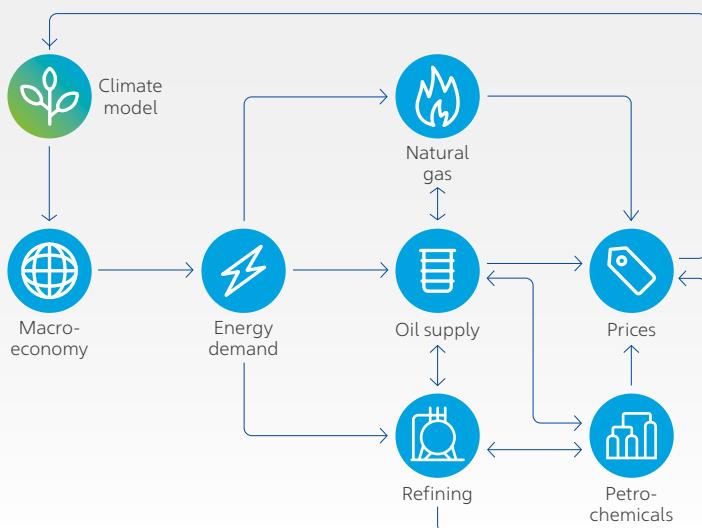
Once the scenario pathways are defined, they are modeled using a proprietary energy analytics system. Scenario outputs include global economic indicators, energy market fundamentals, and GHG emission projections.

In our latest set of scenarios, we have used the energy trilemma framework, first developed by the World Energy Council, to determine alternate pathways for the future. The framework utilizes affordability, energy security and environmental sustainability as three policy objectives that require balance and trade-offs. Each of our scenarios accentuates one dimension of the energy trilemma triangle, while a fourth scenario depicts a balanced approach to these trade-offs.

Aramco's integrated energy and economic modeling system

Aramco developed its proprietary energy solutions platform in collaboration with a number of industry-leading energy data providers and modelers. The platform is a computer-based integrated solution comprised of global economic and energy models. These models represent energy supply (oil, gas, and coal), demand (transportation, residential, commercial, and industrial), conversion (refining, power, and petrochemicals), and macroeconomics.

The system operates in an integrated manner with eight different sub-modules including economics, energy demand, climate, oil supply, gas supply, coal supply, refining, and petrochemicals. The system is capable of modeling at a country-level on 26 sub-sectors, 25 fuel types, energy carriers including electricity and hydrogen, and GHG emissions.



Our climate change and energy transition framework

Our corporate strategy is based on producing hydrocarbons that have one of the lowest upstream production costs and carbon intensities in the world, and supporting a global orderly energy transition towards a lower carbon emissions future through investing in technologies and offering lower carbon products, including e-fuels.

Our climate change and energy transition framework is informed by the circular carbon economy principles of reduce, reuse, recycle and remove.

We have four areas of focus that provide the framework for our climate change initiatives and investments:

Differentiate

Leading in low carbon intensity operations

GHG emissions management

Flaring and methane reduction

Energy management

In-Company renewables

Sustain

Supporting the transition to low-impact energy pathways

Lower carbon fuels and transport technologies

Hydrogen

Diversify

Developing and growing low-impact value chains

Non-metallics

Liquids-to-chemicals

Renewable energy investment

Enable

Collaboration with partners to develop and deploy technologies and infrastructure at speed and scale

Carbon capture and storage

Leveraging technology
Developing offsets and supporting carbon markets



Read about how Aramco seeks to adopt the principles of the [circular carbon economy](#).

Scan here

Leading in low carbon intensity operations

GHG emissions management

We recognize the need to reduce our GHG and methane emissions and have ambitions and targets to reduce carbon emissions associated with our operations.

Our emissions reduction strategy includes investing in low-emission technologies, including CCS, energy efficiency programs and energy mix diversification. We are committed to developing and deploying innovative solutions, optimizing operations, and adopting efficient project designs.

Aramco's industry leading low carbon intensity production performance is the result of almost half a century of careful reservoir management and investment in efficiency, reducing flaring and produced water management. This has yielded an environmental advantage that forms a key pillar of our corporate strategy. We are confident that we can help the world meet its rising energy needs, while reducing emissions from our operations.

Net zero ambition

Aramco's ambition is to reduce GHG emissions from our operations and achieve a net zero GHG emissions footprint by 2050 across our wholly-owned operated assets.

Having undertaken analysis to support this corporate ambition, we know that achieving net zero operational emissions while we grow our business to meet global energy demand will be a huge challenge.

It requires internal targets to be set for our businesses and assets, and for these targets to be embedded into our business planning, to ensure capital expenditure and resource requirements are in place.

What are we doing?

Climate change risk and mitigation

Climate change is considered a top corporate priority for us and we assess this on a medium to long-term horizon. Our response to climate change is embedded in our business strategy, supported by our climate change and energy transition framework and our five GHG reduction initiatives.

| Risk | Mitigation |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Policy: Policies restricting or banning use of fossil fuels, or applying a cost on carbon | <ul style="list-style-type: none"> Climate-related demand scenarios to inform business decision making |
| Technology: Adoption of disruptive technologies and/or slow development of GHG reduction technologies | <ul style="list-style-type: none"> Accelerated development of our technology portfolios, including synthetic fuels, CCUS and CCS technologies, e.g., Jubail CCS Hub |
| Market: Loss of demand for hydrocarbons as customers move to achieve their GHG targets | <ul style="list-style-type: none"> Diversification into low GHG emitting products, e.g., chemicals and hydrogen |
| Legal: Potential exposure to climate-related litigation | <ul style="list-style-type: none"> Accurate and transparent reporting and disclosures with independent assurance |
| Reputation: Impact on corporate reputation | <ul style="list-style-type: none"> Stakeholder engagement, including independent external consultants and subject matter experts to advise on reporting and disclosures, and explain the Company's energy transition pathway |

What are we doing?

Emissions management starts at the subsurface

Our philosophy of sustainable reservoir management is key in reducing our upstream carbon intensity. Instead of maximizing production from wells which could irreversibly damage them, we prioritize the long-term health of our reservoirs. This entails producing our fields at low depletion rates to prevent premature water breakthrough, reducing the quantity of produced water.

Using advanced reservoir modeling and real-time data, our geoscientists and engineers steer multilateral wells with maximum reservoir contact to ensure optimum well placement which help minimize water production. Additionally, these wells are equipped with smart completions which enable shutting off when detecting water. Such practices result in superior produced water management and low water oil ratios (WOR).

When the production of water is minimized, less energy is required for fluid separation, treatment and disposal. These energy savings result in lower carbon emissions. As a consequence, Aramco's average WOR is significantly lower than the global average, and hence our upstream carbon intensity is amongst the lowest globally.

GHG emissions targets

In parallel with our intensity targets, we are aiming to reduce our net annual Scope 1 and Scope 2 GHG emissions from both the upstream and downstream businesses by 52 MMtCO₂e from our business as usual 2035 forecast emissions.

By 2035, consistent with the corporate growth strategy in oil and gas production and development of new businesses, particularly hydrogen and liquids-to-chemicals, we forecast our business as usual Scope 1 and Scope 2 GHG emissions for our wholly-owned operated assets will increase to 119 MMtCO₂e. Our goal is to mitigate this growth in emissions and reduce our emissions to 67 MMtCO₂e by 2035.

What are we doing?

Digital twins

Our EXPEC Computer Center developed a solution to reduce energy intensity and emissions associated with operating subsurface artificial lift systems, leveraging digital twin technology by optimizing the performance of our electric submersible pumps (ESP).

The system was trial tested across 42 ESP lifted wells resulting in a 22% average reduction in power consumption, equivalent to 12 GWh of energy savings during 2022. It is projected that deploying this solution across all fields will result in a 25% average reduction in artificial lift energy intensity at Company level.

What are we doing?

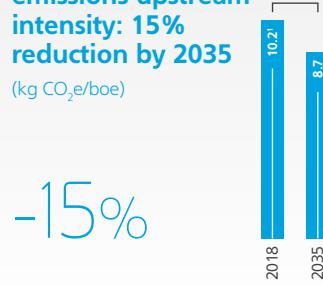
Targeted GHG reduction

Our Yanbu' Refinery facility successfully obtained the International Sustainability and Carbon Certification under its circular cracker oil initiative. The initiative drives the certification relates to an in-house sustainable circular route to produce circular cracker oil from waste oil to reduce our Scope 2 GHG carbon footprint.

Scope 1 and Scope 2 emissions upstream intensity: 15% reduction by 2035

(kg CO₂e/boe)

-15%



Scope 1 and Scope 2 emissions GHG reduction targeted by 2035

(MMtCO₂e)

-52



During 2022, we have made progress toward achieving our 2035 and 2050 ambitions across our five identified levers: energy efficiency, reduced methane and flaring; increased renewables; CCS; and offsets to address emissions we cannot reduce or capture. For more information on our 2022 efforts and impact, please refer to pages 26 and 27.

We have also been conducting site-level bottom-up assessments of what it would take to decarbonize our assets. Once this is completed in 2023, we will update our decarbonization strategy in the next report.

GHG emissions

The Company's GHG emissions management program monitors direct (Scope 1) and indirect (Scope 2) emissions from wholly-owned operated assets, in a manner consistent with the GHG Protocol. Despite increased hydrocarbon production by 10% in 2022, total emissions (Scope 1 emissions and Scope 2 emissions) from the Company and its operationally controlled entities increased by only 6% (71.8 MMtCO₂e in 2022 versus 67.8 MMtCO₂e in 2021) compared to the previous year.

This was enabled by more efficient operations and a reduction in flaring intensity by 17% compared to the previous year due to improved operations of the Company's in-house flare gas recovery systems across several facilities. For more information on our flaring, please refer to page 28.

Our Southern Area Oil Operations won a 2022 Society of Petroleum Engineers Regional Distinguished Corporate Support Award for reducing its emissions by

600,000 tCO₂e

1. 2018 was the first year our GHG inventory was independently assured.

2. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).



Upstream carbon intensity

The Company's 2022 upstream carbon intensity figure remains among the lowest in the industry at 10.3¹ kg CO₂e/boe (2021: 10.7¹ kg CO₂e/boe).

This improvement is predominantly driven by energy efficiency, and reduced flaring across Upstream operations due to improved reliability and performance of our flare gas recovery systems (FGRS). In 2022, two new FGRS became operational in both Abu Ali and Qatif central processing facility resulting in estimated annual flared gas recovery of over 1.0 bscf per year.

Aramco is leveraging its R&D and technology initiatives to develop, and implement innovative approaches that could help lower emissions across our industry and have potential application in other industries.

For more details on what we have done during 2022 regarding our progress on our five levers to meet our 2035 interim GHG targets, please refer to pages 26-27.

Scope 3 — value chain emissions

Our focus is on measurement, reporting, and management of those emissions within our direct control. To date, we have not reported Scope 3 emissions from our supply chain or from customers' use of our products. We are working on supporting the global energy transition towards a lower carbon emissions future through investing in technologies and working with suppliers to integrate ESG performance measures through our ikta program.

Our investment in hydrogen, chemicals and renewable energy sources and the increasing share of gas in our production provide products that will support the global energy transition towards a lower carbon emissions future. We continue to invest in a number of product stewardship partnerships and technologies to reduce emissions, this includes research and development into low emissions transport solutions.

During 2022, we increased our R&D spend on developing potential solutions that will assist the global energy transition towards a lower carbon emissions future — notably over a 45% increase in sustainable mobility R&D spend and over 380% increase in crude to chemicals R&D spend, reflecting the increasing importance of these areas to our future business. For more details on our R&D spend, please refer to pages 40-41.

What are we doing?

Vessel Speed Program

To support the national and corporate GHG reduction aspirations, our terminals instituted the Vessel Speed Program reducing the speed of vessels sailing through the Ras Tanura and Ju'aymah Port to 12 knots from 15 knots. 12 knots was determined as the optimal speed based on vessel engine efficiency, while minimizing impact on customers' satisfaction or our reliability. It is estimated that the program has reduced the GHG emissions of visiting ships by more than 90,000 tCO₂e per year⁴.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. The Jazan Refinery (our downstream refinery) is excluded from our current GHG reporting because in 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the Company's commitment to operational transparency.

3. Fadhili Gas Plant is excluded from 2020 GHG emissions inventory.

4. These emission reductions were calculated from real vessel performance data at different speeds and application of the International Maritime Organization guidelines. Prior to implementation, terminals benchmarked the initiative with other worldwide ports, such as Los Angeles and San Diego in the United States, and other countries including Canada and Singapore.

GHG reduction initiatives to 2035

Levers to achieve interim targets

To achieve reductions in GHG emissions by 2035, we are focusing on five key levers: energy efficiency across our upstream and downstream assets; further reductions in methane and flaring; increased use of renewable energy sources; CCS; and development or purchase of offsets to help address hard-to-abate emissions.

GHG reductions targeted by 2035



1. This figure may not match up due to rounding.

Energy efficiency

Our plans

- Continue to sustain/improve energy intensity
- Optimize co-generation and steam systems
- Ensure energy efficiency in new project design
- Expand utilization and application of the energy efficiency digital solutions
- Initiatives include gas turbine upgrades, boiler and fired heater efficiency improvements

Our actions in 2022

- Achieving a 3% improvement in energy intensity performance compared to last year
- Implementation of new energy efficiency technologies in our industrial and non-industrial facilities
- Using modern low NOx burner technologies to boost fuel efficiency
- Enhancing hydrogen blending capabilities for current boilers
- Upgrading and optimizing operation of boilers, steam traps, and fired heaters
- 36 organizations received the ISO 50001 certification for their energy management system
- Introducing new strategies for implementing energy conservation initiatives for more than 700 buildings

Flaring and methane

Our plans

- Commitment to OGCI near zero upstream methane intensity by 2030 and the World Bank's "Zero Routine Flaring by 2030" initiative
- Further enhance LDAR (Leak Detection and Repair) Program
- Unmanned aerial vehicles and satellite methane detection

Our actions in 2022

- Achieved our lowest ever flaring intensity
- Upstream methane intensity of 0.05%
- Implementing a Flaring Minimization Roadmap, with site-specific priorities across Aramco operations
- Investing in and developing innovative flaring reduction technologies
- Introducing a smart flaring monitoring system
- Installing high efficiency burners
- As part of the LDAR program, surveyed thousands of points across our operations in the Kingdom to minimize methane leaks
- Installed two new Flare Gas Recovery Systems at Abu Ali and Qatif Central Processing Facility

Renewables

Our plans

- Commitment to invest in 12 GW of solar and wind energy by 2030 for our business and also in support of the Kingdom's National Renewable Program

Our actions in 2022

- Sudair Solar PV Plant has reached 56% completion — power generation expected to start in Q4, 2024
- Approved installation of renewable systems to power 20 offshore water injection wells at Berri and Zuluf
- Installing PV systems to power Aramco's remote pipelines load



14
MMtCO₂e

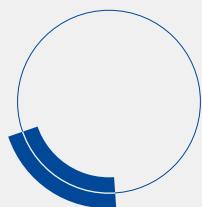
CCS

Our plans

- Jubail CCS hub to capture up to 11 MMtpa by 2035 — contributing towards the Kingdom reaching its goal of 44 MMtpa of CCUS by 2035
- Jubail Hub targeted to store 9 MMtpa, with Phase 1 capturing around 6 MMtpa by 2027 from gas plants at Wasit, Fadhili and Khursaniyah, plus circa 3 MMtpa from other industry sources
- Phase 2 will capture around 5 MMtpa and may include CO₂ from other facilities

Our actions in 2022

- Joint Agreement signed with SLB and Linde to build the Jubail CCS hub
- Identified 9 MMtpa of storage capacity with CO₂ injection expected by 2027
- Captured around 238 MtCO₂ from our pilot Hawiyah Natural Gas Plant resulting in a cumulative total of about 1,570 MtCO₂ stored in the reservoir, since the CO₂ injection started in 2015



11
MMtCO₂e

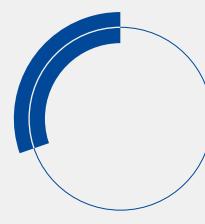
Offsets

Our plans

- Develop carbon offsets from natural climate solutions
- Ambition to plant 300 million mangroves in Saudi Arabia and 350 million mangroves outside the Kingdom by 2035 — expected to remove and offset an estimated 16 MMtCO₂e by 2035
- Assist in developing a credible and functioning carbon credit market in the Kingdom for carbon offsets and credits produced in the MENA region

Our actions in 2022

- Participated, and purchased credits, in the first carbon credit auction held in 2022 through the Regional Voluntary Carbon Market in Saudi Arabia



16
MMtCO₂e

Flaring and methane

Flaring of waste gases has long been recognized as one of the most significant contributors to GHG emissions in the oil and gas sector. Aramco has been a pioneer in gas flaring reduction and now has industry-leading methane intensity and gas flaring metrics.

Minimizing flaring

Aramco is a signatory to the World Bank's "Zero Routine Flaring by 2030" initiative and is committed to sharing best practices with industry partners to accelerate global flaring reduction.

During 2022, our flaring intensity fell by 17%, (4.60¹ scf/boe in 2022 versus 5.51 scf/boe in 2021) due to significant investments, installations and improved operations of our in-house flare gas recovery systems across several facilities and a reduction in routine and non-routine flaring. From April 2022, two new FGGRS became fully operational in both Abu Ali and Qatif central processing facility, which will result in an expected annual reduction of 1.5 bscf per year.

Substantial investments and developments in innovative flaring reduction technologies continued throughout 2022. These included implementing the Flaring Minimization Roadmap, which has identified priorities across Aramco operations, with every operating facility having a flare minimization plan and targets.

Aramco's operations are monitored in real-time at our Fourth Industrial Revolution (4IR) Center in Dhahran. This has enabled us to achieve near zero routine flaring already. We have maintained a flare volume of < 1% of total raw gas production since 2012.

Methane

Addressing methane emissions is one of the fastest, most effective ways to slow the rate of global temperature rise.

An enhanced Leak Detection and Repair program for the Company's methane emissions in the Kingdom prioritizes actions at operating facilities. Hundreds of thousands of points are surveyed across our operations to minimize potential methane leaks. We use drones to monitor and measure methane emissions from our operating facilities.

Upstream methane intensity

(%)

0.05

2020 0.06
2021 0.05
2022 0.05

Flaring intensity

(scf/boe)

4.60

2020 5.97^{2,3}
2021 5.51¹
2022 4.60^{1,2}

In addition to LDAR, we are assessing and deploying remote detection solutions and technologies such as the use of satellite monitoring.

Aramco's upstream methane intensity measures the ratio of our upstream methane emissions for operated assets against the quantity of marketed natural gas. Our upstream methane intensity remained low in 2022 at 0.05% (0.05% in 2021) and is already well below the OGCI ambition to achieve at least 0.20% by 2025.

We have maintained a flare volume of

< 1%
of total raw gas production since 2012

What are we doing?

Two technologies

In 2022, two technologies were piloted to enhance the management of flaring emissions:

- A flaring monitoring system detects flaring performance and optimizes burner feed inputs via cameras equipped with artificial intelligence programs.
- We piloted portable ignition systems for on-demand flaring needs, replacing continuous flaring and emissions.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. The Jazan Refinery (our downstream refinery) is excluded from our current GHG reporting because in 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the Company's commitment to operational transparency.

3. Fadhili Gas Plant is excluded from our 2020 reporting.

Energy management

Co-generation

Highly efficient co-generation plants enable us to produce electricity as a byproduct of our operations and are enabling self-sufficiency in electrical power generation for our own operating plants. We are retrofitting some of our existing plants with co-generation systems to create energy, as well as heat for oil and gas production processes.

We analyze the real-time data of the power generated, which allows us to streamline our carbon footprint.

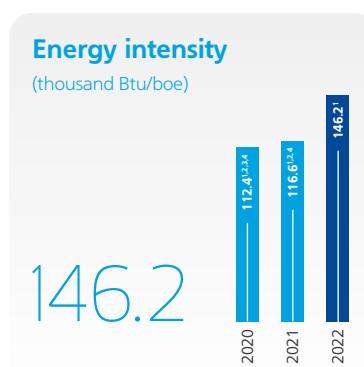
We are harnessing what would otherwise be waste energy by maximizing the conversion of energy released from the combustion of fuel into power and steam to achieve improved thermal energy efficiency and reduce overall GHG emissions. In 2022, we achieved an average thermal efficiency of 70.7% (70.8% in 2021) in our interconnected co-generation facilities.

Energy efficiency

The Company seeks to reduce energy consumption at facilities, design new facilities to be energy efficient, and promote energy efficiency in Saudi Arabia.

While our reporting boundary has expanded as per footnote 1 below, in 2022, at a Company in-Kingdom level, the energy intensity was 112.9 thousand Btu/boe (a fall of 3% from prior year), which demonstrates continued improvement in our energy efficiency initiatives across our business.

We started an energy efficiency management program in 2000. The program has evolved through the implementation of energy efficiency initiatives such as process improvements, fuel gas optimization, higher co-generation utilization, continuous performance monitoring of significant energy users, reduction in energy for crude oil transportation, and load management of top energy users.



As of 2022, we achieved an average thermal efficiency of

70.7%
in our interconnected co-generation facilities

Several initiatives have been planned to improve energy efficiency, including:

- Upgrading of simple cycle gas turbines with energy efficient combined cycle systems;
- Replacement of older inefficient boilers with highly efficient fast ramp up boilers; and
- Implementation of advanced digital solutions to improve energy efficiency performance.

At the end of 2022, all our operational facilities have received the ISO 50001 certification for their energy management system (EnMS). EnMS enables our facilities to focus on an ongoing, sustained improvement in energy efficiency, and reduction in greenhouse gas emissions, along with monetary savings as a result of smarter energy utilization and improved energy efficiency.

What are we doing?

Innovative Energy Project of the Year Award

Aramco won the Innovative Energy Project of the Year Award from the Association of Energy Engineers in recognition of implementing the Energy Demand Forecasting Solution in Oil and Gas facilities. The solution was recognized due to its novel machine learning capabilities that accurately forecast energy demand.

1. As we progress on our reporting journey and our controls around ESG data mature, for this metric from 2022 onwards, we have expanded the reporting boundary from Company in-Kingdom to operational control. The 2021 and 2020 figures are at a Company in-Kingdom level only. In 2022, at a Company in-Kingdom level, the energy intensity was 112.9 thousand Btu/boe.
2. The Jazan Refinery is excluded from our reporting because in 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the Company's commitment to operational transparency.
3. Fadhili Gas Plant is excluded from our 2020 reporting.
4. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

Pathways to lower carbon energy

Aramco's strategy is to increase its production of hydrocarbons while seeking to maximize opportunities for lower carbon products.

We recognize the need to reduce emissions and support a global orderly energy transition towards a lower carbon emissions future through investing in technologies and offering lower carbon products, such as e-fuels, and working with suppliers, to integrate ESG performance measures through our ikta program.

Low carbon fuels and transport technologies

Achieving sustainable mobility requires collaboration across the value chain to meet consumer demand for affordable, low emission transport. Electric vehicles are fast growing and will play an important role in mitigating climate change when integrated with renewable electricity. However, in the near term, transport electrification alone is unlikely to be adequate to meet global CO₂ mitigation goals. This has to be complemented by advanced combustion engines, fuel cell vehicles, and low carbon fuels, including renewable fuels and hydrogen.

Sustainable mobility

Aramco has around 100 scientists and engineers in four locations across the world working on the challenges of sustainable mobility. Through our global network, we are working to create breakthrough transportation technologies with the goal of improving efficiency that has the potential to reduce emissions — both CO₂ and other air pollutants, including NOx and particulates.

We are seeking to redesign internal combustion engines, and the fuels that power them including advanced combustion systems, novel engine architectures, and innovative after treatment systems.

We have two flagship projects that aim to advance the development of low carbon synthetic fuels, one in Spain and another in Saudi Arabia. Aramco's low carbon synthetic fuels plan is to combine CO₂ captured from industrial processes or directly from the air with green hydrogen and target a CO₂ reduction potential of at least 80% on a lifecycle basis.

We are researching:

Gasoline compression ignition

Opposed piston engines

Turbulent jet ignition

Dilute boost engines



For more information on advanced engine technologies see our [website](#)



Scan here

What are we doing?

Demonstrating sustainable fuels through Formula racing

Building on our strategic partnership with Formula 1 (F1) to accelerate our engineering excellence and achieve our respective net zero targets, we are working closely with F1 to support their goal of fully switching to sustainable fuels by 2026.

In February 2022, Aramco entered into a strategic partnership with the Aston Martin Aramco Cognizant Formula One™ Team to promote the development of highly efficient internal combustion engines to accelerate high performance sustainable fuels and advanced lubricants, making use of the diverse technologies Aramco has developed.

Beyond F1, Aramco signed a Memorandum of Understanding with Formula Motorsport Limited to introduce alternative, lower carbon fuels in the Formula 2 and Formula 3 racing championships beginning in 2023.

Through this collaboration, we plan to demonstrate the potential of liquid synthetic fuels to reduce emissions both in motorsport and the broader transportation sector.



What are we doing?

Aramco Ventures and our \$1.5 billion Sustainability Fund

Aramco Ventures is our venture capital vehicle, that invests globally in innovative startup companies.

Aramco Ventures supports three key elements of Aramco's overall strategy:

- Commitment to innovation and technology leadership.
- Supporting our digitalization journey and use of Fourth Industrial Revolution (IR 4.0) technologies.
- Supporting the Company's sustainability ambitions and development of new lower carbon energy solutions.

As we accelerate the implementation of our vision to become the world's preeminent integrated energy and chemicals company, the breadth of our businesses, operations, and geographic presence offer unique opportunities to pilot and deploy the technologies created within the startup companies we invest in.

Launched in 2022, Aramco Ventures' new **\$1.5 billion Sustainability Fund** will accelerate the Company's progress towards developing and using innovative solutions to address the climate challenge, and represents a major expansion of our sustainability investment activities.

The Sustainability Fund's focus is on sectors closely aligned with Aramco's decarbonization and lower carbon energy solutions business strategies, including:

- Carbon capture, utilization and storage;
- Renewable energy and energy storage;
- Energy efficiency technologies;
- Nature-based solutions;
- Hydrogen and ammonia value chains;
- Synthetic renewable fuels, including direct air capture; and
- Digital sustainability solutions.



The Sustainability Fund builds on Aramco Ventures' existing strategic venturing program, which invests in companies developing technologies with strategic importance to Aramco to accelerate their development and deployment in Aramco's operations.

This fund has invested in various companies since inception, with three companies achieving IPO, six reaching "Unicorn" status, and more than 25 technologies deployed in Aramco. This fund will continue to operate focusing on digital and industrial technology domains.

Our **\$1.5 billion Sustainability Fund** will be among the largest sustainability focused venture capital programs announced globally, and the largest by any oil and gas producer.

It will join Aramco Ventures' other investment programs:

- As a founding member of the OGCI, Aramco participates in OGCI's **Climate Investments Fund**. This is a \$1 billion fund that includes the participation of 11 major oil and gas companies. It is focused on investments in carbon capture, utilization, and storage, methane emissions reduction, and carbon dioxide emissions reduction in the oil and gas and transport sectors.
- **Prosperity7**, Aramco's \$1 billion diversified growth venturing program invests in disruptive technologies and start-ups outside of the energy sector. The program focuses on investing in highly scalable start-ups in the U.S. and China. The program has made over 25 investments to date.

1. Unicorn companies are those that reach a valuation of \$1 billion without being listed on the stock market.

Hydrogen

Hydrogen is a primary element in oil and gas, and holds significant potential as a clean, affordable energy that could support emissions reductions in hard-to-decarbonize sectors such as heavy-duty transport, heating, and industrial applications. We believe hydrogen has significant potential to provide a material reduction in GHG emissions, as a global market develops over the next decade.

Hydrocarbon's crucial role in the development of a global hydrogen business

Despite the interest and possibility of producing hydrogen from multiple energy sources, in the short and medium term, hydrocarbons will remain the primary feedstock for its production.

Hydrogen has the potential to become a tradeable commodity, which opens commercial opportunities for our business over the medium to long term.

At the same time, investments in low carbon hydrogen can help foster new technological and industrial development in economies around the world, while also creating skilled jobs.

Natural gas and hydrogen

Natural gas has the potential to be a viable, cost-effective feedstock for blue hydrogen production. Natural gas is the most used feedstock for hydrogen production today.

Aramco is a steering member of The Hydrogen Council, a CEO-led organization that promotes collaboration between governments, industry and investors to provide guidance on accelerating the deployment of hydrogen solutions globally.

What are we doing?

Blue hydrogen certification

In 2022, Aramco and the SABIC Agri-Nutrients Company obtained the world's first independent certifications recognizing "blue" hydrogen and ammonia production.

The certification was granted by an independent testing, inspection and certification agency based in Germany, to SABIC AN, in Jubail, for 37,800 tonnes of blue ammonia and to Aramco's wholly-owned refinery (SASREF), also in Jubail, for 8,075 tonnes of blue hydrogen.

To certify ammonia and hydrogen as "blue" a significant part of the CO₂ associated with the manufacturing process must be captured and utilized in downstream applications.

Capitalizing on this agreement, we made the world's first commercial shipment of blue ammonia to South Korea.



Developing and growing lower environmental impact value chains

The energy transition offers challenges but also various opportunities for us to diversify our portfolio into new, lower impact value chains, including utilizing hydrocarbons for non-combustion uses, such as non-metallic materials and chemical applications, as well as investment in renewables projects.

Such actions provide us with commercial opportunities and help improve our resilience to changes in customer demands caused by the energy transition.

The materials transition

According to a report issued this year by the Atlantic Council, a net zero energy system will be six times as mineral intensive as its hydrocarbon-based predecessor. However, the supply chains needed to deliver these minerals are significantly underdeveloped and undercapitalized; there is a projected \$2 trillion investment gap over the next 15 years for the minerals needed to limit climate change — the world is underprepared for the risk of surging transition-related mineral demand. For example, one megawatt of installed renewable energy capacity utilizes eight to 11 tonnes of petrochemicals-based materials.

Energy demand is projected to more than double from 79 gigatonnes in 2011 to 167 gigatonnes in 2060. Materials production, use, and eventual disposal already accounts for almost a quarter of all global CO₂ emissions. The increase in materials use, even if decoupled from economic growth, will be accompanied by a further rise in CO₂ emissions, particularly in hard-to-abate-industries.

For example, emissions from concrete are projected to total almost four gigatonnes of CO₂ by 2050 because of the growth in demand. Meanwhile, the iron and steel sector accounts for more emissions than the whole of road freight, and global demand for steel alone is expected to rise by more than a third by 2050.

To achieve an accelerated materials transition, cutting-edge R&D, innovation, and the necessary investments are essential.



At Aramco, we see opportunities arising from the materials transition. Steel, concrete and other traditional materials are responsible for significant CO₂ emissions. Non-metallic materials, (e.g. polymers) and other carbon-based materials, can provide durable materials at a lower GHG impact with potential use in housing, construction, infrastructure, automotive, and renewables. At Aramco, we are working across them all.

No matter which energy transition scenario plays out, oil demand from the petrochemicals sector is likely to remain robust. In fact, under a net zero scenario, petrochemicals could account for more than half of total global oil demand by 2050.

The more intense the transition, the more important petrochemicals will be to the oil and gas industry, and other industries. Our pursuit of sustainable materials is underpinned by a powerful business case that is driving our world leading chemicals growth ambitions — making our business portfolio even more robust.

**There is a projected
\$2 trillion
investment gap
over the next
15 years for the
minerals needed to
limit climate change**

Liquids-to-chemicals

Our 2020 acquisition of a 70% stake in SABIC brought together two global companies committed to growth and value creation in petrochemicals.

This propels our strategy to convert up to 4 million barrels per day of liquids-to-chemicals. More advanced, more sustainable materials would strengthen the power of our net zero ambition and our chemicals' strategies. To earn a larger share of the materials market in high volume applications, we must be cost and GHG competitive.

In 2022, we announced the first large-scale deployment of our crude to chemicals cracking technology at our S-Oil integrated downstream hub in Korea and a joint project between Aramco and SABIC to develop a crude-to-chemicals complex in Ras Al-Khair.

These are major steps forward in our downstream business, and show the power of technical innovations to meet our ambitions.

Conversion of crude oil into chemicals diverts our carbon from the transportation fuel value chain into durable goods.

Our chemicals business spans production of basic chemicals such as aromatics, olefins, and polyolefins to more complex products such as polyols, isocyanates, and synthetic rubber.

Our crude-to-chemicals technologies have the potential to deliver higher chemical yields. By converting crude oil directly to chemicals, we will optimize or eliminate several energy-intensive industrial processes, creating cost and operational efficiencies that result in high value chemical product streams.

What are we doing?

TC2C™ — Thermal Crude to Chemicals

The TC2C™ platform was designed by Aramco and its partners to produce greater than 70% chemicals from every barrel of crude oil, while maintaining top tier efficiency. To reduce CO₂ emissions while also improving profitability, TC2C™ deploys a simplification of the crude oil separation process, relative to a traditional fuels-directed refinery, thereby reducing energy and utility requirements. The reuse of heat from the steam cracking section reduces energy consumption even further.

The optimized integration of the hydroprocessing reactor platforms into a single high-pressure loop enables a significant reduction of equipment count compared to more traditional approaches. Furthermore, through careful management of high-value streams such as hydrogen, and by internally recycling low-value streams, production of waste from the process is minimized.

Such efficiencies in energy and material use are major factors in reducing the carbon footprint and capital expenditure of a TC2C™ facility.

TC2C™ was selected in 2022 for its first commercial deployment, as part of our S-Oil integrated downstream hub (Shaheen project) in South Korea.



For more information on our chemicals business, please refer to our [website](#)



Scan here

Non-metallics

Non-metallics are materials such as plastics and other such applications, that can replace traditional materials and minerals. They can provide improved performance and lower maintenance costs and have potentially lower life cycle costs, with greater resistance to corrosion, and a lower carbon footprint than like-for-like alternatives.

In the oil and gas industry, plastics are already being used for various applications, such as in pipelines. In the future, carbon fiber reinforced plastics will be used to manufacture large diameter pipelines with greater strength and operating efficiency than legacy steel-based pipelines.

Today, the cost of advanced composite materials are becoming more competitive and we need to continue to invest in R&D in this sector — by finding new solutions and efficiencies, we can help drive the adoption of new materials at scale across the globe and thereby help meet net zero ambitions.

Renewable energy investments

Renewable energy, including power from solar and wind, is an energy source required under any energy transition scenario. With more than 320 sunny days per year and ample wind, Saudi Arabia's geography and climate hold great potential for harnessing these renewable energy sources. Deployment of renewable resources within the Kingdom will reduce GHG emissions and support long-term prosperity.

The Saudi government has established a National Renewable Program with the goal of increasing the generation capacity of renewable energy sources to over 58 GW by 2030. 40 GW is planned from solar, 16 GW from wind energy and the balance from other renewable energy sources.

Aramco is supporting the Kingdom on this journey and has committed to investing in 12 GW of solar and wind energy by 2030 by being part of a consortium led by ACWA Power to develop the 1.5 GW Sudair solar plant, a key project in Saudi Arabia's renewable energy push. We will use the allocation of renewable energy credits from these investment toward offsetting the emissions associated with power supplied to our operations.

Construction of the Sudair Plant has reached 56%. The project is expected to commence power generation in Q4, 2024.

What are we doing?

Microalgae

Aramco is exploring various applications for microalgae. The Arabian Peninsula is ideal for microalgae production with its extensive, unique *sabkha* (salt flat) formations along the Arabian Gulf.

Through the photosynthesis process, algae efficiently converts sunlight, CO₂, water, and the available nutrients in the wastewater into a carbohydrate and protein-rich biomass, and fresh oxygen, which is then released back into the atmosphere. The resulting biomass can then be converted into many useful products such as biofuel, animal feed, and pharmaceuticals.

Sabkhas can be easily converted to saline algae production ponds. *Sabkha* areas are in close proximity to many of Aramco's industrial facilities, meaning that emissions can be utilized to enrich algae ponds, increasing the potential for productivity and in turn reduce the Company's emissions.

Aramco also trialled an artificial carbon capture and algae production system, known as the "Clima Tree". This uses a microalgae photobioreactor integrated with a patented CO₂ scrubber to capture and store CO₂ in the form of a carbonate mineral, and produce algae biomass as a byproduct. The Clima Tree has been designed by Aramco in collaboration with Greengroves Environmental Services.

What are we doing?

NEXCEL — Non-metallic Excellence and Innovation Center

Aramco and the China Building Materials Academy (CBMA) launched NEXCEL, a new Non-metallic Excellence and Innovation Center, to further advance the use of non-metallic materials in the building and construction sector.

NEXCEL promotes the development and application of non-metallic technologies by exploring opportunities for joint projects in research and development, standards development and adoption, professional development and certifications, advocacy and international outreach.

NEXCEL joins the Aramco-launched NIC: Non-metallic Innovation Centre at The Welding Institute in Cambridge, U.K.; and NEx: A Center of Excellence for Non-metallic Building Materials at the American Concrete Institute, headquartered in Michigan, USA.

Collaboration with partners to develop and deploy technologies and infrastructure at speed and scale

Collaboration with partners to develop and deploy technologies and infrastructure at speed and scale is necessary to support emissions reductions and the development of low carbon business opportunities.

Working with other companies, including contractors, industry peers or companies in our product value chains, and with academia and research institutes, offers an opportunity to share learning and risk, and multiply the impact of investment.

Carbon capture and storage

CCS is identified as a major tool to achieve the global net zero emissions ambition. Industry and governments are responding to this.

In 2022, more than 60 new CCS facilities were announced globally (around a 40% increase in CCS capacity since last year) and resulting in the CCS capacity of all CCS facilities under development globally to 244 MMtCO₂ per annum¹.

We believe capturing and storing, and, where possible, reusing CO₂ has the potential to significantly reduce global emissions. Saudi Arabia has the know-how and scale to capture and store large amounts of CO₂, which could be reused and reutilized. It is an important part of the circular carbon economy and the central lever to support the decarbonization of our own business and operations. It is also an essential element of an integrated blue ammonia and hydrogen program. Partnerships will be required for the development of commercial solutions.

Aramco has set a goal of developing CCS capacity to capture up to 11 MMtCO₂ annually by 2035. The ability to grow our CCS capacity is critical to our efforts to decarbonize, and will be supported by government incentives that will help to develop the infrastructure that will be required.

What are we doing?

CO₂ nanobubbles

When CO₂ is captured in liquid form, CO₂ bubbles are formed. We are investigating CO₂ nanobubbles (CO₂ bubbles with diameters less than 200 nm) for near wellbore stimulation in conventional formations as they have the ability to sequester more CO₂ in the same reservoir than common larger sized CO₂ bubbles. CO₂ nanobubbles are also being considered for green energy applications, such as algal biocrude production.

For unconventional formations, carbon capture underground treatment and sequestration technology is being explored to chemically treat formations with the goal of increasing sequestration capacity.

In parallel, we are developing opportunities to use captured CO₂ for conversion into other materials or products with higher economic value and where either combustion is avoided or lower levels of CO₂ are emitted, e.g., plastics, concrete and biofuels.

CO₂ is a primary building block, which can be used both directly and as a feedstock. Current advanced CO₂ utilization takes place in chemicals production, mineralization processes, and plastics and polymer production. We are also exploring direct air capture — a less mature technology — with technology partners.

We realize the value that a decarbonization lever like CCS can achieve and as such we have fast-tracked the assessment and the development timeline for our first saline aquifer CO₂ CCS project. The assessment entailed the deployment of multiple rigs to drill evaluation wells, and simultaneously acquiring all relevant subsurface data, in order to expedite the technical evaluation of the saline aquifer sink.

This has lead to the announcement of our world-scale CCS hub that will have the capacity to deliver 9 MMtpa of CO₂ by 2027 and sequester it in our saline aquifer sink.

1. [Global CCS Institute – Global Status of CCS 2022 Report](#).

What are we doing?

Jubail carbon capture and storage hub

CCS is one of the key elements of the Saudi Green Initiative and a major contributor to the Kingdom's plan to achieve its 2060 net zero ambition.

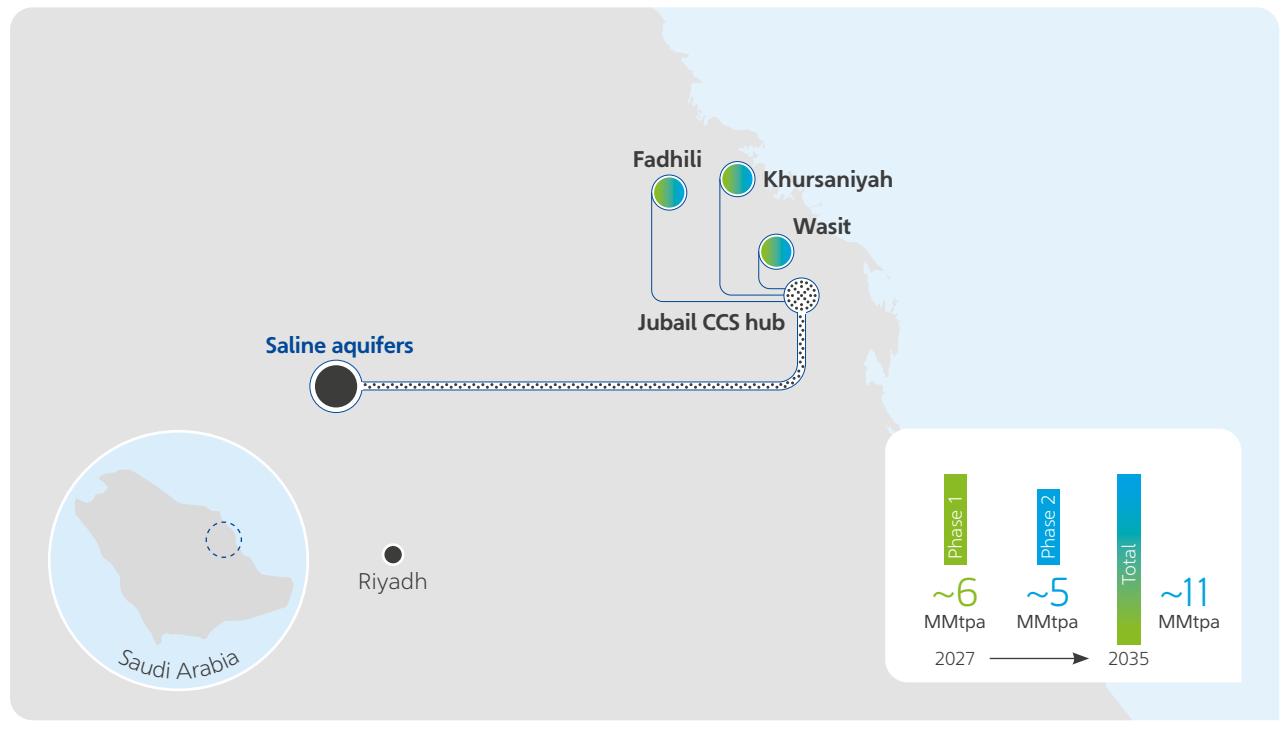
In November 2022, the Ministry of Energy announced a target of capturing 44 MMtpa of CO₂ by 2035. Aramco is a key partner supporting this ambition, and we signed a joint development agreement with SLB and Linde in building a CCS hub in the Jubail industrial zone in the Eastern Province of Saudi Arabia.

This project will be one of the largest CCS hubs globally, and plans to capture up to 9 MMtpa of CO₂ per year from 2027 onwards (Aramco's share is around 6 MMtpa and our partners' share is 3 MMtpa).

To execute the project, Aramco has signed a joint development agreement with experts in the field to design, develop and construct the CCS hub, with a planned completion date of 2027. Phase one of the CCS hub is intended to capture around 6 MMtpa CO₂ by 2027 from three Aramco gas plants (Fadhili, Khursaniyah, and Wasit). Phase 2 of the CCS hub is intended to capture around 5 MMtpa by 2035.

By 2035 up to 11 MMtpa of CO₂ will be captured from Aramco facilities and transported through a pipeline network via the Jubail CCS hub and stored below ground in saline aquifers.

Aramco's planned CCS facilities in Saudi Arabia



What are we doing?

Concrete and CO₂ capture

The manufacture of cement — the principal ingredient of concrete — produces around 7% of annual global GHG emissions.

If the global precast concrete industry implemented CO₂ curing technology, it is estimated it could recycle at least 63 million tonnes of CO₂ every year. The actual figure may potentially be as high as 246 million tonnes of CO₂.

At Aramco, we have developed a pilot program that has delivered storage of 150 to 200 kg of CO₂ in a tonne of cement in precast concrete, or 60 to 80 kg of CO₂ in 1 m³ of precast concrete, outside of the laboratory at a precast concrete plant. We achieved this by combining the CO₂ with steam.

Offsets and carbon credits

A carbon offset is a reduction in emissions of CO₂ or other GHGs made to compensate for emissions made elsewhere. A carbon credit is an instrument traded in carbon markets representing this reduction and may take alternative names such as allowance, permit, or reduction unit. Aramco seeks to generate carbon credits by undertaking greenhouse gas reduction projects.

The use of offsets is an important part of Aramco's net zero planning as they enable the mitigation of hard to abate emissions. They also allow us to accelerate emissions reduction action, particularly where alternatives, such as CCS, are not fully mature.

Carbon reduction operations may include a variety of techniques, such as natural climate solutions, or engineered carbon removal. Commercial arrangements can vary from directly financed projects and joint ventures, to fund investments, sustainable financing mechanisms in the form of carbon credits and direct purchases of carbon offsets from a voluntary carbon market.

While all these techniques help to generate carbon offsets, our goal is to diversify the carbon offsets portfolio, balancing the carbon footprint with the value of co-benefits for the communities and ecosystems where we operate.

Aramco has planted

24 million

mangroves along the Arabian Gulf and Red Sea coastlines and over 3 million terrestrial native trees — and we plan to plant millions more



Natural climate solutions

Natural climate solutions are conservation, restoration and improved land management actions that increase carbon storage or avoid GHG emissions in landscapes and wetlands across the globe. Combined with innovations in clean energy and other efforts to decarbonize the world's economies, natural climate solutions can deliver significant support to combating to climate change.

Aramco is exploring the use of natural climate solutions to generate offsets. To date, Aramco has planted 24 million mangroves along the Arabian Gulf and Red Sea coastlines and 3 million terrestrial native trees — and we plan to plant millions more. Mangroves and trees form a natural sink for CO₂.

Mangrove and native tree planting also restores natural habitats, encouraging biodiversity, and act as a natural barrier to coastal erosion.

To develop useable offsets, Aramco plans to develop baselines, confirm methodologies and establish third-party measurement and verification of carbon stored in mangroves and other trees being planted in Saudi Arabia and abroad.

Aramco is working with external experts to assess the baseline ecosystem carbon stock around our existing mangrove forests to support and facilitate current and future verification assessments of carbon offsets from natural climate solutions projects. A third-party assessment, using The Blue Carbon Initiative methodology¹, was undertaken to quantify the cumulative levels of carbon sequestered through mangroves planted by Aramco alongside both coasts of Saudi Arabia over a number of decades. The assessment recorded an average carbon stock of around 340,000 tCO₂e (between 276,000 tCO₂e and 410,000 tCO₂e.)

In line with the Saudi Green Initiative, which has a target to plant 10 billion trees and increase the percentage of protected areas in Saudi Arabia to more than 30%, Aramco plans to invest in planting 31 million mangroves in the Kingdom by 2025, 300 million in Saudi Arabia by 2035, with a further and 350 million mangroves outside Saudi Arabia by the same date.

Carbon markets

Putting a price on carbon would be a key enabler for motivating investment in emerging technologies that are currently not cost-effective. Aramco favors and supports efficient and cost-effective ways to set a carbon price. We believe market mechanisms that address climate

What are we doing?



Captura

Captura, one of the latest startups invested in by Aramco Ventures, is exploring and looking to scale-up the potential for low-cost atmospheric carbon removal by leveraging the world's largest natural CO₂ absorber — the ocean. With minimal impacts on the environment and using only renewable electricity and ocean water as inputs, its patented electrodialysis process generates a stream of pure CO₂ that can then be sequestered or utilized to make other low carbon products.

Captura's ocean carbon capture represents an innovative and potentially cost-effective approach to reducing atmospheric CO₂. It can also be integrated with desalination infrastructure, which is already deployed at large-scale in Saudi Arabia.

change and sustainable development, and take the economic circumstances of developing countries into account, offer a good balance between driving emissions reductions and supporting economic growth.

To be effective, any framework or market-based mechanism should cover all emitting sectors and all types of GHG emissions, recognize carbon intensity differentiation, equity, and revenue neutrality, as well as transferability of potential credits.

Voluntary markets enable private investors, governments, non-governmental organizations, and businesses to purchase carbon credits to offset their emissions.

The Regional Voluntary Carbon Market

In 2022, Aramco signed a Memorandum of Understanding (MoU) with Saudi Arabia's Public Investment Fund to support the establishment of the Regional Voluntary Carbon Market in Riyadh and participated in its inaugural auction, where 1.4 million carbon credits were sold, of which 650,000 were purchased by Aramco.

1. For more information on [The Blue Carbon Initiative methodology](#).

The credits sourced through the auction are accredited by reputable international standards bodies compliant with globally accepted offsetting schemes (CORSIA) and originate from a variety of carbon reducing projects in developing countries between 2018 and 2020.

Use of carbon offsets

Aramco is building a portfolio of carbon offsets that is either generated through the projects it invests in, or purchased in the voluntary carbon markets. These carbon offsets will be used to offset the Company's residual emissions once we establish our annual targets.

Aramco is actively engaging in the development of global carbon markets through its memberships of the International Emission Trading Association and OGCI.

Additionally, through Aramco Venture's Sustainability Fund, we are planning to invest in new technologies promoting the development of global voluntary carbon markets.

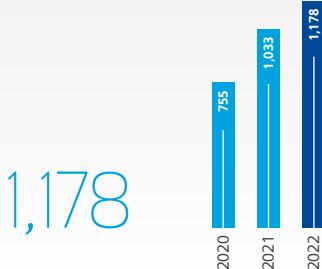
Leveraging technology

We have a track record of innovation and technology development and we recognize that a successful energy transition requires collaboration with a wide range of business and technology partners to develop the solutions needed:

- As the energy transition gathers pace, Aramco is leveraging technology and innovation toward a low carbon future and driving sustainable energy solutions across our business and the industries we supply; and
- We are innovating toward more sustainable solutions to help drive our positive impact on society and boost the quality of life for future generations.

Total R&D spend¹

(\$ million)



1. Total Group R&D including SABIC.

2. Includes direct R&D program costs plus estimated overheads.

3. Does not include SABIC R&D expenses.

What are we doing?

Embracing data-driven decision making: Aramco's Support for the Archie Initiative

As part of our ongoing efforts to drive sustainability and transparency in the energy sector, we support the [Archie Initiative](#), an innovative scientific project aimed at enhancing GHG emissions estimations and fostering transparency within the global energy supply chain.

The Initiative brings together leading researchers, analysts, energy producers and thought leaders from academia and industry to collaborate and provide data on the carbon intensities of various energy sources, enabling better-informed decision-making.

The Initiative utilizes widely accepted life cycle analysis methods to enable a scientifically robust assessment and quantification of GHG emissions from various stages of the energy supply chain worldwide.

We believe our partnership can contribute to a more data-driven energy sector, promoting more sustainable and responsible energy choices for the benefit of shareholders, customers, and the global community.

4,100
oil fields analyzed

96
countries

92%
global production

In 2022, our sustainability-related R&D was \$435 million², which equated to 59% (an increase of 7% from 2021) of total 2022 R&D spend of \$737 million³. Our R&D spend encompassed sustainability focused solutions to improve our business and energy efficiency, lower our carbon footprint and enhance company circularity, as well as supporting the global energy transition towards a lower carbon emissions future.

| R&D focus areas | 2021 spend (\$ million) | 2022 spend (\$ million) |
|--------------------------------------------------------------------------------------|-------------------------|-------------------------|
| CCS | 24.7 | 41.5 |
| Renewable energy | 9.3 | 6.4 |
| Energy efficiency | 55.9 | 64.8 |
| Waste management and recycling | 31.1 | 32.3 |
| Water management | 29.7 | 32.2 |
| Gas treatment | 21.4 | 40.5 |
| Low carbon hydrogen | 25.6 | 26.4 |
| Sustainable mobility | 94.0 | 136.6 |
| Crude to chemicals | 7.8 | 30.3 |
| Non-metallic applications | 15.5 | 24.2 |
| Total R&D for sustainability technologies^{2,3} | 315 | 435 |
| Total Aramco R&D^{2,3} | 607 | 737 |
| % of sustainability-related R&D out of Aramco R&D spend^{2,3} | 52% | 59% |

Examples of ongoing R&D initiatives include:

- Innovative technologies and processes for the utilization of CO₂ in various applications to deliver alternative sequestration pathways;
- Cost-competitive technology for large-scale CO₂ capture from air for reusing it for e-fuels or storage;
- New technologies that optimize/aid in the integration of alternate energies into upstream operations, reducing emissions associated with power consumption;
- Cost-effective and efficient onsite hydrogen and electricity generation systems to provide low carbon hydrogen and electricity for transport;
- With leading engine manufacturers, developing and demonstrating efficiency – and therefore reduced emissions – in internal combustion engines utilizing CO₂, and emissions solutions;
- Converting crude oil directly to chemicals to optimize or eliminate several energy intensive industrial processes;
- In plastics, develop technologies and processes to reduce material and chemical consumption, and increase recycling; and
- Reduce emissions associated with water processing and disposal/re-injection through reduced water production, recycling and reuse.

IR 4.0 — the Global Lighthouse Network

Three of our larger facilities have been accredited by the Global Lighthouse Network, a group of industrial sites that the World Economic Forum has identified as pace-setting in implementing Fourth Industrial Revolution technology at scale.

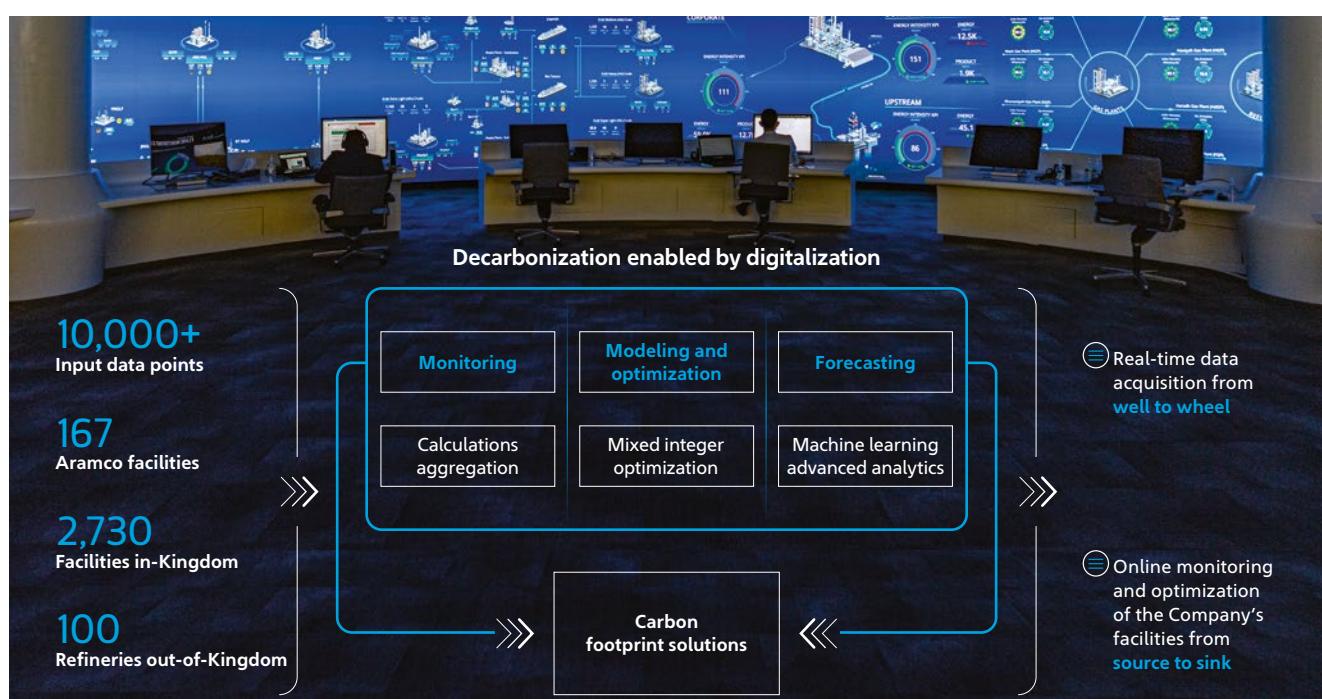
The latest addition to the network is our Abqaiq Plant, the largest crude stabilization plant in the world. It joins Khurais Producing facility and our 'Uthmaniyah gas plant. Aramco is the only major energy firm represented — a testament to our commitment to IR 4.0 technologies and to the scale of our ongoing digital transformation.

Aramco's digital transformation has affected almost every aspect of our Abqaiq Plant's operations, with three key changes:

First, the use of robots and drones equipped with cameras, thermal imagers, and gas detectors reducing reliance on in-person checks.

Second, the introduction of machine learning and AI powered algorithms has enabled a continuous and proactive digital adjustment of the oil stabilization process — leading to a 4.5% increase in energy efficiency since 2019, as well as a reduction in CO₂ emissions.

Third, the use of data analytics and predictive modeling has enabled our engineers to anticipate potential disruptions more effectively.







Safe operations and people development

At Aramco, safety is at the heart of everything we do. It is a core value that helps protect our people, assets, and environment.

We are committed to a strong safety culture across our employees, contractors, and suppliers. We prioritize the training of our workforce to perform their jobs safely, while also promoting an open reporting culture.

We empower our people to reach their full potential through providing a safe, respectful, and professionally challenging working environment. We are committed to respecting and protecting the rights of every single member of our workforce (employees and contractors); we expect and support our suppliers to do the same.

Material topics

Workforce protection

Relevant metrics

Number of fatalities
Lost time injuries/illnesses rate (number of LTI cases x 200,000/total work hours)
Total recordable case frequency (total recordable incidents x 200,000/total work hours)
Health performance* (number of overdue major health findings) x (100)/total number of open major health findings

Relevant UN SDGs



Process safety and asset integrity

Number of Tier 1 process safety events



Human rights

Number of grievances raised*
Sites with a grievance mechanism in place* (%)



Labor practices

Attrition rate* (%)
Number of company employees
Number of female employees*
Female (%) of total employees
Female (%) of total number of new hires*
Number of female employees in leadership positions*
Female employees (%) in leadership positions
Number of contractor employees*
Employee engagement score* (%)
Employees receiving regular performance reviews (%)
Number of hired graduates
Number of apprentices
Number of interns
Total hours of training and development*
Average hours of training and development* (per employee)



* Metric reported for the first time externally.

ⓘ For more details on relevant metrics, see page 86.



Scan here

Learn more about how Aramco developed a [safety strategy](#) and worked on imbedding it as part of its culture since the 1940s.

Workforce protection

Our approach

Aramco is committed to providing a safe workplace for our people. We believe that all injuries are preventable. We conduct business in a manner that strives to prevent incidents that have the potential to impact people, damage assets, or harm the environment.

We are committed to developing our people, embracing diversity, and strengthening global collaboration with industry leaders to share safety knowledge, build capabilities, and address emerging challenges.

Visible management commitment to safety is a cornerstone of the successful implementation of Aramco's global safety policy. The Executive Management Safety Review (EMSR) program has been in place for over 40 years. Every month the president and CEO, along with a team of executive management, visit one of the Company's major operational areas. During the visit, the executive team meets with area management to review their HSE performance and engage with employees and contractors to discuss any safety issues or concerns.

Safety performance

The table below provides an overview of our HSE performance over the past three years.

| | 2022 | 2021 | 2020 |
|------------------------------------------------------------------------------------------------------|--------------------|----------------|----------------|
| Number of fatalities ¹ | 5 ² | 1 ² | 1 ² |
| Total recordable case frequency ¹ (total recordable incidents x 200,000/total work hours) | 0.050 | 0.054 | 0.044 |
| Lost time injuries/illnesses rate ¹ (number of LTI cases x 200,000/total work hours) | 0.014 ² | 0.017 | 0.011 |

Sadly, we had five fatalities in our workforce (one employee and four contractors) during the year. One employee passed away due to heat exposure after their car became stranded in the desert.

What are we doing?

Responsible Care

Responsible Care is the global chemical industry's voluntary initiative to continuously improve environmental, health, safety and security knowledge and performance.

Our wholly-owned subsidiary ARLANXEO completed the Responsible Care® 14001:2015 certification process for all of its worldwide locations. This broadens the scope of ISO 14001 beyond environmental management systems to include health safety and security and other Responsible Care requirements — the culmination of a project that commenced in 2020.

Within our contractors and partners, one contractor lost his life due to a motor vehicle accident, a second contractor was struck by rotating equipment on a drilling rig, a third contractor was involved in a pipe stack collapse incident, and a fourth contractor was involved in a pipeline rupture fire.

Each case has been fully investigated and the lessons learned have been communicated to all parties. We continue to work closely with our contractors to build a strong safety culture and prevent such incidents.



1. For 2020, the reporting boundary was Company in-Kingdom. As we progress on our reporting journey and our controls around ESG data mature, for this metric from 2021 onwards, the reporting boundary has been expanded to operational control. Please refer to page 86 for more details on our metrics' reporting boundaries.

2. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

What are we doing?

Transportation safety initiatives



Safety on the road

Aramco has over 11,000 vehicles, including over 500 buses, to transport our people for business, and in 2022, our vehicles traveled over 199 million kilometers. We closely monitor and support the safety of our people on the road. In addition to mandatory traffic training and education, we use digital solutions aimed at improving traffic safety.

The Company launched SafeTravel — a digital journey management tool that provides real-time journey data to supervisors and journey coordinators — that enables personnel to complete their journeys in a safe manner. In addition, we piloted a number of AI solutions in vehicle monitoring systems that detect fatigue, distractions, drowsiness, and other negative driving conditions.

Recent initiatives:

- Introduced a “Safety Corridor” initiative to reduce accidents on an 80 km stretch of the Dhahran - Al-Hasa Highway.
- A traffic safety campaign, “The Park,” was conducted at the Dhahran Expo to promote traffic safety within local communities. The campaign attracted more than 41,000 visitors in person and more than 6 million views across social media platforms.
- An initiative to enhance traffic safety on the roadways leading to Qatar; 1,950 km of roads were surveyed and evaluated and the technical report was shared with relevant ministries.



Safety at sea

We operate a fleet portfolio of over 270 vessels with more than 7,000 employees and contractors traveling over 1.4 million nautical miles. Our strategy is to enable safe behavior through focused international maritime, safety, and environmental standards as well as cybersecurity compliance. Aramco is committed to enabling excellence in safety, both onshore and offshore. Aramco’s marine operations span along the Kingdom’s coastlines from the Arabian Gulf to the Red Sea, providing safe, reliable and, cost-effective integrated marine solutions. This supports the Company’s critical offshore operations such as exploration, drilling, producing, exportation, crew transfer, oil spill response, subsea repairs, offshore logistics, and offshore security.



Safety in the air

Aramco’s Aviation Department operates one of the world’s largest corporate fleets, consisting of 49 owned and leased aircraft (both fixed wing and rotary), that annually transport more than 900,000 passengers safely to Kingdom-wide destinations, and globally. During 2022, we carried our people on some 29,000 flights traveling some 4 million miles. Our flights support Aramco’s operations by providing transportation, special missions, search and rescue, and evacuation services to our onshore and offshore operations.

We maintain the highest level of safety standards while being mindful of our responsibility toward the environment. Our flight operations are benchmarked against airline industry standards and best practices, and are continually audited by internal and third-party aviation assessors.

Emergency preparedness

Aramco invests heavily in incident prevention, while also taking every measure to ensure emergency readiness. The Company has a dedicated Corporate Emergency Management Taskforce to ensure resilience and readiness through pre-planning and risk-based site-specific emergency response plans.

In 2022, over 1,100 emergency exercises were conducted to train people and evaluate improvement opportunities.

Contractor safety

Aramco is committed to maintaining the safety and well-being of its contractors. Our approach is focused on proactive engagement, effective field presence, performance measurement, and governance.

This approach is supported by a suite of custom risk-based tools that monitor contractor safety performance to ensure compliance with safety requirements. Our Construction Safety Index (CSI) monitors our construction contractors' safety performance to ensure compliance with construction-related safety requirements. In 2022, over 3,300 CSI inspections were conducted. Driven by this success, the Company implemented a Turnaround Safety Index (TSI) focused specifically on contractors performing turnaround and inspection. In 2022, over 670 TSI inspections were completed. During the fourth quarter of 2022, we launched the Rig Safety Index (RSI) that monitors onshore and offshore drilling rigs. Over 60 RSI inspections were completed since its launch.

We recognize the importance that state-of-the-art technologies play in delivering a proactive approach to safety. The Smart Site Safety Solution (4S) combines innovation and technology to detect and prevent construction site incidents. It extends support to management to mitigate major risks through zone monitoring, collision avoidance, confined space monitoring, and heat stress management. Using custom-developed software, 4S collects and processes data in real-time through video analytics and smart wearables.

What are we doing?

Safety at the world's largest oil field — Ghawar

We have established the Ghawar Intelligence Center as a unified information and collaboration hub. This has enabled the deployment of more than 300 Fourth Industrial Revolution technologies across safety, environment, health, and corrosion. This includes drones taking preprogrammed routes within the facility, which automatically confirm and check several safety and environmental aspects within the plant. Off-road navigation and trip management solutions are also deployed to enhance the safety of the workforce working off-road.



A new vision for safety training and certification

Safety training and development has always been a key focus area for Aramco. In line with the Company's focus on digitalization, we are transforming our training from a conventional classroom-based learning experience to a hands-on competency-based learning approach.

Through immersive virtual reality (VR) simulations, trainees are able to conduct exercises in real-time, and we have introduced a collaborative training environment that enables multiple individuals to participate in simulations together. Aramco has deployed VR environments that allow personnel to undergo practical testing virtually. For example, scaffolding supervisors and inspectors are now tested in a VR environment.

These technologies offer a multitude of benefits when compared with traditional and more conventional training methods, including cost-effectiveness, just-in-time learning, and the experience of high consequence failures in a safe environment.

In 2022, over

1,100
emergency exercises
were conducted
to train people
and evaluate
improvement
opportunities

Process safety and asset integrity

Safety Management System

Aramco's Safety Management System (SMS) drives our commitment to safety across our business. It provides a framework that integrates occupational and process safety, and assists business units in meeting safety expectations.

Our SMS was developed following comprehensive benchmarking with industry peers. It is aligned with requirements outlined in Occupational Health and Safety Management System ISO 45001:2018, and has been evaluated by an independent third party to ensure alignment with international practices.

All Aramco organizations are assessed against SMS expectations, through our internal corporate safety assessment program. With over 50 SMS assessments performed in 2022, this program has been expanded further to include both in-Kingdom and international affiliates.

Process safety

Aramco adopts strong process safety practices to protect people, assets, and the environment. We employ a proactive approach to managing process safety through well-established programs covering safe operations, preventative maintenance, and asset integrity. We maintain a dedicated program aimed at assessing and monitoring process safety risks throughout our facilities.

Tier 1 process safety events

In 2022, the Company recorded 11 Tier 1 process safety events, all of which were investigated, with root causes identified and corrective actions implemented.

| | 2022 | 2021 | 2020 |
|-----------------------------------------------------|------|------|------|
| Number of tier 1 process safety events ¹ | 11 | 11 | 9 |

Out of the 11 events, nine occurred at in-Kingdom wholly-owned operated assets and two at an entity under Aramco's operational control. None of the Tier 1 incidents in 2022 resulted in operational interruption. Two incidents were classified as major with the remaining classified as moderate. Six incidents resulted in injuries, including one fatality.

What are we doing?

Closed loop well testing

A new closed loop well testing equipment design was developed to provide a remote interaction in sour environments. The design includes equipment and fluid monitoring devices that operate remotely to control the flow and measure the fluid properties. The design also minimizes personnel exposure to toxic gases during operations.

This technology is now being rolled out for all sour wells in Saudi Arabia.



¹ For 2020, the reporting boundary was Company in-Kingdom. As we progress on our reporting journey and our controls around ESG data mature, for this metric from 2021 onwards, the reporting boundary has been expanded to operational control. Please refer to page 86 for more details on our metrics' reporting boundaries.

Human rights

Our people

Aramco is home to over 70,000 individuals from all over the world, comprising more than 85 nationalities. We are proud of the multiculturalism and diverse thinking that our community brings to the Company and strive to maintain an environment of respect and understanding.

As per our commitment to the UN SDG 5 (Gender Equality) and UN SDG 8 (Decent Work and Economic Growth), along with our support for Saudi Vision 2030, we provide our people with opportunities and a safe environment to develop personally and professionally.

Human rights in the workplace

To be treated with dignity and respect is the right of everyone. We strive to uphold human rights in the workplace by acknowledging our role as a corporate citizen and promoting a positive culture that adheres to those values. We are committed to ensuring that employees are not subject to abusive or inhumane practices. We are opposed to all forms of slavery and exploitation, and child labor.

Our corporate strategy involves engaging with stakeholders to prevent incidents that negatively impact human rights. We seek to make positive and lasting contributions in the areas of governance, transparency, respect for the rule of law, and social and economic development.

We comply with local laws and respect international human rights principles, such as, the Universal Declaration of Human Rights, the Fundamental Conventions of the International Labor Organization, the UN Guiding Principles on Business and Human Rights, and the principles of the UN Global Compact.

Aramco strives to ensure employees feel respected and safe. Our Code of Business Conduct lays out the minimum expectations we have of our people, our suppliers, and key stakeholders. The Code articulates our values: integrity, excellence, safety, accountability, and citizenship.

We strive with our suppliers to ensure that all goods or services meet country of origin standards for human rights, including health and safety as a minimum.

Aramco
is home to over
70,000
people comprising
more than
85
nationalities



Employee relations

To ensure our people enjoy working at Aramco, we engage with them regularly via various communication channels, such as town hall meetings, engagement surveys, recognition events, the intranet, periodic performance reviews, and the Young Leaders Advisory Board. We have a Workers Committee, which is managed by a voluntary team of elected employees to ensure our employees are heard and hold management accountable.

Wherever we operate, we strive to comply with all labor laws with the goal of providing equal employment opportunities to employees and job applicants, while maintaining a workplace free from discrimination, harassment, and retaliation. We hire and promote the most qualified individuals, regardless of age, disability, gender, nationality, race, religion, or any other applicable protected category.

Aramco has a non-retaliation policy which empowers our people to speak freely and confidently about issues and concerns that could improve our operations and to act with integrity. People who come forward with concerns play an important role in maintaining our ethical workplace. Employees are expected to report suspected violations of the law, policies, and the Code. To encourage an open, candid culture, Aramco offers several channels for employees to ask questions and speak up:

- Management escalation;
- Personnel department, Compliance department, Internal Audit department;
- Corporate Security Division; and
- An anonymous hotline.

What are we doing?

Workers' Committee

Aramco Workers' Committee is a team of selected employees who voluntarily represent all workers. The Workers' Committee mandate is to present recommendations to management related to the areas listed below:

- Promoting safety and occupational health;
- Improving workers' health and hygiene;
- Improving work conditions and circumstances; and
- Enhancing workers' productivity and work-life balance.

Grievances

Aramco has a formal grievance process, which is overseen by our Personnel Department. This process ensures all items raised are fairly and objectively assessed.

At Aramco, we believe that speaking up is an employee's right. We ensure that all sites have grievance mechanisms in place for our employees to raise any concerns in confidence.

| | 2022 | 2021 | 2020 |
|------------------------------------------------|-------------|------|------|
| Number of grievances raised* | 293 | 236 | 297 |
| Sites with a grievance mechanism in place* (%) | 100% | 100% | 100% |

* Metric reported for the first time externally.

Employee engagement

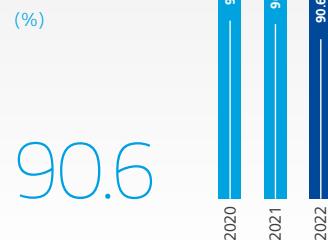
In October 2022, the corporate-wide Employee Engagement Census Survey was launched across Aramco to over 75,000 employees and contractors. The survey closed with a 59% response rate, which represents a healthy corporate response as validated against external benchmarks through an independent vendor.

An analysis of our most recent engagement surveys concluded that employees wanted leaders who enable, care for, recognize and develop their teams. To assist leadership in enhancing the engagement of their people, a new set of Employee Experience Tools for leaders was created in relation to each key theme. In total, 16 new tools were created as part of an interactive online toolkit. These include one-to-one conversation and team conversation guides. These tools have been downloaded more than 10,000 times.

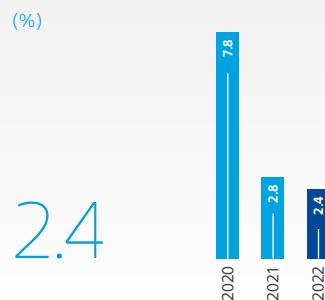
In addition, to support leaders at every level, a new virtual training, "An Introduction to Employee Experience for Leaders" was created in-house. The workshop provides useful definitions for employee experience and employee engagement, and shares practical steps chief position holders can implement to improve employee engagement. In addition to leaders, employee engagement is also supported by over 250 Employee Experience Champions who are embedded across the business.

As a final step in the performance management program year-end cycle, annual employee performance reviews are facilitated by senior management during the months of January and February. For the 2022 business cycle, 90.6% of employees received a performance review.

Employees receiving a performance review (%)



Attrition rate* (%)



What are we doing?

Our 2022 Forbes award

For the third year in a row, Aramco was ranked number one on the 2022 Forbes "Top Companies to Work for in the Middle East" list and the highest rated company in the construction, oil and gas, mining and chemicals sectors. This is reflected in our low attrition rate.



* Metric reported for the first time externally.

Labor practices

Diversity and inclusion

We are proud of the diversity and inclusivity our community brings to the Company with our people being from more than 85 different nationalities. We strive to maintain an environment of mutual respect and understanding. We are focused on continuing to build on our diverse workforce by increasing the number of opportunities for women.

A major contributor to Aramco's success in boosting diversity has been the establishment of diversity and inclusion corporate targets, metrics on female representation, females in leadership, and people with disabilities representation.

This focus and effort, led by a dedicated diversity and inclusion team has resulted in the number of female hires increasing year-on-year for the past five years.

| | 2022 | 2021 | 2020 |
|-----------------------------------------------------|--------------|-------------------|-------------------|
| Number of female employees* | 4,503 | 3,802 | 3,400 |
| Female (%) of total employees | 6.4% | 5.6% ¹ | 5.1% ¹ |
| Female (%) of total number of new hires* | 28.4% | 31.2% | 34.1% |
| Number of female employees in leadership positions* | 176 | 136 | 110 |
| Female employees (%) in leadership positions | 3.8% | 3.1% | 2.7% |

What are we doing?

Visible progress on diversity

In 2022, we achieved an 18% increase compared to 2021 in the number of female employees in our workforce.

Aramco female employees include engineers and scientists across our operations, and in our research and development centers.

In 2022, 50% (208 out of 414) of overall enrollments in our College Preparatory Program were female students. The CPP is a 10-month college preparatory program where students receive support to prepare them for the challenges of a top-tier university.

During 2022, our Security organization and Industrial Services organizations have developed and hired women into roles they had not traditionally held previously, e.g., security guards.

18%
increase in female representation compared to the previous year

23%
increase in female employees in leadership positions

28.4%
of direct new hires are female*

Female employees at Aramco

(%)



* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

Investing in our workforce

Our success is based on having a happy, healthy, motivated, skilled, and diverse workforce.

During 2022, we welcomed over 6,000 new people joining us either full-time or part-time. There was a:

- 26% increase in the number of apprentices (1,728 in 2022 versus 1,369 in 2021); and
- 66% increase in the number of interns (3,190 in 2022 versus 1,922 in 2021) joining Aramco.

Education and training

As a global energy and chemicals company, we are faced with addressing some of the world's biggest technical, logistical, and environmental challenges. To ensure that our workforce can handle these challenges, we invest in talent development. We have a proud history, spanning decades, of providing opportunities for educating and training Saudi nationals, as well as our international workforce. Depending on employees' training and development requirements, Aramco provides sponsored training to MBA level and specialized master's programs at prestigious institutions around the world.

The Company has delivered leadership and targeted development programs to over 18,500 participants through The Leadership Center, a world-class facility located in Ras Tanura and through affiliation with top-ranked business schools and world-class development partners such as Harvard, Wharton, and the London Business School.

What are we doing?

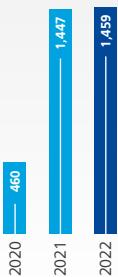
Embracing diversity and inclusion

- Launched a Global Diversity Awareness Campaign.
- Conducted a Disability Inclusion Awareness Campaign, in collaboration with Johns Hopkins Aramco Healthcare.
- Recognized World Autism Awareness Day on April 2, 2022.
- Hosted the Company's first-ever Saudi Sign Language training.
- Partnered with an international school to establish an in-Kingdom center to provide therapeutic and educational services for individuals with special needs (children and adults).

Hired graduates

(number)

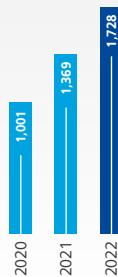
1,459



Apprentices

(number)

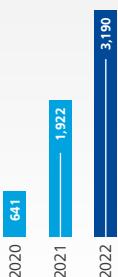
1,728



Interns

(number)

3,190



In 2022, we recorded 13 million T&D hours provided to upskill our workforce and ensure they are provided with strong support to perform their roles effectively.

In 2022, over \$200 million was invested in the following training programs:

Regular Development Program

Non-Employee Programs

Hosted University Programs

Leadership Programs

Executive Leadership Programs

Assessment Centers

Workforce well-being

A healthy working environment is critical for employee health, positive engagement, and operational safety. To support our employees, dependents, and their families, medical services are provided across all Aramco sites and made easily accessible to our people. In 2022, a review of the existing well-being programs and activities at Aramco identified an opportunity to broaden the scope to reflect the Company's size and scale. This resulted in the creation of new well-being strategy that focused on four key elements of well-being: physical, emotional, social, and financial.

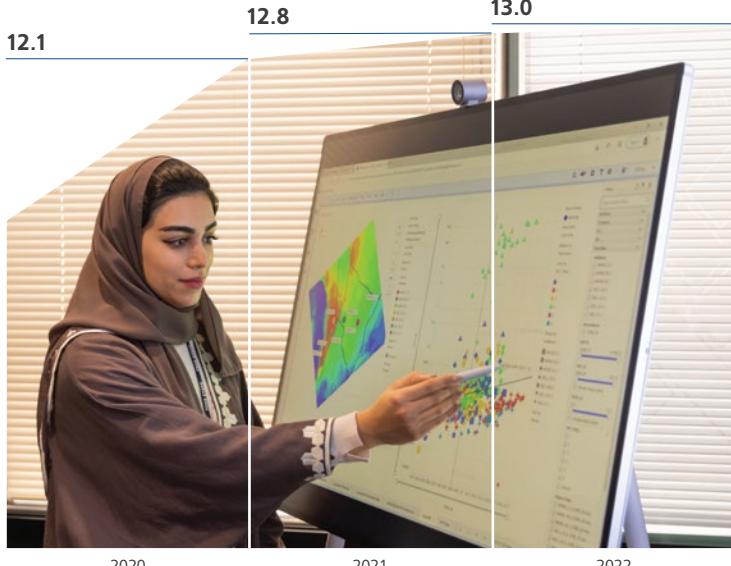
In addition, to support our contractor workforce, we have developed a Contractor Well-Being Program that provides a range of free services including a 24/7 hotline, video counseling and online resources.

The program is complimented further by the Contractor Passport Solution that tracks salary payments and living conditions, which are assessed through a comprehensive contractor accommodation inspection program.

Total hours of training and development*

(million hours)

12.1



12.8

13.0

2021

2022

The Company has delivered leadership and targeted development programs to over

18,500 participants

* Metric reported for the first time externally.

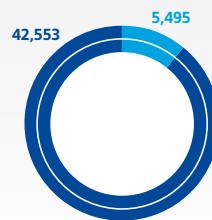
What are we doing?

National Training Centers

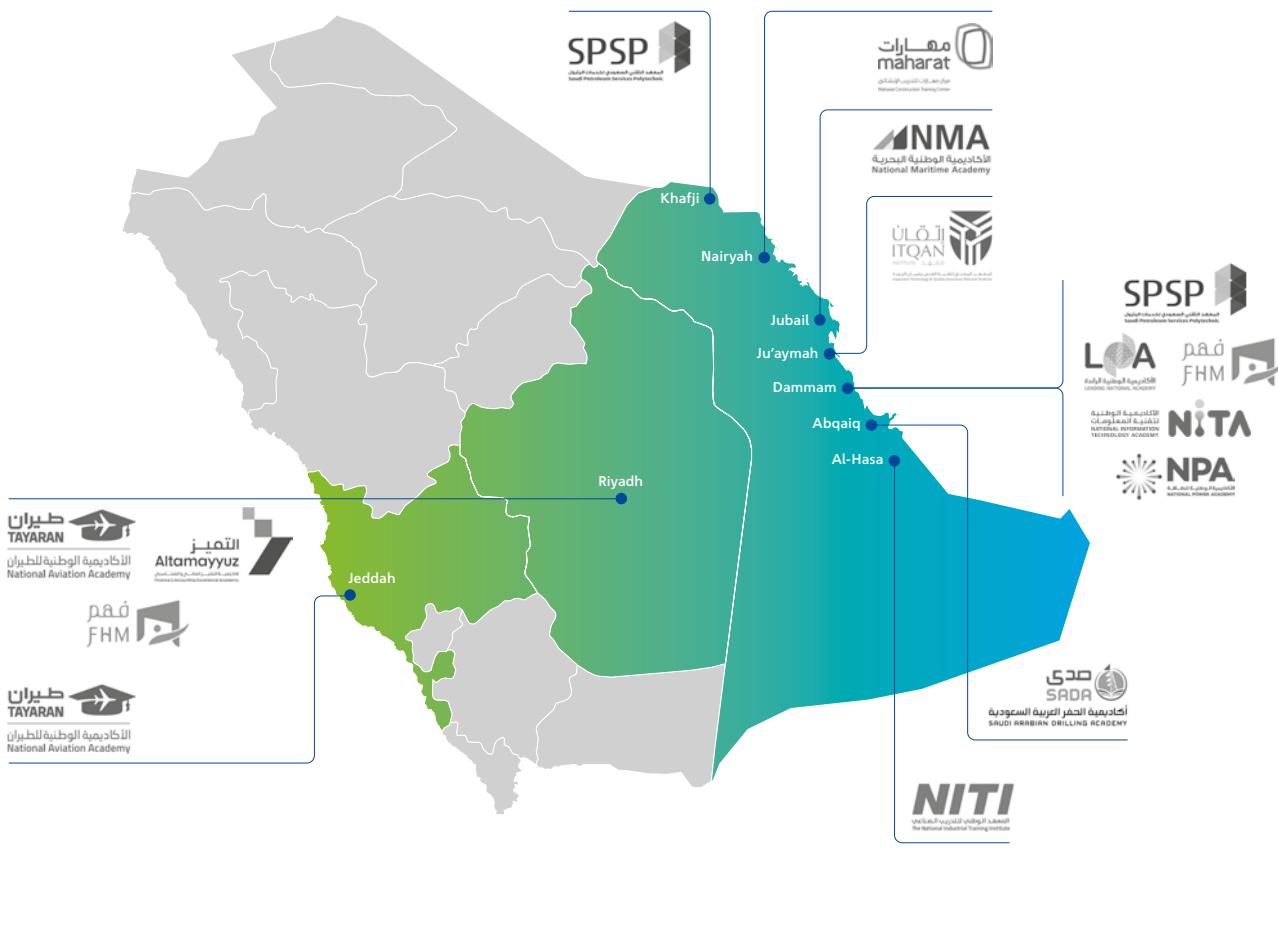
National Training Centers (NTCs) are the product of a strategic partnership between Aramco, selected government entities, and the private sector, which started in 2008. The established NTCs focus on the training of young Saudis. The centers prepare men and women to join different industry sectors, including oil and gas, drilling and workover, maritime, aviation, construction, inspection, IT, facility and hospitality management, power, and finance. The mission of the partnership is to equip Saudi Arabia with a highly motivated and qualified Saudi workforce.

Total graduates as of December 31, 2022

48,048



- Male (89%)
- Female (11%)



To enable front-line leaders to provide greater support for their employees, Aramco introduced the “Supporting Employee Well-Being for Leaders” training, together with a globally recognized third-party vendor. During the year, over 600 leaders were trained in the pilot phase of the project, with a goal to train all leaders within two years. In addition, demand for well-being training continued in 2022 reaching over 5,000 employees.

As a provider of both retirement and savings benefits for our employees, we encourage financial literacy and provide regular access to financial well-being programs and on-site financial consultants. We also provide unique amenities to promote a healthy work-life balance, including leisure activities, recreational facilities, self-directed groups, and nutrition and fitness coaching. We strive to ensure that all of our facilities are accessible to staff with disabilities.

Mental health

Mental health forms an important part of the overall well-being program at Aramco, and a dedicated team provides regular seminars to support employees, including:

- Release Your Stress;
- Move for Energy;
- Human Energy Management;
- Digital Detox; and
- Resiliency and Thriving

Our “Work-Life Support Program” provides 24/7 access to mental health services for employees and their families. The program works with a qualified vendor to link to a global network of mental health professionals who provide one-on-one counseling, life coaching, digital health programs, and many more offerings. The service is completely confidential and has been invaluable in helping employees to manage stress, mental health, work-life balance, and personal relationships. Since its inception, it has been accessed over 73,000 times.







Minimizing environmental impact

We aspire to create a legacy of projects that improve natural habitats and protect shared resources, through best practice environmental management systems and initiatives that promote positive outcomes.

We apply technology, innovation, and resources to invest in environmental protection and nature-based solutions, and we embed circular economy principles across our operations.

Material topics

Relevant metrics

Relevant UN SDGs

Local environmental impact

Number of hydrocarbon spills
Volume of hydrocarbon spills (bbl)
Recovered hydrocarbon* (%)
Hydrocarbon discharge to water (barrels)
SO_x emissions (kilotonnes)
Number of sites with ISO 14001 certification* (%)



Biodiversity and ecosystems

Net positive impact*



Water management

Freshwater consumption (million m³)
Freshwater withdrawal (million m³)



Product stewardship and waste management

Industrial waste generated (metric tonnes)
Industrial waste recycled* (%)



* Metric reported for the first time externally.

ⓘ For more details on relevant metrics, see page 86.



Scan here

Learn more about how Aramco is taking real steps to protect the environment, and engaging in a range of projects and initiatives.

Local environmental impact

Environmental management systems

Since 2012, our operations have been supported by a strong environmental management system based on ISO 14001 standards. As we strive to be consistent with local environmental regulations while following international best practices, our environmental management system provides a systematic and planned approach to achieve the desired outcomes.

To support the certification process we appointed an independent third party to assess our systems against the requirements of the standard. During 2022, we achieved ISO 14001 certification* for 98%¹ of facilities under our operational control. In 2023, we will continue to progress our efforts to achieve 100% certification.

We also conducted more than 30 environment and health site assessments during 2022 to minimize any negative environmental and safety impact of our operations.

Corporate circular economy roll-out program

In 2021, we commenced the roll-out of a corporate execution plan to apply the principles of circular economy across the Company value chain. We are embedding circularity models in activities ranging from circular material management to environmental performance management to our investment master plan. To date, we have launched over 20 initiatives, in critical areas such as water conservation, waste management, circular procurement services, circular construction and built infrastructure.

We are developing our first integrated waste management facility that aims to deploy waste management technologies to recover, treat and manage the waste generated by our communities and operations. This includes a planned waste-to-energy plant, so that Aramco's waste can become a potentially usable source of energy for the Company. Please see page 67 for more details on our waste management initiatives.



During 2022, we achieved ISO 14001 certification* for

98%

of facilities under our operational control

SO₂, NOx, and VOCs

We continued the development of the Sulfur Recovery Units Dashboard, which monitors all Aramco sulfur recovery units (SRUs) to ensure safe and optimal operations. The real-time dashboard shows key SRU performance tracking parameters that are used to ensure the highest possible overall sulfur recovery efficiencies. We also continued our SRU upgrades with tail gas treatment units to reduce SO₂ emissions. We are expediting these projects in line with our commitment to environmental stewardship and to support our efforts in fulfilling our compliance obligations. Tail gas treatment is gaining importance as the preferred technology to address stipulations on sulfur recovery systems in the latest revision of environmental regulations in the Kingdom and as we explore economic opportunities for sulfur itself. We are focused on ensuring these technical improvements are implemented at scale to achieve their full potential.

In 2022, our SO₂ emissions were 18% higher than in 2021 due to increased production of gas from our facilities. As we continue to scale up our operations, technologies like SRU tail gas treatment will support our efforts in keeping our SO₂ emissions low relative to our production.

* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. For this metric, the reporting boundary has been reclassified from operational control excluding ATC, ASC, AOC and SAAC to operational control for 2022, 2021 and 2020. This is because ATC, ASC, AOC and SAAC are office-based entities and therefore, have no SO₂ emissions

3. The Jazan Refinery (our downstream refinery) is excluded from our SO₂ emissions reporting. In 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the company's commitment to operational transparency.

We are working to quantify NOx emissions from our point sources and ensure they follow corporate and governmental mandates. We have improved our relative accuracy testing from every two years to every quarter on all applicable facilities. Increased frequency of testing will allow us to identify the NOx emissions from all applicable operating facilities and address exceedances, if any.

Our vapor recovery system helps to minimize emissions of volatile organic compounds (VOCs) from our bulk loading operations, including new and established refined product distribution depots, which continue to operate efficiently to reduce VOCs from the ambient environment.

Spills to the environment

Aramco operates across Saudi Arabia with many operations in remote areas. This increases the complexity of detecting spills onshore and offshore and providing a swift response to spill sites. We mitigate these challenges by employing rigorous inspection programs of assets, putting fail-safe measures in place, training employees, and utilizing advanced technologies to predict possible failures.

While Aramco strives to achieve zero spills, we encourage the reporting to provide lessons learned and prevent future incidents. Regrettably there were 15 hydrocarbon spills that occurred in 2022 with a total hydrocarbon volume of 142,885¹ barrels. Two major onshore oil spills were responsible for more than 99% of the total oil spills. A volume of 130,000 barrels was spilled due to a ruptured pipe in the pipeline corridor near Shedgum in Saudi Arabia, due to nearby heavy equipment-related work. Aramco managed to rehabilitate the affected area. Further clean-up operations continued at year-end. A volume of more than 11,900 barrels was also spilled due to equipment failure that led to a flow line rupture in the 'Uthmaniyah area; however, the spread of the spill was halted quickly by the response team by isolating the damaged section of the pipe and the team was able to recover the liquid in full. Remediation activities were ongoing at year-end to rehabilitate the affected area.

| | 2022 | 2021 | 2020 |
|----------------------------------------|----------------------------|--------|------|
| Number of hydrocarbon spills | 15 | 13 | 6 |
| Volume of hydrocarbon spills (barrels) | 142,885¹ | 14,447 | 134 |



We continuously invest in efforts to ensure lessons are learned from any hydrocarbon spills and shared across our business. In 2022, we improved our asset integrity, process safety and prevention measures through the Company's engagement with regional, national and international entities to carry out oil spill drills to evaluate our response capabilities.

In the event of any spills and resultant pollution, we have response plans that enable rapid mitigation. Our management processes are particularly aligned to minimize the impacts of hazardous chemicals and air, water, and soil pollution and contamination.

We have completed an upgrade on our containment and recovery equipment to ensure we have access to flexible solutions and the latest technology. Currently, we are engaged in efforts to introduce major upgrades to our existing aerial dispersant spray systems with the acquisition of advanced large aircraft.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

Biodiversity and ecosystems

Governance framework

With the planet experiencing a dangerous decline in nature as a result of human activity, the United Nations Biodiversity Conference (COP 15) concluded in Montreal, Canada, in December 2022 with 196 countries, including Saudi Arabia, signing up to the Kunming-Montreal Global Biodiversity Framework (GBF). The GBF aims to address biodiversity loss, restore ecosystems and protect indigenous rights, providing a refreshed roadmap for delivering the Global Goal for Nature.

One of the key levers of the GBF is the protection and restoration of ecosystems to deliver 30 by 30 i.e. 30% of land and sea protected and 30% of degraded ecosystems restored by 2030. This principle lies at the center of Aramco's Corporate Biodiversity Protection Policy and standard operating procedures developed in 2021 and applied as governance in 2022. These provide the framework and responsibilities of relevant Company organizations to ensure protection of biodiversity and ecosystem services wherever the Company operates and to restore degraded areas.

The Company continues to work to update its operating procedures and standards to ensure we meet the commitments of the Biodiversity Protection Policy and support the aims of the GBF. We have continued to invest in biodiversity and in 2022 established a dedicated biodiversity team by forming our Environmental Biodiversity Division.

Under the governance framework, Aramco strives to achieve a net positive impact on biodiversity and ecosystem services. In all our new projects we implement the biodiversity mitigation hierarchy, with enhanced outcome requirements for new projects to deliver net positive impacts for biodiversity and ecosystem services. In 2022, we developed a biodiversity KPI to help track the Company's biodiversity performance.

What are we doing?

Achieving a net positive impact¹

Aramco's Biodiversity Protection Corporate Policy provides the road map for all the Company's operational areas to achieve a Net Positive Impact for biodiversity and ecosystem services.

During the year, Aramco developed a new metric to measure and monitor its biodiversity footprint. The NPI is a metric that seeks to achieve net gains for biodiversity and ecosystem services. This occurs when the biodiversity gains through our conservation projects outweigh the overall negative impacts on biodiversity as a result of our operations on our owned land.

In 2022 (our baseline), our NPI* was 53%² and we have set a target to increase the NPI by 30% by 2025.

The KPI is based on spatial area of operational footprint versus the area of biodiversity projects, and so does not include aspects such as ecological quality and condition data. However, it represents the best proxy evaluation of Company's biodiversity currently available. The biodiversity KPI is being further developed to reflect the complexity of biodiversity measurement and assessment.

The most effective way to conserve biodiversity is to avoid operating in high-quality habitat. Where Company activities must interact with biodiversity, we seek to minimize negative impacts by refining our standard operating procedures. When habitats have been impacted, the degraded areas are restored. Finally, unavoidable and long-lasting impacts need to be offset, for example by creating new habitat.

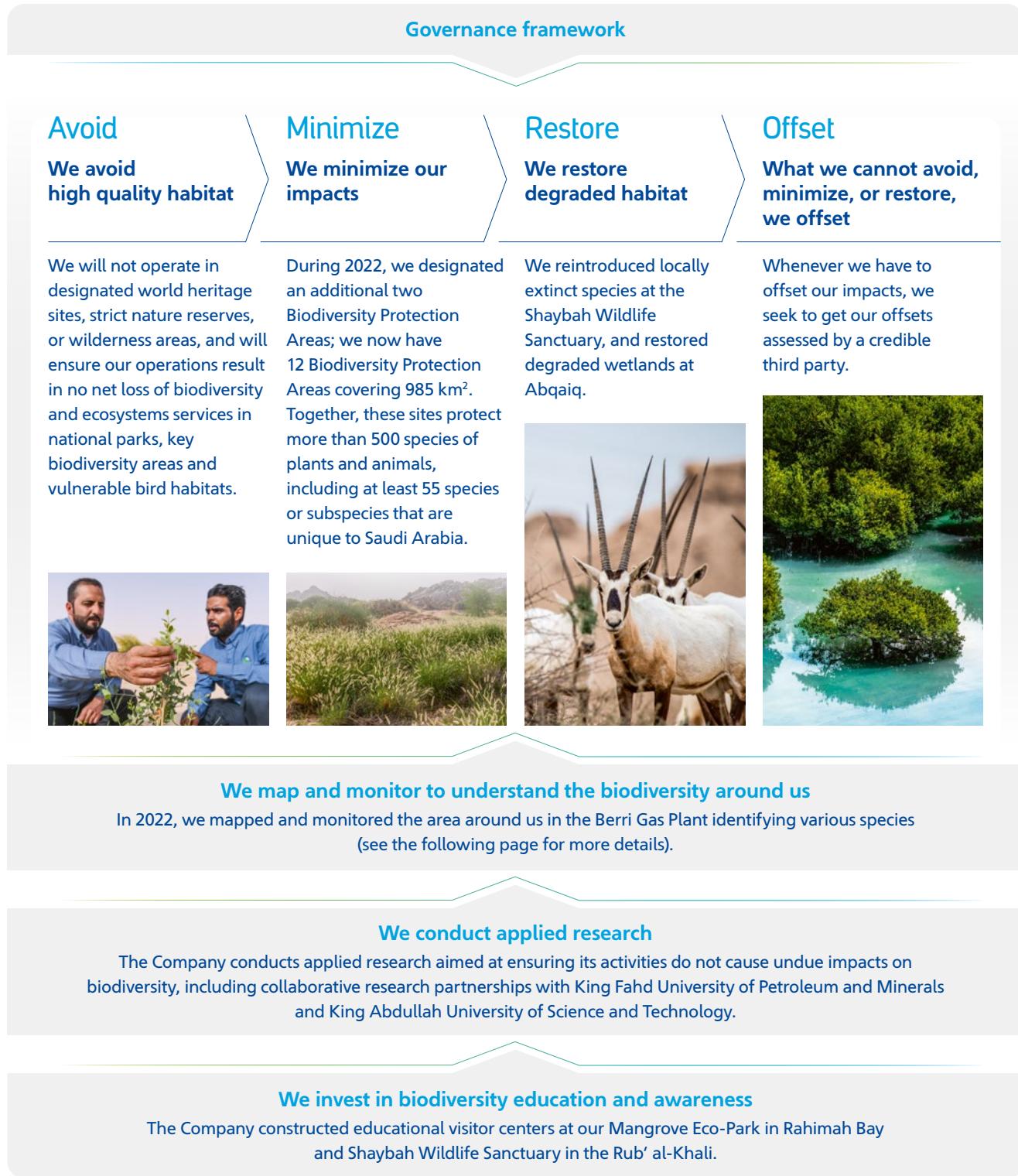
These workstreams are delivered by investing in four enabling elements: a strong governance framework, targeted mapping and monitoring, applied research, and education and awareness. This biodiversity framework aligns with Ipieca guidelines on biodiversity protection and the LEAP (Locate, Evaluate, Assess, Prepare) approach from the Taskforce for Nature-related Financial Disclosures.

* Metric reported for the first time externally.

1. Please refer to page 86 in the Data section of this report for the formula of this metric.

2. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

Our biodiversity mitigation hierarchy



Minimizing environmental impact

Biodiversity at Aramco

An impressive array of biodiversity exists within Saudi Arabia, including over 2,400 plant species, 1,230 marine fish species, 499 bird species, 266 coral species, 117 mammals, 107 reptiles, eight amphibians, eight freshwater fish, and numerous invertebrates. It is inevitable that our activities will at times overlap and potentially impact areas of biodiversity value and much of this biodiversity can be found in our operations and reservation areas.

Our operating areas, including fenced areas, along coastlines and around offshore platforms, are home to significant patches of remnant biodiversity. These provide high quality habitat for threatened, endemic (unique to Arabia), and/or migratory species. By conserving these valuable natural resources, the Company helps to fortify the Kingdom's biodiversity for current and future generation, and replenish terrestrial and marine ecosystems and their ecosystem services, including promoting well-being within our workforce. We coordinate with and contribute to national biodiversity strategies within Saudi Arabia and wherever we operate.

We have created digital habitat models that identify and show the potential habitat of every species that resides in the Kingdom. These habitat models enable Aramco to identify, prioritize, avoid, and reserve high quality habitat on Company land and reduce impacts on biodiversity, as well as targeting resources for restoration and biodiversity protection.

In 2022, at our Berri Gas Plant in northern Saudi Arabia, we conducted a comprehensive biodiversity survey to map species and habitats found within the area of the facility (32 km²). The study identified 431 species; 204 plants, 163 birds, 41 mammals, and 23 reptiles. Of these 45 species were recorded as High Conservation Priority Species, as per the International Union for Conservation of Nature Red List of Threatened Species.

Biodiversity Protection Areas

The Company identifies and designates its own Biodiversity Protection Areas over valuable patches of habitat, which we avoid operating in. An internal procedure outlines the steps required to designate Aramco Biodiversity Protection Areas over high quality habitat, requiring a third-party consultant to confirm that a proposed site is of sufficient ecological quality to warrant designation as a corporate Biodiversity Protection Area.

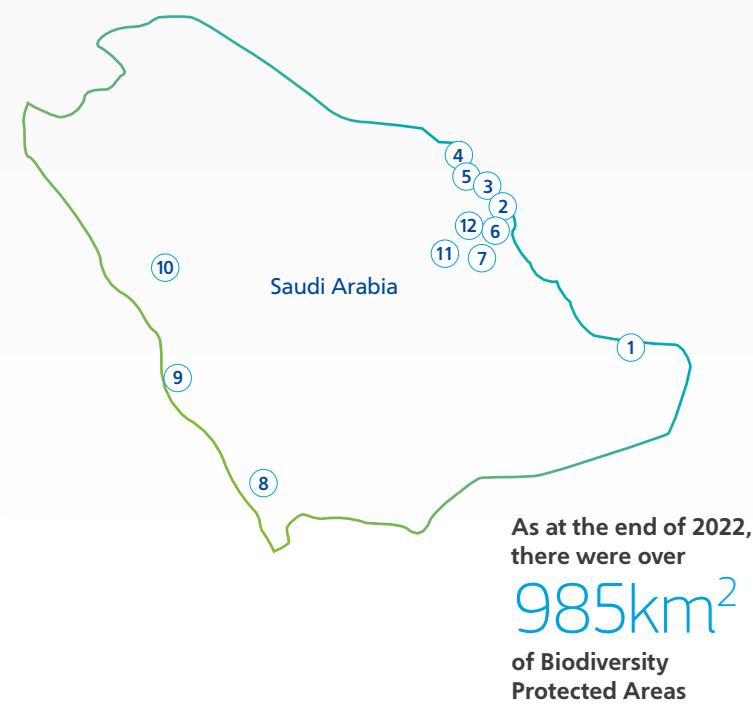
Aramco's Biodiversity Protection Areas

The most effective way to conserve biodiversity is to avoid high-quality habitat. Under the Corporate Biodiversity Protection Policy, Aramco will not operate in designated World Heritage Sites, Strict Nature Reserves, or Wilderness Areas, and will ensure our operations result in no net loss of biodiversity and ecosystem services in National Parks, designated Important Bird and Biodiversity Areas, Important Plant Areas, and Aramco Biodiversity Protection Areas.

Biodiversity Protection Areas contain at least 55 endemic species or subspecies (plants and animals that are found only in the Arabian Peninsula).

Our protected sites:

- ① Shaybah Wildlife Sanctuary
- ② Rahimah Bay Mangrove Eco-Park
- ③ Abu Ali Island
- ④ Tanajib Biodiversity Protection Area
- ⑤ Manifa Biodiversity Protection Area
- ⑥ Abqaiq Wetlands
- ⑦ Udhailiyah Biodiversity Protection Area
- ⑧ Abha Biodiversity Protection Area
- ⑨ Bahra Biodiversity Protection Area
- ⑩ Madina Biodiversity Protection Area
- ⑪ Khurais Biodiversity Protection Area
- ⑫ Bagga Bird Oasis



In 2022, the Company increased its Biodiversity Protection Network by 20%, and currently has twelve designated sites totaling over 985 km². Each of these sites is recognized as fulfilling International Union for Conservation of Nature protected area criteria and protects regionally or internationally significant biodiversity, such as the presence of threatened, migratory and/or endemic species.

Over 500 species of birds, reptiles, mammals, amphibians, and plants are protected within Aramco's Biodiversity Protection Areas, including at least 55 endemic species or subspecies. Many of these species are globally endangered; others are highly migratory, flying 10,000 km or more to forage at Company protected areas; some exist in Arabia and nowhere else on earth — and all of them need our ongoing stewardship.

Wetlands strategy

Water plays a vital role in the ecology and environmental health of the nation. In 2022, a Company-wide wetlands strategy was developed, consisting of two major themes that reflect the intersection of the Company with Saudi Arabia's environment:

- Restoration and protection of natural wetlands on Company land, primarily for biodiversity conservation outcomes (but with co-benefits such as carbon sequestration); and
- Creation of constructed wetlands that provide nature-based solutions for sustainable and efficient wastewater treatment (with biodiversity and other ecosystem service co-benefits).

Fact-finding missions to constructed wetlands in the Middle East region established the feasibility and parameters for their development. All the natural wetlands and evaporation ponds with potential for conversion to constructed wetlands were mapped in the Kingdom and on Aramco reservation land.

Using Aramco's bespoke biodiversity heat map for the Kingdom, we identified the most important natural wetlands on Company land to protect. This led to the designation of a new wetland Biodiversity Protection Area in 2022.

We will continue designating priority natural wetlands as Biodiversity Protection Areas. We are also developing ecosystem service assessments to measure the full range of benefits from constructed wetlands in addition to their wastewater treatment and energy efficiency attributes.

What are we doing?

Manifa Bay

At the 2022 Middle East Energy Awards, Aramco won the Upstream Project of the Year Award, for its development, management, and production of the Manifa field, and its innovative solutions for protecting the fragile marine ecosystem in Manifa Bay.

When planning the development of the Manifa field, residents and fishing communities of Manifa Bay were considered carefully, using a multifaceted approach to field development and balancing sustainable production operations with the preservation of Manifa Bay's ecosystem.



Minimizing environmental impact

Nature-based solutions

Nature-based solutions are actions that protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits.

Mangrove forests are one of nature's most powerful ecosystems, providing life-sustaining habitats for plants, birds, nursery areas for marine life, and supporting local communities relying on these productive ecosystems for their food security and well-being.

They may also serve as an underwater nursery where juvenile fish and shrimp can grow in relative security before venturing out into the open ocean. Also, the complex and deep descending mangroves' root structures can prevent shoreline erosion from waves and heavy storm surges, providing a natural adaptation to climate change impacts.

As vast stretches of Saudi Arabia's coastline are suitable for this forestation (and reforestation), we have invested significant resources in planting millions of mangroves.

Tree planting using drones

We have piloted drone technology for planting native trees and monitoring growth of these trees and the mangroves.

The pilot:

- Enabled seed germination technique for drone plantation;
- Conducted soil and water analysis;
- Planted 100,000 native trees using drones; and
- Achieved a plantation success rate exceeding 88%.

Coral reefs

Coral reefs are the most diverse ecosystems in the world. Aramco has been actively promoting the growth of marine life with artificial reefs. In addition to the offshore oil and gas facilities that act as artificial reefs by providing substrate for marine communities, we are working together with the Okinawa Coral Reef Conservation Consortium, Japan. Building on 11 years of research, we conducted studies on how to restore coral reefs, and ran educational programs.

Aramco Singapore is working with the National Parks Board on the trial application of CoralAID Mineral Accretion units to enhance coral growth. Under this technology, corals are subjected to low-voltage electricity to stimulate their growth.

What are we doing?

Mangroves

We have an ambition to plant 300 million mangroves in KSA and 350 million mangroves outside KSA by 2035. In 2022, we set an interim target to plant another 31 million mangroves along the Arabian Gulf and Red Sea shorelines by 2025. This plantation target will support marine ecosystems adjacent to the Company's operation in Abu Ali, Rahima, Yanbu', and Jazan.

To date, we have planted accumulatively 24 million mangroves.

Mangroves planted

(millions)

24

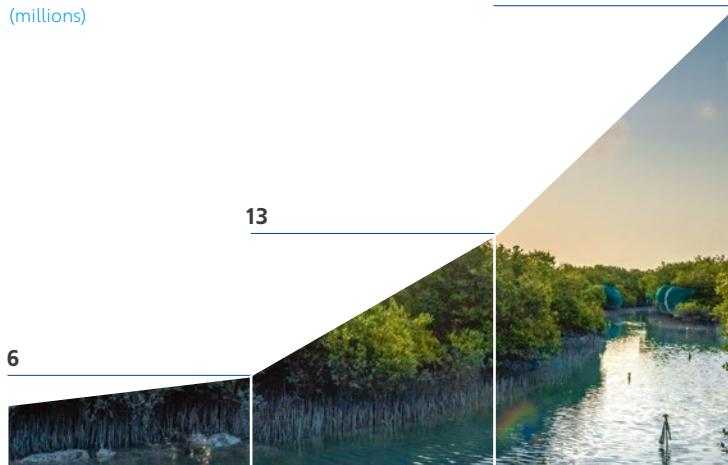
6

13

2020

2021

2022



We are also helping to rescue and rebuild important reefs in the coastal waters of the United States, the Caribbean, and Mexico through grants by the National Fish and Wildlife Foundation's Coral Reef Conservation Fund.

Seaweed

Seaweed is a carbon negative crop and has a high potential for climate change mitigation. The Intergovernmental Panel of Climate Change (IPCC) *Special Report on the Ocean and Cryosphere in a Changing Climate* recommends "further research attention" as a mitigation tactic. We developed a sustainable seaweed farming facility at Yanbu', and to date, we have spent over \$1.5 million using this project to remove GHG and NOx by producing macro algae (seaweed). The laboratory, nursery and workshop have been built, but the farm is still under development.

11 million
mangroves and
1 million
trees were planted
in 2022

Water management

Aramco's approach to water

Headquartered in one of the most arid environments in the world, water management has been an essential focus of our business since our inception. Today, that means:

- Assigning an economic value to groundwater allocated for projects to incentivize the use of alternative sources;
- Reducing our dependence on groundwater by using alternative water sources, such as seawater, treated sewage effluent, and treated reject streams, including significant investment in desalination; and
- Ensuring the safety of the drinking water supply for our own and our host communities through water safety plans, which require the producer to conduct comprehensive risk assessments from the source to the consumer tap.

In 2022, we completed the utilization of treated sewage effluent as make up water for cooling systems across several air conditioning plants in our communities. We also evaluated and deployed water efficient irrigation technologies to reduce irrigation water demand. Hydrogel technologies were deployed at the Khurais Producing facility and the irrigation water demand at that site is expected to reduce substantially as the technology increases water holding capacity, aeration balance and improves soil structure. We also conducted water conservation assessments to reduce freshwater consumption through the identification of gaps, and the implementation of best practices and water conservation initiatives.

As part of our efforts to improve our monitoring and reporting of all our operations, we expanded the reporting boundaries of our two water metrics¹ from Company in-Kingdom only to operational control for 2022. During the year, our freshwater consumption was 93.6² million m³; a small decrease from the prior year (94.6 million m³) and our freshwater withdrawn fell by 3.5% (136.6 million m³ in 2022 compared to 137.3 million m³ in 2021). The slightly lower trend in freshwater withdrawn performance is mainly due to our continued water conservation efforts, despite the increase in production.

Deploying new technologies to conserve groundwater

Two technologies were pilot tested in 2022:

- 1 Crude desalting technologies were deployed at several of our facilities to enhance the process, improve crude quality, and optimize de-emulsifier consumption, reducing demand for wash water, thereby reducing the consumption of groundwater.
- 2 Produced water treatment technologies, in which a high salinity water is pretreated then desalinated using one of these processes, eliminating the need to use groundwater as wash water altogether.

In 2022, we recorded

47%

reduction in our hydrocarbon discharge to water

Wastewater and discharges to water

We recognize the need to responsibly manage and treat water prior to returning it to the environment, and have a comprehensive wastewater effluents management program.

Sustained performance has been achieved over the years by maintaining figures within targets. In 2022, we recorded a 47% reduction (16.4² barrels in 2022 versus 30.7 barrels in 2021) in our hydrocarbon discharge to water (HC2W). This is as a result of various activities, including:

- Pro-active measures to avoid any incidental discharge;
- Preventive maintenance of aging equipment; and
- Enhanced monitoring and tracking of the metrics through the HC2W corporate dashboard.

| | 2022 | 2021 | 2020 |
|---------------------------------------------------------------|-------------------|-------|-------|
| Hydrocarbon discharge to water ¹ (barrels) | 16.4 ² | 30.7 | 20.2 |
| Freshwater consumption ¹ (million m ³) | 93.6 ² | 94.6 | 90.2 |
| Freshwater withdrawal ¹ (million m ³) | 136.6 | 137.3 | 142.9 |

1. As we progress on our reporting journey and our controls around ESG data mature, for this metric, we have expanded the reporting boundary from Company in-Kingdom to operational control. To allow comparability, we have restated the 2021 and 2020 figures in line with the expanded reporting boundary.

2. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

Minimizing environmental impact

The Company continues monitoring hydrocarbon discharge to water data through the HC2W dashboard. In 2022, we further developed the dashboard to enhance the use of data and reduce the chance of error while reporting data.

The HC2W metric is the total amount of hydrocarbons in barrels (bbl) that the Company systematically releases to surface water through regulated industrial wastewater discharge and excludes hydrocarbon releases from accidental oil spills, which are tracked separately. This has given us greater control over the wastewater we generate, thereby enhancing our capacity to improve water quality by reducing pollution, eliminating dumping and minimizing the release of hazardous chemicals and materials. Since 2021, the Company has been holding workshops with relevant facilities to provide clear guidelines of the reporting methodology.

In 2022, we also augmented our management processes with updates to our Company's asset integrity, process safety and prevention measures. These measures enhance our precautionary approach and risk management practices toward the environmental management of our operations, which require us to maintain specific environmental assessments and promote these best practices with our supply chain partners.

Drilling fluids recycling

Over the years, we have continued using drilling fluids recycling techniques, where properties of drilling fluids such as oil-based, water-based, and brine-based fluids are adjusted to fulfill specific operational requirements, as well as completion activities. These fluids are stored after being used, and in many cases treated, to be used on other wells, avoiding building new volumes from scratch.

As part of our effort, and to share lessons with other energy companies, we are a member of Ipica's Water Working Group.

What are we doing?

Winner at the World Oil Awards

At the 2022 World Oil Awards, Aramco won The Best Water Management Technology Award for the Zero Liquid Discharge Technology. With relatively large volumes of water produced along with hydrocarbons in oil and gas fields, a sustainable produced water management solution was developed and piloted to recycle and reuse water by transforming its ionic properties. The technology comprises a unique combination of a custom-designed pretreatment system to remove residual oil, hydrogen sulfide, and a dynamic vapor recovery technology for salt removal from hypersaline oil field produced waters.

Such technology would enable the adequate and effective recycling and reusing of produced water.



What are we doing?

Avoiding groundwater use at Jafurah

Our plans for the development of the Jafurah unconventional gas field (a gigantic basin with an estimated 200 trillion standard cubic feet of gas, with wells drilled with long horizontal lateral lengths, which require significant water use) incorporate avoiding the need to draw on groundwater by building a dedicated seawater treatment facility to supply enough water for the process.



Waste management

Aramco's approach to waste

In 2022, we developed a Corporate Waste Management Strategy with a goal to minimize and divert waste from landfill and provide short- and long-term targets. The strategy has incorporated national waste management targets for minimizing waste disposal to landfills and maximizing recycling and energy recovery within the Company and within the framework of a circular economy and digital transformation. Additionally, we have enhanced the online corporate waste management system for better data capture and reporting.

Our waste management strategy is the foundation for waste generated by Aramco in five focus areas: municipal, industrial, drilling, naturally occurring radioactive material (NORM), and plastic waste management.

Industrial waste

We continue to conduct waste minimization assessment studies as part of a project's Environmental Impact Assessment, including existing facilities. These studies identify opportunities to eliminate or minimize waste. As for operating facilities, Aramco performs waste minimization opportunity assessments three to five years after commissioning.

Our waste management is guided by the Aramco Hazardous Waste Code, which has been prepared to define consistent requirements and best practices for the management of waste materials that are considered hazardous to human health or the environment, due to their ignitability, reactivity, corrosivity, or toxicity. These Company requirements are in accordance with the recently published Saudi Government regulations (Environmental Law, Waste Management Law and their regulations).

We employ the waste management hierarchy to manage our waste, which ranks waste management options in a manner that minimizes environmental impacts and supports circular economy objectives. Waste is categorized into three management streams: hazardous, non-hazardous (including municipal), and inert. Management options are ranked by their potential environmental impact, with the highest priority accorded to waste prevention and reduction.

In 2022, Aramco generated 318,656 metric tonnes of industrial waste (2021: 240,225) which was disposed of at licensed and Company

What are we doing?

Automated NORM waste management

Naturally occurring radioactive material occurs across a variety of oil and gas waste streams, including in sludge from oil/gas separation and in debris from pipeline scrapings. In 2022, we initiated a system to track NORM waste from generation to storage and to final disposal by utilizing radio frequency identification (RFID) tracking technology. This will interface with our SAP waste manifesting and provide a real-time NORM inventory, shifting from a manual process to a fully automated one, delivering detailed information of each NORM waste container from our facilities. The system enhances our accountability and ensures compliance with government regulations.

| | 2022 | 2021 | 2020 |
|---------------------------------------------------------|-------------------------|---------|---------|
| Industrial waste generated ¹ (metric tonnes) | 318,656 | 240,225 | 313,348 |
| Industrial waste recycled* (%) | 39.9² | 39.8 | 49.5 |

qualified industrial waste management service providers. The increase in waste has been driven by an increase in our hydrocarbon production and the oil spills during the year. In 2022, we recycled* 39.9%² of our industrial waste (an increase in waste recycled compared to the prior year, despite the 33% rise in industrial waste).

Measures that have contributed to the increase in recycling, primarily of oily wastewater and oily sludge waste streams, include adopting industry best practices and technologies for managing generated industrial waste and recovering hydrocarbons, such as automatic tank cleaning methods. Based on our strict quality criteria when selecting third-party partners, we included 18 industrial waste transporters and 12 industrial waste management third-party service providers for efficient disposal of our waste.

We have initiated a process of setting internal targets for recycling industrial waste. We also identified an opportunity for recycling spent-claus catalyst through the cement industry.

We are trialling a technology that can be used to condition NORM waste and recover material from the NORM waste stream, including hydrocarbons and water.

* Metric reported for the first time externally.

1. As we progress on our reporting journey and our controls around ESG data mature, for this metric, we have expanded the reporting boundary beyond just Company in-Kingdom. To allow comparability, we have restated the 2021 and 2020 figures in line with the expanded reporting boundary.

2. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).



Through our Namaat industrial investment arm, we launched IK Metals Reclamation and Catalyst Manufacturing as a non-equity investor. With a consortium of investors, the state-of-the-art recycling complex will integrate manufacturing facilities for fresh residue upgrading for catalysts and energy storage batteries in the Kingdom.

The IK Supercenter is planned across three discrete phases:



Phase 1 will see the construction of hydrometallurgical technology for vanadium reclamation to be used for producing vanadium electrolytes, for use in energy storage batteries.

Phase 2 will see the expansion of the IK Supercenter to include a hybrid hydro-pyro-metallurgical technology for metals reclamation of spent residue upgrading catalyst feedstock.

Phase 3 will further expand the IK Supercenter to include a fresh residue upgrading catalyst manufacturing facility.

What are we doing?

SafeChem

Some chemicals used in our operations are rated as high security concerns and need to be tracked and reported to the relevant governmental entity. SafeChem, an IR 4.0 solution, was developed to track chemicals of government security concern throughout their life cycle across our facilities. Utilizing RFID technology, chemicals can be tracked in real-time providing accurate information about their inventory, consumption, transportation, disposal, and location.

Municipal waste

Aramco has established a joint venture with Veolia, an international waste, water, and energy management company, to develop an integrated waste management facility in the Kingdom. The facility is intended to treat all of the Company's municipal and industrial waste generated in the Kingdom, and in the future expand to treat other wastes in the Kingdom and the region. A suitable site for the first phase of the project has been identified and all necessary geotechnical and environmental impact assessment studies have been carried out. Waste characterization studies, masterplans for both municipal and industrial wastes, and feasibility studies to identify the best available technologies to maximize recycling and minimize disposal to landfill have also been completed.

Plastic waste management

Our vision is to play a meaningful role in eliminating plastic waste and leakage to the environment, and it is informed by four key points:

- 1** The demand for plastic is projected to grow faster than the available supply of recycled materials due to increasing population, urbanization and economic development.
- 2** Plastic waste cannot be solved only by consuming less and recycling more — we need a re-engineering of the whole plastic value chain.
- 3** Plastic products need to be better designed with a focus on circularity with greater efficiency, reusability and improved recyclability.
- 4** Innovative technologies, such as the “refinery of the future” concept can address reusability by converting plastic waste into sustainable fuels or adopting chemical recycling technologies.

Aramco continues to promote the use of recycled plastics in the construction industry. For example, synthetic rubber from waste tyres was deployed in asphalt pavement construction as a partial replacement to bitumen (up to 10%).

We are also exploring methods and ways to increase the circular economy in the plastic industry in collaboration with key stakeholders, including recycling companies and local authorities.

We are currently assessing the development of a plastic recycling investment that aims to recycle post-consumer waste plastic into recycled pellets.



With our subsidiary SABIC, we are developing alternative uses for plastic waste and its recovery, ranging from mechanical to chemical recycling and new material design to provide more circular plastics.

Durable and non-metallic materials are an integral part of the auto industry, and demand is expected to grow significantly as we transition to hybrid and electric vehicles. Most of the plastics used in automobiles come from polymers — and our affiliate, SABIC, introduced the world's first circular polymer.

In addition to our individual efforts to address the challenges related to plastic waste management, we support involvement with collective prevention work directly or via our subsidiaries. We partner or engage with a range of industry associations, regulators, and non-government bodies.





Growing societal value

From the first discovery of oil in Saudi Arabia in 1933, we have created sustainable opportunities for the welfare of the Kingdom and the global communities where we operate. Citizenship, and contributing to growing societal value, is a firmly established principle that Aramco dedicates resources and capabilities to.

In 2022, Aramco invested \$370 million in a range of initiatives that will positively benefit thousands of people around the world.

Many of these projects have been realized through strategic collaboration and partnerships with businesses, non-profit organizations, charities, governments, and stakeholders.

In line with our commitment to relevant UN SDGs and Saudi Vision 2030, we enable citizens and businesses to unleash their full potential, helping to diversify the economy, supporting local content, and developing innovative opportunities for the future.

| Material topics | Relevant metrics | Relevant UN SDGs |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Labor practices | Number of people on Aramco sponsored programs* | |
| National content | Saudization (%) Saudization of construction contracts (%) Saudization of service contracts (%) iktva procurement spend in-Kingdom (%) | |
| Human rights (supply chain) | % of active suppliers signed up to Aramco's Supplier Code of Conduct* Number of active suppliers* | |
| Community and society | Social investment* (\$ million) Number of volunteers* Number of volunteer hours* | |
| Economic contribution | Direct economic value generated and distributed (\$ million) Total R&D spend (\$ million) | |

* Metric reported for the first time externally.

1. These programs include the Vocational College Internship Program (VCIP), University Internship Program (UIP), Summer enrichment program, Tomooh program, Advantage program, and ACCEL International Ajyal Center.

(≡) For more details on relevant metrics, see page 86.



Scan here

Learn more about how Aramco is mobilizing capabilities, and allocating resources to make a tangible and a positive difference in people's lives.

Labor practices and national content

Growing societal value wherever we operate

Nearly a century after the Kingdom's founding, the Saudi economy continues to grow and prosper thanks in part to the leading role that businesses, particularly Aramco, have played in the country's development.

As Aramco's business continues to evolve and expand across the Kingdom and the world, the Company has focused its vast energy on creating and developing a local workforce and supply chain infrastructure that can support the Company's plans for future growth.

We are proud of the significant contributions that our dedication to training, development, and in-Kingdom partnerships have provided to the overall economy and society in Saudi Arabia. This continued effort creates a positive feedback loop for our business: it brings our supply chain closer to home; it creates a pipeline of talent to support our business; and it enhances the development of qualified local partners.

As our business expands around the world, we seek to apply the same principles and values that made Aramco a success at home. One example of these efforts is our ownership of Motiva (the largest refinery in the U.S.) where we contribute significantly to the American economy through local employment, tax revenues, and a wide range of community projects. More information on our contributions abroad are provided on pages 78 and 79.

Building the local workforce in the Kingdom of Saudi Arabia

Labor practices

While Aramco's current workforce consists of more than 85 nationalities, given that the Company is headquartered in the Kingdom of Saudi Arabia, a large part of our revenues come from the Kingdom. We therefore need to ensure that we build local capacity and capability, not just by investing in socio-economic projects, but by investing in local citizens.

Saudization

In line with the Kingdom of Saudi Arabia's government Saudization program, and as part of Vision 2030, we have continued to invest in the national population. At the end of 2022, 90.9% of the Company's employees were Saudi nationals (90.5% in 2021).

| | 2022 | 2021 | 2020 |
|------------------------------------------------------------------|-------|-------|-------|
| Saudization (% of Saudi nationals as part of Aramco's workforce) | 90.9% | 90.5% | 89.6% |

Within Saudi Arabia, we support a number of preparatory programs, with a particular focus on education and preparing the leaders of the future for further education and employment.

In 2022, we led an outreach campaign to high school graduates, promoting the Apprenticeship Program for Non-Employees and the College Degree Program for Non-Employees to more than 317,000 high school students, including over 178,000 young women in 31 cities and governorates across the Kingdom. This positively impacted the quality and number of applications for the non-employees' programs. The number of applications was more than three times that received in 2021, including an 87% increase in applications from females.

| | 2022 | 2021 | 2020 |
|-------------------------------------------------------------|--------|-------|------------------|
| Number of people on Aramco sponsored programs ^{*1} | 12,160 | 9,010 | 737 ² |

87%

increase in applications by females to our education programs

* Metric reported for the first time externally.

1. These programs include the Vocational College Internship Program (VCIP), University Internship Program (UIP), Summer enrichment program, Tomooh program, Advantage program, and ACCEL International Ajyal Center.

2. The 2020 figure is significantly lower than the 2021 and 2022 figures due to the global COVID-19 pandemic.

Localizing our supply chain

In-Kingdom Total Value Add program

Our ikvta program is a national success story that we are immensely proud of. We are on track to meet our in-Kingdom target of spending 70% of all our procurement spend locally by the end of 2025. Through the program, the local component of our overall 2022 expenditure across our supply chain stood at 63% (2021: 59%).

During the year, Aramco entered into over 90 agreements with an estimated value of \$17.3 billion (SAR 64.9 billion) to build long-term collaborative relationships with strategic, local suppliers.

As a result of our partnerships and local spend, our suppliers had an aggregate invested capex of more than \$600 million (SAR 2,250 million) in 2022, which also created over 4,000 jobs for the local workforce.

In addition, 31 new local manufacturers were established. Items manufactured for the first time in the Kingdom, included:

- A chemical reaction plant;
- Frac equipments;
- Welding wires;
- Venturi flow meters;
- Firefighting foams; and
- Drilling rigs.

We also introduced three new requirements in the ikvta formula to drive emerging focus areas. Incentives are provided to help suppliers meet these requirements, which include:

- An Environmental, Social, and Governance factor to drive ESG practices in the local supply chain;
- A Cybersecurity factor to drive supply chain and cybersecurity compliance; and
- A Regional Headquarter (RHQ) factor to accelerate RHQ migration to the Kingdom, in alignment with Vision 2030.

By building a strong supply chain program, we mitigate risks and strengthen Aramco's position as a reliable and secure supplier of energy.



Beyond spending locally, we have proactively been building local capabilities in our workforce and supply chain. To date, this encompasses 965 organizations across 43 different sectors, including oil field services, chemicals, drilling, pipes, steel, and non-metallics.

Aramco procurement of domestically produced goods and services has benefited the Saudi Arabian economy. Mainly driven by the ikvta program, Aramco's total domestic spending is estimated to have contributed \$166bn in GDP since the program's inception, when considering the direct and supply chain contribution to the Kingdom's economy.

Mainly driven by the ikvta program, Aramco's total domestic spending is estimated to have contributed

\$166 billion in GDP since the program's inception

Growing societal value

The Saudization of construction contracts reached 28.0% in 2022, exceeding the 2021 year-end number of 25.6%. The Saudization of service contracts reached 57.2%, exceeding the 2021 year-end number of 56.6%.

Saudization of construction contracts

(%)

28.0



Saudization of service contracts

(%)

57.2



National Champions

In support of the Kingdom's Vision 2030 to deliver economic diversification and development, an internal National Champions organization was established to be at the forefront of Aramco's support to the national economy.

Our goal is to create a world-class cluster of innovative businesses that drives business and job creation, and national economic growth. Our mission is simple: convert lucrative business ideas into national champions, or large companies that can become leaders in their respective sectors. In doing so, we anticipate that thousands of new private sector jobs will be created across the country, benefiting the national GDP in the process.

Aramco's National Champions program encompasses a set of unique programs focused around five strategic domains — sustainability, digital, industrial, manufacturing, and social innovation — that drive development from an initial idea to a small- and medium-enterprise (SME) through to global businesses, and aligns with the Kingdom's Vision 2030 and its Shareek¹ Private Sector Partnership Reinforcement Program.

What are we doing?

Spare Parts Reverse Engineering

To sustain equipment spare parts availability, cost and know-how, we developed an in-house digital inventory of equipment spare parts. The inventory is created by multiple automated reverse engineering processes. Approximately 500 digital parts were developed as an initial trial with thousands of additional spare parts targeted in the coming year. Eleven local vendors have been qualified to produce spare parts from the digital inventory whenever needed. With this newly established system, a new source of spare parts has been established to ensure parts availability, reduce cost and improve delivery times.

1. A cooperative Government program that is providing job opportunities and diversifying the economy and strengthening cooperation between public and private sectors.

National Champions



Arabian Rig Manufacturing Company

Two onshore rigs, manufactured in-Kingdom and delivered by Aramco's joint venture, the Arabian Rig Manufacturing Company (ARM), were successfully commissioned and spudded on well location. Operations have started in Manifa for rig no.1 and Hawyah for rig no.2, representing two of a total of 50 committed onshore rig purchases to date. Locally built drilling rigs will enable additional resilience to our Company, while also providing significant employment opportunities for locals.



Artificial intelligence

In 2022, with a private sector partner, we established the Global AI Corridor to build local capacity and grow talent, nurture Saudi AI startups, and attract high-impact intellectual property and capital investment to the Kingdom. The Corridor is intended to launch several initiatives in the domains of AI research, solutions, upskilling, training, and venturing that augments other Aramco and in-Kingdom initiatives to create a vibrant AI ecosystem, which will assist us in seeking innovative energy management solutions.

Taleed

Launched in 2022, "Taleed" strives to accelerate the growth of SMEs in Saudi Arabia — helping boost their contribution to economic development and support job creation.

The program targets sustainable SME growth across multiple sectors through a portfolio of 20 initiatives, providing a wide range of support from capability building and strategy development to training, market access, advisory services, and business planning.

Taleed also strives to deliver funding and financial solutions across multiple funds with a combined capital exceeding \$800 million (SAR 3 billion).

The funds are being established in collaboration with partners to support SME development in sustainability, digital, manufacturing, industrial, and social innovation.

Human rights

Human rights in the supply chain

Human rights is not just relevant for our employees, but also for our broader stakeholders, especially our supply chain. In addition to our Code of Business Conduct (page 85), our Supplier Code of Conduct provides more details on the standards we expect our suppliers to conform to in relation to ethical sourcing, labor conditions and human rights.

To mitigate the risk of any of our suppliers falling short of our values, we require all suppliers in Saudi Arabia to sign the Supplier Code of Conduct, which along with the Company supplier contractual agreement terms, set our commitments to prohibiting all forms of child and forced labor, illegal working and living conditions, and violations of locally applicable minimum wages.

Over the past three years, all our suppliers in Saudi Arabia have agreed and signed up to the Code of Conduct, which requires Aramco's suppliers to ensure and respect human rights in Saudi Arabia, such as providing end of service benefits or medical insurance that comply with the labor law of the Kingdom.

We recognize due diligence in human rights and complying with the Code of Conduct requires thoroughness, to ensure the implementation of our values and standards. Therefore, Aramco regularly examines its businesses, suppliers, government relationships, acquisitions, mergers and divestitures. Our contracting teams inspect our suppliers, especially in high-risk locations, to check for any malpractice, e.g., contractors being paid below minimum wage and/or unsafe living conditions.



As mentioned on page 73, this year we incorporated an ESG element in the iktva program to drive better ESG practices in the local supply chain and by awarding suppliers an incentive factor through the iktva formula.

As part of a two-way engagement process, our suppliers have access to a hotline to report concerns, which are reviewed and investigated to limit the risk of inappropriate activities.

Community and society

Social investment

The Company's citizenship strategy is defined by two key pillars: People and Planet. People social investment activities focus on two key areas of support: knowledge and creativity, and socio-economic development. Planet social investment activities prioritize the protection of diverse biospheres, including reforestation, mangrove and tree plantation, and coral reef regeneration, among other projects.

In 2022, we made social investments of \$370 million in Saudi Arabia and abroad. Examples of the types of projects we invested in are provided on pages 78 and 79.

Socio-economic development: Micro-industries programs

The primary focus of this effort is to identify, evaluate, and incubate high potential micro-enterprises across the Kingdom with the goal of creating a self-sufficient, value-generating businesses that supports community economic growth.

Saudi coffee plantation and production

In 2022, Aramco signed MoU to build a National Coffee Development Center that will enable coffee farmers in several ways. The center intends to provide farmers with the training and resources to produce higher quantities of coffee beans. The center will also support farmers through the different stages of production, from treating the coffee beans all the way to the packaging stage. The center is currently being built in partnership with the Jazan Mountain Development Authority, and Al-Dayer Ber Charity.

Over

1.5 million

students in 28,000 schools participating in the F1 in Schools challenge

Rosyar factory

The Rosyar factory produces high quality FDA approved body care products from al-Taif rose oil. The factory provides employment for socially disadvantaged women and provides them with a sustainable means of income. In 2022, the factory increased the number of beneficiaries from 50 to 100 women. Additionally, over 40 new jobs were created.

What are we doing?

Enabling people: Focus on STEM

F1 Schools is a global STEM challenge where a team of 3-6 students design, manufacture and race a miniature Formula 1 car of the future and teams follow a systematic engineering design process using technology. The challenge inspires learning in STEM including project management, marketing, teamwork and innovation. Teams submit their cars, project portfolios, designs and are judged by SMEs. The winners progress at each stage with only the top teams from each country attending the annual Aramco F1 in Schools World Finals. To date, there are over 1.5 million students in 28,000 schools across 60 countries.

Aramco, which became a title sponsor of the F1 in Schools world finals last year, is supporting its introduction to Saudi Arabia as part of the Company's efforts to promote education, foster a culture of innovation and creativity, and accelerate human potential. The Saudi team selected for the national finals are supported by Ithra, Aramco's flagship corporate citizenship initiative, as well as the Technology Advancement and Prototyping Center at King Fahd University of Petroleum and Minerals (KFUPM).

Saudi students participated in the Global Finals for the first time in the event held in the UK in 2022. The initial cohort of 18 male and female students was drawn from public and private schools through a selection criteria. The training hubs included specialist facilitators and a state-of-the-art research and development lab. The students went through an intensive training program with three teams chosen to go to the global final and won the Best Newcomers Award 2022.



Global citizenship

During 2022, Aramco made \$370 million of social investment around the world across various initiatives. The map and case studies below present some highlights of our people and planet projects during the year.

Saudi Arabia

In Saudi Arabia, one of Aramco's key initiatives is to evaluate and incubate Saudi-based micro-enterprises that can potentially grow at scale and make a significant community economic impact.



Textile industry People

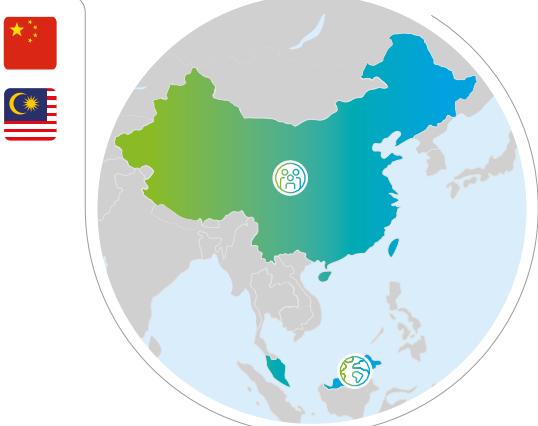
Established in the second half of 2022, Imprint is a local factory producing government uniforms. Established in collaboration with Alanamel Almobdeah Charity, the center provides training and employment, with a specific focus on garment production for government personnel, and includes employment opportunities to rehabilitate newly released prisoners.

Artificial reef deployment in the Planet Arabian Gulf

The deployment of three mega reefs is an initiative with a goal to improve the fisheries in the Gulf and enhance biodiversity by providing habitat for fish and other marine life. In 2022, we completed the development of the artificial reef blocks and deployment will begin when pending government permits are issued.

Asia

In Asia, Aramco supported 11 organizations across China, Malaysia, Singapore, Japan, Korea, and India, with various environmental, education, social, and medical initiatives.



Children Benefit People

Established in 2010, the CCAFC is a nationwide non-profit organization, committed to improving the livelihood of underprivileged children in China. The goal is to provide medical checkups and necessary follow-up treatment for underprivileged children in rural areas with inadequate access to professional health care facilities. Approximately 1,300 underprivileged children will benefit from the project, which also provides repetition, dental care and eye care in the Fujian, Liaoning, Shandong, and Jiangsu provinces.

Global Environment Centre Planet

The Global Environment Centre is a Malaysian non-profit organization established to address key environmental issues. The funding will enable support for community-based mangrove conservation and rehabilitation in two areas in Pengerang, Johor: Tanjung Surat Island and Johor River Forest reserve.

Europe

In Europe, Aramco supported eight non-profit organizations across Spain, the Netherlands and the U.K.



Fundación Global Nature Planet

The Fundación Global Nature is a non-profit foundation dedicated to nature protection. The foundation aims to restore and expand the El Hito, a priority salt flat and wetland area in southeast Spain. The program looks to purchase traditional farmland around steppe wetlands to implement pilot programs of sustainable agriculture to train local farmers.



Leiden University

Collaborating with education institutions (including schools and universities) to increase public awareness, knowledge and understanding of Islam and Middle East.

Americas

In the Americas, Aramco supported 13 non-profit organizations, including national and regional/state charities, in environmental, STEM and social projects.



Houston Food Bank

The Houston Food Bank is a non-profit organization serving 18 counties, almost 93,000 households, and 159 million meals a year. Aramco's donation will provide the equivalent of 150,000 meals to communities in need in the Greater Houston area.

Geology Camp Planet

A Texas A&M University program investing in teacher's professional development, enriching the classroom experience for students.

Aramco sponsors this program with our Upstream and Geology teams.



King Abdulaziz Center for World Culture (ithra)

In 2022, our largest social investment was ithra, Saudi Arabia's leading destination for cross-cultural experiences. Since opening in Dhahran in 2018, ithra has been a catalyst for cultivating innovation, developing talent, expanding human potential and empowering creativity.

In 2022, ithra delivered over 8,000 programs and welcomed more than one million visitors. For example, the Tanween Bio-tech Fashion Challenge invited designers to create unique garments exploring the potential of new biomaterials and sustainable business models; and the Idea Lab produced initiatives dedicated to environmental and economic sustainability.

ithra's Content Commissioning Program provides Saudi freelancers and small enterprises with opportunities to develop creative content including literature, film, translation and music. It includes the flagship Tanween Creativity Season and the immersive-tech oriented Creative Solutions program.

Matched giving

In 2022, the Corporate Donation Program celebrated its 20th anniversary, reaching another record number of donations (2022: \$1.7 million/ SAR 6.3 million versus 2021: \$1.6 million/ SAR 6.0 million). Aramco's matched giving program enabled these donations to be doubled; thus \$3.4 million/SAR 12.6 million in 2022 and \$3.2 million/SAR 12 million in 2021 being donated by Aramco.

There were 18,500 participants in this program with 41,000 beneficiaries.

Volunteering days

Along with engaging with our communities via business activities, matched giving and social investments, we encourage our management and employees to engage with communities through volunteering. In December 2021, we also launched a structured year-round volunteering portal to help identify volunteering activities that match Company employees' talents.

| | 2022 | 2021 | 2020 |
|----------------------------|----------------------------|---------|--------|
| Number of volunteers* | 4,941¹ | 4,153 | 1,503 |
| Number of volunteer hours* | 168,590¹ | 136,284 | 52,408 |

* Metric reported for the first time externally.

1. As we progress on our reporting journey and our controls around ESG data mature, for this metric from 2022 onwards, we have expanded the reporting boundary from Company in-Kingdom to operational control. The 2021 and 2020 figures are at a Company in-Kingdom level only. In 2022, at a Company in-Kingdom level, the number of volunteers were 4,397 and the number of volunteer hours were 166,734.

What are we doing?

Supporting people with disabilities

In Saudi Arabia, Aramco has a history of supporting children and adults with developmental disabilities, particular in Autism and Down Syndrome. The Company has provided support to a number of specialist organizations and treatment centers, including:

AFAC Autism Center

A supportive community center for children aged 3 to 16 on the autism spectrum and their families.

Al-Madina Association for Autism (Tamakkon)

A facility that provides diagnosis, care, education and rehabilitation for people on the autism spectrum.

Hiba Center for Down Syndrome

An education and rehabilitation center for children with Down Syndrome.

ACCEL Ajyal Center for children with disabilities

Provides educational, therapeutic, employment, behavioral, life skills, and transitional services.

Shamaah Autism Center

A supportive educational environment that promotes the inclusion of people on the autism spectrum in education and society.

Aramco supported events delivering

168,590
volunteer hours*

Economic contribution

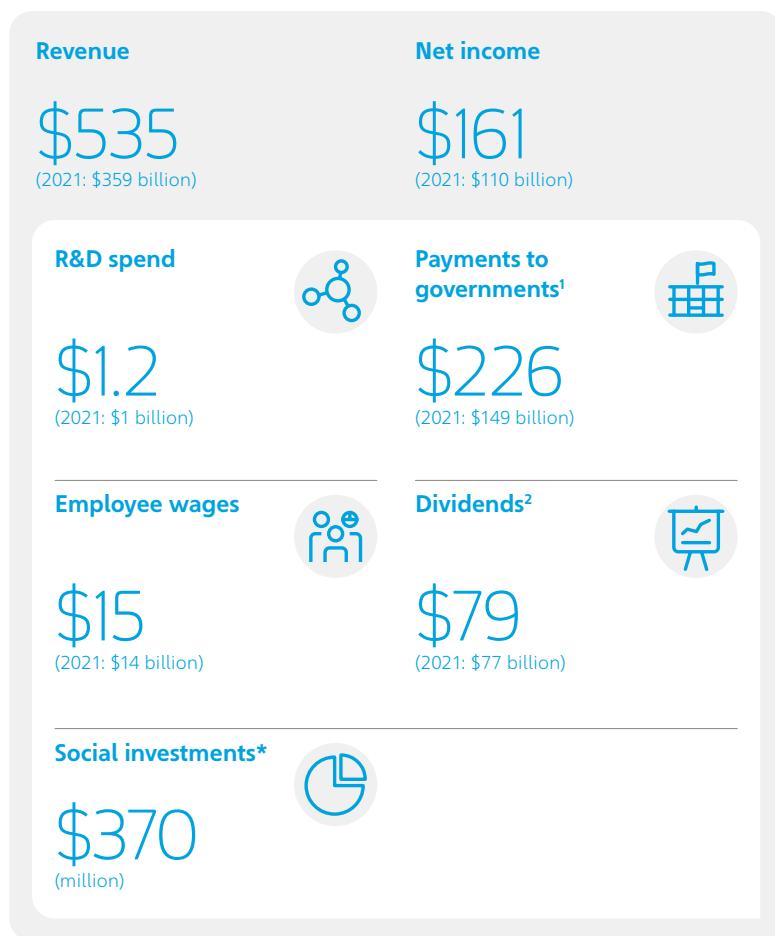
Aramco's value to local economies

With our operations in more than 30 countries and activities throughout the value chain, Aramco creates value and makes significant positive economic contributions, wherever we operate.

Beyond our \$30 billion iktva spend, \$370 million global social investment and leveraged capex of more than \$600 million via our value chain, we increased our payments to governments by 52% (\$226 billion in 2022 versus \$149 billion in 2021) and our global R&D spend by 14% (\$1.2 billion in 2022 versus \$1 billion in 2021).

Our R&D spend enables us to support projects that have the potential to positively change the way we do business and enables us to contribute positively to the communities we operate in, as well as increase the number of potential job opportunities available.

Our R&D spend is not limited to providing economic benefits but they also have the potential to provide sustainability benefits. Similar to last year where 52% of our total R&D was sustainability-related, in 2022, 59% of our total R&D was linked to sustainability related projects, which can help us reduce our environmental footprint (CCS, methane, biodiversity, etc.) as well as help us focus on new energies (hydrogen, renewables, etc.)



* Metric reported for the first time externally.

1. Figure includes income taxes, royalties and dividends.

2. Dividends paid includes dividends to shareholders and non-controlling interests.



Governance

The Board of Directors (Board) of the Company acts as an oversight body for Company management, including providing strategic leadership and guidance, as well as assessing opportunities, risks, and risk mitigation controls. The Board also oversees the Company's governance, risk, compliance regime and sustainability performance.

The Chairman of the Board is H.E. Yasir O. Al-Rumayyan. The current members of the Board include high-ranking Saudi Government officials and former senior executives from the international oil and gas, chemical, petroleum refining, petrochemical, and finance industries.

Material topics

Corporate governance

Relevant metrics

Board composition by average age
Board composition by average tenure
Board members' average attendance* (%)
Number of independent Board members*
Board diversity* (number of females on the Board)

Relevant UN SDGs



Ethics, anti-bribery and anti-corruption (compliance)

Number of allegations received through the 24-hour hotline
Anti-bribery and anti-corruption training

In this section, we discuss sustainability governance. Please see our 2022 Annual Report for greater details of our corporate governance.

* Metric reported for the first time externally in our Sustainability Report.

ⓘ For more details on relevant metrics, see page 86.

Learn more about our corporate governance structure.



Scan here

Our sustainability governance

Our Board and senior executives

Our Board members and senior executives have strong oversight of the Company's financial and sustainability strategy and performance. In 2022, there was 100% attendance* at Board meetings. Five of the eleven Board members are independent.

Executive remuneration

Senior executive remuneration is linked to the Company's sustainability performance. The remuneration framework for senior executives is designed to provide a balanced remuneration package that includes fixed and variable remuneration. The variable remuneration is market-aligned and subject to the fulfillment of predefined performance goals.

Performance goals include sustainability metrics, such as GHG emissions intensity, flaring and safety.

| | 2022 | 2021 | 2020 |
|---------------------------------------------------|------------|------|------|
| Board composition by average age | 63 | 62 | 61 |
| Board composition by average tenure | 6 | 5 | 5.6 |
| Board members' average attendance* (%) | 100 | 97 | 98 |
| Number of independent Board members* | 5 | 5 | 5 |
| Board diversity* (number of females on the Board) | 1 | 1 | 1 |

Two variable pay plans are used:

- (i) Short-Term Incentive Plan (STIP) — an annual cash-based plan designed to reward performance in four areas (financial, operational, safety, and sustainability); and
- (ii) Long-Term Incentive Plan (LTIP) — designed to reward key financial, strategic and environmental/sustainability performance over a three-year period.

In 2022, there was 100% attendance at Board meetings*

Sustainability governance

Our sustainability governance model strives to align our sustainability aspirations with the corporate business strategy and goals.

Board Sustainability, Risk and HSE Committee

The Board Sustainability, Risk and HSE (Health, Safety and Environment) Committee provides oversight and review of Company plans and performance, and advises on our sustainability, risk and HSE policies and practices to ensure that these are discussed, understood, owned and promoted at Board level. This includes advising on the Company's response to climate change. This Committee meets quarterly to review the HSE performance (including health and safety incidents).

Sustainability governance management framework



* Metric reported for the first time externally in our Sustainability Report.

Corporate committees

Overall accountability for sustainability within Aramco lies with the chief executive officer, the Management Committee and the Strategy Council. They are supported by the Health, Safety, Security and Environment Committee (HSSE) and the Sustainability Steering Committee (SSC).

The Company's HSSE Committee is led by the president and CEO. It establishes the Company's health, safety, security, and environmental policies and reviews key issues. This includes Company-wide safety initiatives, environmental and safety performance, compliance and conformance reviews, major HSSE incidents, insurance survey results, and cybersecurity.

Sustainability Steering Committee

The SSC, led by the executive vice president of Strategy and Corporate Development, reports to both the Strategy Council and Management Committee. The committee is comprised of senior vice presidents representing key Business Lines and Administrative Areas in the Company.

The role of the SSC is to identify issues linked to sustainability and enable Aramco to categorize any potential impact on long-term value creation for stakeholders and the business.

The SSC has specific accountability for the review of the Company's climate strategy, decarbonization plans, and corporate risk assessments. The outcome of these reviews are then presented and endorsed by the Management Committee prior to the final review by the Board.

Ethics and compliance

Aramco maintains a zero tolerance policy for unethical behavior and conduct. Aramco expects its employees, and any party it does business with, to adhere to the principles contained in this policy. The policy includes, but is not limited to, anti-bribery, anti-corruption, and anti-fraud.

Code of Business Conduct

Aramco's Code of Business Conduct is the foundation of our compliance program, which includes specific principles regulating anti-bribery and anti-corruption. Aramco has a mandatory enterprise-wide online Code of

Conduct training program. The Code of Conduct is supported by compliance policies, implementing procedures and guidelines. Procedures have been developed to operationalize and support our anti-bribery and anti-corruption policies, which prohibits bribery and corruption in all forms. It includes, but is not limited to, procedures for third-party due diligence, gifts, meals, entertainment, and travel.

An anonymous 24-hour hotline, the General Auditor Hotline is open to employees, suppliers, and all stakeholders to report any suspected misconduct, including allegations related to bribery or corruption. Information about the hotline is available on Aramco's public webpage and enables reporting via email, telephone, facsimile, or the Company's intranet. Aramco has zero tolerance for retaliation, in any form, for good faith reporting of suspected misconduct.

As part of our continued enhancements to our compliance program, we maintain committees to review findings of misconduct committed by personnel or third parties to ensure timely implementation of appropriate and consistent remedial measures.

In 2022, there were 655 allegations (2021: 539) relating to a range of different topics, such as breach of the Aramco Code of Conduct, conflicts of interest/ethics (including alleged bribery and fraud) and misuse of IT equipment.

| | 2022 | 2021 | 2020 |
|------------------------------------------------------------|-------------|-------------|-------------|
| Number of allegations received through the 24-hour hotline | 655 | 539 | 619 |

The number of allegations received from Aramco employees increased during the year, whereas allegations from anonymous sources has decreased significantly, especially when compared to prior years. We believe this indicates that employees have a growing level of awareness and trust regarding ethics matters, policy compliance expectations, and the channels for reporting and communicating concerns. The proliferation of digital technology and data analytics tools across Aramco has also been a major contributor to the increase in the number of allegations received in 2022.

Data

The following table presents Aramco's sustainability metrics for the years 2022, 2021, and 2020. Reporting boundaries for each metric and for each year are shown for transparency, and where possible, comparability.

There are three common terms used in reference to the metrics' reporting boundaries and the definitions of the commonly used terms are:

Company in-Kingdom — Saudi Arabian Oil Company in-Kingdom wholly-owned operated assets.

Operational control — 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).

Group — Saudi Arabian Oil Company, together with its consolidated subsidiaries, and where the context requires, its joint operations, joint ventures and associates.

For more information
on our metrics, see our
[sustainability data](#)
on our website.



Scan here

Our metrics

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------|---------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
|  Climate change and the energy transition | | | | | | | |
| Climate change | Scope 1 emissions (million metric tonnes of CO ₂ e) | 55.7 ^{1,2} | Operational control excluding ATC, ASC, AOC and SAAC | 52.3 ^{1,2} | Operational control excluding ATC, ASC, AOC and SAAC | 50.2 ^{1,2,3} | Operational control excluding ATC, ASC, AOC and SAAC |
| Climate change | Scope 2 emissions (million metric tonnes of CO ₂ e) Location-based | 16.1 ^{1,2} | Operational control excluding ATC, ASC, AOC and SAAC | 15.5 ^{1,2} | Operational control excluding ATC, ASC, AOC and SAAC | 18.1 ^{1,2,3} | Operational control excluding ATC, ASC, AOC and SAAC |
| Climate change | Scope 2 emissions (million metric tonnes of CO ₂ e) Market-based ^{*4} | 10.3 ^{1,2} | Operational control excluding ATC, ASC, AOC and SAAC | | | Metric not disclosed previously | |
| Climate change | Upstream carbon intensity ⁵ (ratio of total upstream GHG emissions (Scopes 1 and 2) to production marketed ⁶ , kg CO ₂ e/boe) Location-based | 10.3 ¹ | Operational control | 10.7 ¹ | Operational control | 10.6 ³ | Operational control |
| Climate change | Upstream methane emissions ⁵ (metric tonnes of CH ₄) | 29,193 | Operational control | 26,754 | Operational control | 26,424 ³ | Operational control |
| Climate change | Upstream methane intensity ⁵ (methane emissions from upstream operations per volume of marketed natural gas, %) | 0.05 | Operational control | 0.05 | Operational control | 0.06 ³ | Operational control |

* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. The Jazan Refinery (our downstream refinery) is excluded from our GHG reporting. In 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the company's commitment to operational transparency.

3. Fadhili Gas Plant is excluded from 2020 GHG emissions inventory.

4. In 2022, we also adopted a market-based methodology for our Scope 2 emissions, as per the GHG Protocol Scope 2 Guidance.

5. For this metric, the reporting boundary has been reclassified from Company in-Kingdom to operational control for 2022, 2021 and 2020. All of the company's upstream operations are in the Kingdom of Saudi Arabia, therefore for this metric, Company in Kingdom and operation control are the same.

6. The methodology of this metric is the same as previous years and no change in figures. However, the term 'production sold' has been renamed to 'production marketed' to align with our reporting to the OGCI Reporting Framework (Version 3.6, March 2022).

Our metrics

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------|----------------------|------------------------------------------------------|------------------------|------------------------------------------------------|
|  Climate change and the energy transition | | | | | | | |
| Climate change | Flaring intensity ² (volume of hydrocarbon gas flared per barrel of oil equivalent produced, scf/boe) | 4.60 ^{1,3} | Operational control | 5.51 ³ | Operational control | 5.97 ^{3,4} | Operational control |
| Climate change | Flared gas ² (MMscf) | 23,818 ³ | Operational control | 25,825 ³ | Operational control | 26,995 ^{3,4} | Operational control |
| Climate change | Energy intensity (ratio of total net energy consumption and total production, thousand Btu/boe) | 146.2 ⁵ | Operational control | 116.6 ^{1,3} | Company in-Kingdom | 112.4 ^{1,3,4} | Company in-Kingdom |
|  Safe operations and people development | | | | | | | |
| Workforce protection | Number of fatalities | 5 ¹ | Operational control | 1 ¹ | Operational control | 1 ¹ | Company in-Kingdom |
| Workforce protection | Lost time injuries/illnesses rate (number of LTI cases x 200,000/total work hours) | 0.014 ¹ | Operational control | 0.017 | Operational control | 0.011 | Company in-Kingdom |
| Workforce Protection | Total recordable case frequency (total recordable incidents x 200,000/total work hours) | 0.050 | Operational control | 0.054 | Operational control | 0.044 | Company in-Kingdom |
| Workforce protection | Health performance* (number of overdue major health findings) x (100)/total number of open major health findings) (%) | 15 ¹ | Operational control excluding ATC, ASC, AOC and SAAC | 15 | Operational control excluding ATC, ASC, AOC and SAAC | 20 | Operational control excluding ATC, ASC, AOC and SAAC |
| Process safety and asset integrity | Number of Tier 1 process safety events | 11 | Operational control | 11 | Operational control | 9 | Company in-Kingdom |

* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. For this metric, the reporting boundary has been reclassified from operational control excluding ATC, ASC, AOC and SAAC to operational control for 2022, 2021 and 2020. This is because ATC, ASC, AOC and SAAC have no flaring emissions.

3. The Jazan Refinery (our downstream refinery) is excluded from our GHG reporting. In 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the company's commitment to operational transparency.

4. Fadhili Gas Plant is excluded from 2020 GHG emissions inventory.

5. As we progress on our reporting journey and our controls around ESG data mature, for this metric from 2022 onwards, we have expanded the reporting boundary from Company in-Kingdom to operational control. The 2021 and 2020 figures are at a Company in-Kingdom level only. In 2022, at a Company in-Kingdom level, the energy intensity was 112.9 thousand Btu/boe.

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------|--------------------|--------------------------------------------|--------------------|------------------|--------------------|
|  Safe operations and people development | | | | | | | |
| Human rights | Number of grievances raised* | 293 | Company in-Kingdom | 236 | Company in-Kingdom | 297 | Company in-Kingdom |
| Human rights | Sites with a grievance mechanism in place* (%) | 100 | Company in-Kingdom | 100 | Company in-Kingdom | 100 | Company in-Kingdom |
| Labor practices | Attrition rate* (%) | 2.4 | Company in-Kingdom | 2.8 | Company in-Kingdom | 7.8 | Company in-Kingdom |
| Labor practices | Number of company employees | 70,496 | Company in-Kingdom | 68,493 | Company in-Kingdom | 66,800 | Company in-Kingdom |
| Labor practices | Number of female employees* | 4,503 | Company in-Kingdom | 3,802 | Company in-Kingdom | 3,400 | Company in-Kingdom |
| Labor practices | Female (%) of total employees | 6.4 | Company in-Kingdom | 5.6 ¹ | Company in-Kingdom | 5.1 ¹ | Company in-Kingdom |
| Labor practices | Number of female employees in leadership positions* | 176 | Company in-Kingdom | 136 | Company in-Kingdom | 110 | Company in-Kingdom |
| Labor practices | Female (%) of total number of new hires* | 28.4% | Company in-Kingdom | 31.2% | Company in-Kingdom | 34.1% | Company in-Kingdom |
| Labor practices | Female employees (%) of leadership positions | 3.8 | Company in-Kingdom | 3.1 | Company in-Kingdom | 2.7 | Company in-Kingdom |
| Labor practices | Number of contractor employees* (Supplementary man power) | 7,639 | Company in-Kingdom | 6,339 | Company in-Kingdom | 6,365 | Company in-Kingdom |
| Labor practices | Employees receiving regular performance reviews (%) | 90.6 | Company in-Kingdom | 96.8 | Company in-Kingdom | 98.4 | Company in-Kingdom |
| Labor practices | Employee engagement score* (%) | 85% | Company in-Kingdom | N/A as this survey is done every two years | | 85% | Company in-Kingdom |
| Labor practices | Number of hired graduates | 1,459 | Company in-Kingdom | 1,447 | Company in-Kingdom | 460 | Company in-Kingdom |
| Labor practices | Number of apprentices | 1,728 | Company in-Kingdom | 1,369 | Company in-Kingdom | 1,001 | Company in-Kingdom |
| Labor practices | Number of interns | 3,190 | Company in-Kingdom | 1,922 | Company in-Kingdom | 641 | Company in-Kingdom |
| Labor practices | Total hours of training and development* (million) | 13.0 | Company in-Kingdom | 12.8 | Company in-Kingdom | 12.1 | Company in-Kingdom |
| Labor practices | Average hours of training and development* (per employee) | 183 | Company in-Kingdom | 188 | Company in-Kingdom | 176 | Company in-Kingdom |

* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

Our metrics

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|---------------------------------|---------------------|---------------------------------|---------------------|
|  Minimizing environmental impact | | | | | | | |
| Local environmental impact | Number of hydrocarbon spills Total number of accidental release events of liquid petroleum hydrocarbon into the environment, where the spill incident is > 1 bbl | 15 | Operational control | 13 | Operational control | 6 | Operational control |
| Local environmental impact | Volume of hydrocarbon spills Total volume of liquid petroleum hydrocarbon accidentally released into the environment, where the spill incident is > 1 bbl | 142,885 ¹ | Operational control | 14,447 | Operational control | 134 | Operational control |
| Local environmental impact | Recovered hydrocarbon Percentage of liquid petroleum hydrocarbon removed from the environment through recovery methods* (%) | 9 ¹ | Operational control | 94 | Operational control | Metric not disclosed previously | |
| Local environmental impact | Hydrocarbon discharge to water ² The total of hydrocarbons that are systematically released to surface water through regulated industrial wastewater discharges (barrels) | 16.4 ¹ | Operational control | 30.7 | Operational control | 20.2 | Operational control |
| Local environmental impact | SO ₂ emissions ^{3,4} Quantity of sulfur dioxide (SO ₂) (kilotonnes) | 167 ¹ | Operational control | 141 | Operational control | 163 | Operational control |
| Local environmental impact | Number of sites with ISO 14001 certification* (%) | 98 ¹ | Operational control | Metric not disclosed previously | | | |

* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. As we progress on our reporting journey and our controls around ESG data mature, for this metric, we have expanded the reporting boundary from Company in-Kingdom to operational control. To allow comparability, we have restated the 2021 and 2020 figures in line with the expanded reporting boundary.

3. The Jazan Refinery (our downstream refinery) is excluded from our SO₂ emissions reporting. In 2022, it remains in the startup and stabilization phase and is not fully operational. Aramco is working to stabilize the refinery's operations and complete all necessary reporting configurations before the end of 2023. Reporting on the refinery's environmental and sustainability elements will commence immediately thereafter, in line with the company's commitment to operational transparency.

4. For this metric, the reporting boundary has been reclassified from operational control excluding ATC, ASC, AOC and SAAC to operational control for 2022, 2021 and 2020. This is because ATC, ASC, AOC and SAAC are office-based entities and therefore, have no SO₂ emissions.

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------|-------------|------------------------------------------------------|-------------|------------------------------------------------------|
|  Minimizing environmental impact | | | | | | | |
| Biodiversity | Net positive impact* (total biodiversity areas (km ²)/Footprint area (km ²) x 100) (%) | 53 ¹ | Operational control | | Metric not disclosed previously | | |
| Water management | Freshwater consumption ² (million m ³) The difference between the volume of freshwater removed from the environment, incl. surface water, groundwater, for use in operations, and freshwater returned to the source. The total dissolved solids concentration of this type of water is up to 2,000 mg/l | 93.6 ¹ | Operational control excluding ATC, ASC, AOC and SAAC | 94.6 | Operational control excluding ATC, ASC, AOC and SAAC | 90.2 | Operational control excluding ATC, ASC, AOC and SAAC |
| Water management | Freshwater withdrawal ² (million m ³) | 136.6 | Operational control excluding ATC, ASC, AOC and SAAC | 137.3 | Operational control excluding ATC, ASC, AOC and SAAC | 142.9 | Operational control excluding ATC, ASC, AOC and SAAC |
| Product stewardship and waste management | Industrial waste generated ² The total amount of industrial waste, hazardous and non-hazardous, generated from operating facilities, not including waste recycling, re-using, and recovery (metric tonnes) | 318,656 | Operational control | 240,225 | Operational control | 313,348 | Operational control |
| Product stewardship and waste management | Industrial waste recycled* (%) | 39.9 ¹ | Operational control | 39.8 | Operational control | 49.5 | Operational control |

* Metric reported for the first time externally.

1. This figure has undergone external limited assurance in accordance to the ISAE 3000 (revised). The assurance report can be found [online here](#).

2. As we progress on our reporting journey and our controls around ESG data mature, for this metric, we have expanded the reporting boundary beyond just Company In-Kingdom. To allow comparability, we have restated the 2021 and 2020 figures in line with the expanded reporting boundary.

Our metrics

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|-------------|---------------------------------|-------------|--------------------|
|  Growing societal value | | | | | | | |
| Labor practices | Number of people on Aramco sponsored programs* ¹ | 12,160 | Company in-Kingdom | 9,010 | Company in-Kingdom | 737 | Company in-Kingdom |
| National content | Saudization (%) | 90.9 | Company in-Kingdom | 90.5 | Company in-Kingdom | 89.6 | Company in-Kingdom |
| National content | Saudization of construction contracts (%) Percentage of construction saudi contractors relative to the total construction contractors workforce in Saudi Arabia | 28.0 | Company in-Kingdom | 25.6 | Company in-Kingdom | 21.6 | Company in-Kingdom |
| National content | Saudization of service contracts (%) Percentage of Saudi service contractors relative to the total service contractors workforce in Saudi Arabia | 57.2 | Company in-Kingdom | 56.6 | Company in-Kingdom | 51.0 | Company in-Kingdom |
| National content | iktva procurement spend within the Kingdom (%) | 63.0 | Company in-Kingdom | 59.0 | Company in-Kingdom | 57.5 | Company in-Kingdom |
| Human rights | % of active suppliers signed up to Aramco's Supplier Code of Conduct* | 100% | Company in-Kingdom | 100% | Company in-Kingdom | 100% | Company in-Kingdom |
| Human rights | Number of active suppliers* | 3,199 | Company in-Kingdom | | Metric not disclosed previously | | |
| Community and society | Social investment* ² (\$ million) | 370 | Operational control | | Metric not disclosed previously | | |
| Community and society | Number of volunteers* | 4,941 ³ | Operational control | 4,153 | Company in-Kingdom | 1,503 | Company in-Kingdom |
| Community and society | Number of volunteer hours* | 168,590 ³ | Operational control | 136,284 | Company in-Kingdom | 52,408 | Company in-Kingdom |
| Economic contribution | Direct economic value generated and distributed ² : | | Group | | Group | | Group |
| | – Revenue (\$ million) | 535,188 | | 359,181 | | 204,829 | |
| | – Other income related to sales (\$ million) | 69,178 | | 41,287 | | 25,062 | |

* Metric reported for the first time externally.

1. These programs include the Vocational College Internship Program (VCIP), University Internship Program (UIP), Summer enrichment program, Tomooh program, Advantage program, and ACCEL International Ajyal Center.

2. This metric is converted at a fixed rate of U.S. dollar 1.00 = SAR 3.75 for convenience only.

3. As we progress on our reporting journey and our controls around ESG data mature, for this metric from 2022 onwards, we have expanded the reporting boundary from Company in-Kingdom to operational control. The 2021 and 2020 figures are at a Company in-Kingdom level only. In 2022, at a Company in-Kingdom level, the number of volunteers were 4,397 and the number of volunteer hours were 166,734.

| Material topic | Metric definition (unit of measure) | 2022 actual | 2022 boundaries | 2021 actual | 2021 boundaries | 2020 actual | 2020 boundaries |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------|--------------------|-------------|--------------------|---------------------------------|--------------------|
|  Growing societal value | | | | | | | |
| Economic contribution | – Operating costs (\$ million) | 299,279 | | 194,624 | | 127,662 | |
| | – Employee wages and benefits (\$ million) | 14,665 | | 14,066 | | 13,670 | |
| | – Dividends paid (\$ million) | 78,863 | | 76,911 | | 69,841 | |
| | – Payments to government (\$ million) | 225,866 | | 148,542 | | 110,076 | |
| Economic contribution | Total R&D spend ¹ (\$ million) | 1,178 | Group | 1,033 | Group | 755 | Group |
| Governance | | | | | | | |
| Corporate governance | Board composition by average age | 63 | Group | 62 | Group | 61 | Group |
| Corporate governance | Board composition by average tenure | 6 | Group | 5 | Group | 5.6 | Group |
| Corporate governance | Board members' average attendance* (%) | 100 | Group | 97 | Group | 98 | Group |
| Corporate governance | Number of independent Board members* | 5 | Group | 5 | Group | 5 | Group |
| Corporate governance | Board diversity* (number of females on the Board) | 1 | Group | 1 | Group | 1 | Group |
| Ethics, anti-bribery and anti-corruption (compliance) | Number of allegations received through the 24-hour hotline | 655 | Company in-Kingdom | 539 | Company in-Kingdom | 619 | Company in-Kingdom |
| Ethics, anti-bribery and anti-corruption (compliance) | Anti-bribery and anti-corruption training hours | 22,575 | Company in-Kingdom | 7,300 | Company in-Kingdom | Metric not disclosed previously | |

* Metric reported for the first time externally in our Sustainability Report.

1. This metric is converted at a fixed rate of U.S. dollar 1.00 = SAR 3.75 for convenience only.

Abbreviations, terms and glossary

Currencies

Currency conversion

All financial amounts in SAR and USD in this Report are reported in line with the exchange rates reported in [Saudi Aramco's 2022 Annual Report](#).

SAR/Saudi Riyal

Saudi Arabian riyal, the lawful currency of the Kingdom

\$/USD/US\$/Dollar

US dollar

Units of measurement

Barrel (bbl)

Barrels of crude oil, condensate or refined products

boe

Barrels of oil equivalent

bscf

Billion standard cubic feet

bscfd

Billion standard cubic feet per day

Btu

British thermal unit

GW

Gigawatts

Mboed

Thousand barrels of oil-equivalent per day

MMboed

Million barrels of oil-equivalent per day

MMscf

Million standard cubic feet

MMtpa

Million metric tonnes per annum

per day

Volumes are converted into a daily basis using a calendar year (Gregorian)

scf

Standard cubic feet

tscf

Trillion standard cubic feet

Terms and glossary

Affiliate

With respect to financial information, the term Affiliate is defined by IFRS, meaning the Company's subsidiaries, joint arrangements and associates.

Aramco Namaat

Aramco's industrial investment program.

ARLANXEO

ARLANXEO Holding B.V., a wholly-owned specialty chemicals subsidiary.

ATC

Aramco Trading Company, a wholly-owned subsidiary of Aramco.

Carbon credit

A carbon credit is a tradable instrument that represents either; a permit to emit one tonne of CO₂ or equivalent GHG (tCO₂e) into the atmosphere or; a certificate that represents the avoidance or removal of one tonne of CO₂ or equivalent GHG (tCO₂e) from the atmosphere.

Carbon dioxide (CO₂)

A naturally occurring gas, and also a byproduct of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal human-caused greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1.

Carbon capture, and storage (CCS)

A set of technologies that can reduce CO₂ emissions from new and existing coal- and gas-fired power plants, industrial processes, and other stationary sources of CO₂. It is a three-step process that includes capture of CO₂ from power plants or industrial sources; transport of the captured and compressed CO₂ (usually in pipelines); and underground injection and geologic sequestration, or permanent storage, of that CO₂ in rock formations that contain tiny openings or pores that trap and hold the CO₂.

Sequestration and Storage are often used interchangeably. Utilization is where CO₂ is reused in other applications, e.g., food preparation, carbonated drinks manufacturing, etc.

Carbon dioxide equivalent (CO₂e)

A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tonnes of carbon dioxide equivalents (MMtCO₂Eq)." The carbon dioxide equivalent for a gas is derived by multiplying the tonnes of the gas by the associated GWP. MMtCO₂Eq = (million metric tonnes of a gas) * (GWP of the gas).

Carbon intensity

A measure of greenhouse gas emissions in carbon dioxide (CO₂) equivalent per barrel of oil equivalent.

Carbon markets

Two types of carbon market exist:

- (1) Regulatory compliance markets — used by companies and governments that by law have to account for their GHG emissions. It is regulated by mandatory national, regional or international carbon reduction regimes.
- (2) Voluntary markets — the trade of carbon credits is on a voluntarily basis.

Carbon offset

Reduction credits generated in one location that are transferred to another location or entity, and are usually denominated in metric tonnes of a reduced emission or megawatt hours of renewable energy produced.

CHP

Combined Heat and Power.

Circular carbon economy

A circular carbon economy is a framework for managing and reducing emissions. It is a closed loop system involving 4Rs: reduce, reuse, recycle, and remove.

Circular economy

A circular economy is an economic model of closed loops designed to retain the maximum value of resources, assets and products by design, improve environmental performance and systems thinking at the core.

Climate

Usually defined as the “average weather,” or more rigorously, in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years.

Climate change

Any significant change in the measures of climate lasting for an extended period of time. Climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

Company/Aramco/Saudi Aramco

As used herein, and unless the context or additional text suggests otherwise, the terms “Aramco,” “Saudi Aramco,” “Company,” “we,” “us,” or “ours” refer to Saudi Arabian Oil Co. and its consolidated subsidiaries.

Concession

As defined and discussed on page 126 of the [Saudi Aramco Annual Report 2022](#).

CO₂

Carbon dioxide.

CO₂e

Carbon dioxide equivalent.

Condensate

Light hydrocarbon substances produced with raw gas, which condenses into liquid at normal temperatures and pressures associated with surface production equipment.

Decarbonization

The process of reducing CO₂ (GHG) emissions from the company's operations.

Direct Air Capture (DAC)

Technologies and processes that extract CO₂ directly from the atmosphere. The CO₂ can be permanently stored in geological formations or used as a feedstock in the production of fuels, chemicals, building materials, and other products containing CO₂.

Domestic

Refers to the Kingdom of Saudi Arabia.

Emissions

The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

Emissions reduction

Carbon reduction projects result in a net reduction in absolute CO₂/GHG emissions relative to current emission levels or relative to an historical baseline.

Energy efficiency

Using less energy to provide the same service. Energy efficiency is one of the core strategies for reducing greenhouse gas emissions from fossil fuels.

Energy intensity

An index for measuring the total energy consumed to generate a unit of product, represented in thousand Btus per total production in barrel of oil equivalent.

Energy transition

A significant structural change in an energy system.

Environment

The natural world, as a whole or in a particular geographical area, especially as affected by human activity.

ESG

Environmental, social and governance.

Flaring intensity

Volume of gas flared per barrel of oil equivalent produced (scf/boe).

Freshwater

Non-brackish water with total dissolved solids concentration up to 2,000 mg/l.

Abbreviations, terms and glossary

G20

Group of Twenty is an intergovernmental forum comprising 19 countries and the European Union (EU).

GDP

Gross domestic product. The broadest quantitative measure of a nation's total economic activity, representing the monetary value of all goods and services produced within a nation's geographic borders over a specified period of time.

Greenhouse gas (GHG)

Any gas that absorbs infrared radiation in the atmosphere rather than allowing it to radiate into space. Greenhouse gases include CO₂, methane, nitrous oxide, ozone, chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

GHG avoidance

The avoidance of GHG emissions that would otherwise occur without the protective actions implemented by an offset project.

GHG reduction

Quantified absolute decrease in GHG emissions specifically related to/arising from an activity.

GHG removal

Withdrawal of a GHG and/or a precursor from the atmosphere by a GHG sink or GHG removal technology.

Government

The Government of the Kingdom of Saudi Arabia (and "Governmental" shall be interpreted accordingly).

Greenhouse gas (GHG) emissions

Any gaseous compound in the atmosphere that is capable of absorbing infrared radiation. Generally, consists of water vapor, CO₂, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. Aramco's inventory includes CO₂, methane and nitrous oxide.

Greenhouse Gas Protocol

GHG Protocol establishes comprehensive global standardized frameworks to measure and manage greenhouse gas emissions from private and public sector operations, value chains and mitigation actions. It was a product of the collaboration between the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD).

Group

Saudi Arabian Oil Company, together with its consolidated subsidiaries, and where the context requires, its joint operations, joint ventures and associates.

HSSE

Health, Safety, Security and Environment.

Hydrocarbons

Substances containing only hydrogen and carbon. Fossil fuels are made up of hydrocarbons.

Hydrocarbons law

Law governing hydrocarbons, hydrocarbon resources, and hydrocarbon operations existing within the territory of the Kingdom, enacted by Royal Decree No. M/37, dated 2/4/1439H (corresponding to December 20, 2017), as amended.

IFRS

International Financial Reporting Standard(s) that are endorsed in the Kingdom and other standards and pronouncements endorsed by SOCPA.

iktva

In-Kingdom Total Value Add. The company's program to promote the development of a localized energy/industrial eco-system.

Income tax law/tax law

Income Tax Law issued under Royal Decree No. M/1 dated 15/1/1425H (corresponding to March 6, 2004) and its Implementing Regulations issued under Ministerial Resolution No. 1535 dated 11/6/1425H (corresponding to August 11, 2004), as amended from time to time.

IPIECA

International Petroleum Industry Environmental Conservation Association.

IPO

The initial public offering.

ISO

International Organization for Standardization.

Joint venture/JV

The term joint venture, as defined by IFRS, means a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the joint arrangement.

KAUST

King Abdullah University of Science and Technology.

KFUPM

King Fahd University of Petroleum and Minerals.

Kingdom

Kingdom of Saudi Arabia.

KPIs

Key performance indicators.

LTI

Lost time injuries/illnesses.

Master Gas System (MGS)

An extensive network of pipelines that connects Aramco's key gas production and processing sites throughout the Kingdom.

Ministry of Energy

Ministry of Energy of the Kingdom. Successor to MEIM.

Methane (CH₄)

A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at 25 times that of carbon dioxide (CO₂). Methane is produced through anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

Motiva

Motiva Enterprises LLC — located in the US.

National

Refers to the Kingdom of Saudi Arabia.

Natural gas

Underground deposits of gases consisting of 50–90% methane (CH₄) and small amounts of heavier gaseous hydrocarbon compounds such as propane (C₃H₈) and butane (C₄H₁₀).

Net zero emissions

This is achieved when anthropogenic GHG emissions to the atmosphere are balanced by anthropogenic removals.

NGL

Natural gas liquids, which are liquid or liquefied hydrocarbons produced in the manufacture, purification and stabilization of natural gas. For purposes of reserves, ethane is included in NGL. For purposes of production, ethane is reported separately and excluded from NGL.

Nitrogen oxides (NOx)

Gases consisting of one molecule of nitrogen and varying numbers of oxygen molecules. Nitrogen oxides are produced in the emissions of vehicle exhausts and from power stations. In the atmosphere, nitrogen oxides can contribute to formation of photochemical ozone (smog), can impair visibility, and have health consequences; they are thus considered pollutants.

Operational control

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).

Original concession

See definition to "Concession."

Paris Agreement

The United Nations Framework Convention on Climate Change Paris Agreement.

PIF

Public Investment Fund of Saudi Arabia.

Production costs

The sum of operating costs and depreciation, reflecting both the erosion of asset value over time on an accounting basis and the cost of operating the business.

R&D

Research and development.

Reserves

Those quantities of liquids and gas, which by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible — from a given date forward, from known reservoirs, and under existing economic conditions, operating methods and government regulations — prior to the time at which contracts providing the right to operate expire, unless evidence indicates that renewal is reasonably certain, regardless of whether deterministic or probabilistic methods are used for the estimation. The project to extract the hydrocarbons must have commenced or the operator must be reasonably certain that it will commence the project within a reasonable time.

Reliability

Total products volume shipped/delivered within 24 hours of the scheduled time, divided by the total products volume committed. Any delays caused by factors that are under the company's control (e.g., terminal, pipeline, stabilization, or production) negatively affect the score, whereas delays caused by conditions that are beyond the company's control, such as adverse weather, are not considered. A score of less than 100% indicates there were issues that negatively impacted reliability.

SABIC

Saudi Basic Industries Corporation.

SASREF

Saudi Aramco Jubail Refinery Company, a subsidiary of Aramco, formerly known as Saudi Aramco Shell Refinery Company.

Saudi Aramco/Aramco

Saudi Arabian Oil Company, together with its consolidated subsidiaries, and where the context requires, its joint operations, joint ventures and associates.

Any reference to "us," "we," or "our" refers to Aramco except where otherwise stated.

Unless otherwise stated, the text does not distinguish between the activities and operations of the company and those of its subsidiaries.

Saudi Green Initiative (SGI)

A national initiative for the Kingdom that strives to increase the Kingdom's reliance on clean energy, offset the impact of fossil fuels and combat climate change.

Scope 1 GHG emissions

Direct emissions, which include GHG emissions from on-site fuel combustion, flaring, venting and fugitive emissions.

Scope 2 GHG emissions

Indirect emissions, which account for GHG emissions from offsite power generation including electricity and steam.

Abbreviations, terms and glossary

Scope 3 GHG emissions

All indirect emissions (not included in Scope 2) that occur in the value chain, including both upstream and downstream emissions.

Senior executives/Management Committee

The members of the senior management of Aramco holding the title of president (CEO) or senior vice president.

Senior management

The senior management and other officers of Aramco who, while subordinate to the senior executives, are still involved in the management of Aramco and participate in driving its strategies, decisions or operations.

Shareholder

Any holder of shares.

Shareek program

A cooperative government program that is designed to provide support via various pillars, including financial, monetary, operational and regulatory cooperation and asset investment, striving to enhance the development and resilience of the Saudi economy by increasing the gross domestic product, providing job opportunities, diversifying the economy and strengthening cooperation between public and private sectors.

SME

Small- and medium-enterprise

SOPCA

Saudi Organization for Chartered and Professional Accountants.

S-Oil

S-Oil Corporation.

SSC

Sustainability Steering Committee.

Subsidiaries

Except with respect to financial information, the term subsidiaries means the companies that Aramco controls through its ability to influence the actions or decisions of another person through, whether directly or indirectly, alone or with a relative or affiliate (i) holding 30% or more of the voting rights in a company, or (ii) having the right to appoint 30% or more of the Board of a company.

With respect to financial information, the term subsidiaries is defined by IFRS, meaning entities over which the company has control.

Tier 1 process safety event

An unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials, from a process that results in one or more of the consequences listed in API Recommended Practice-754.

Total recordable case (TRC) frequency

Sum of recordable cases that occurred in the workplace per 200,000 work hours.

UN SDGs

United Nations Sustainable Development Goals.

U.S./United States/USA

United States of America.

Zero carbon

Applies only to energy sources, processes, products, projects, etc., that emit zero GHG emissions.

Forward-looking statements

This Sustainability Report (the "Report") may contain certain forward-looking statements with respect to Aramco's financial position, results of operations and business and certain of Aramco's plans, intentions, expectations, assumptions, goals and beliefs regarding such items. These statements include all matters that are not historical fact and generally, but not always, may be identified by the use of words such as "believes," "expects," "are expected to," "anticipates," "intends," "estimates," "should," "strive," "will," "shall," "may," "is likely to," "plans," "targets," "goals," "outlook" or similar expressions, including variations and the negatives thereof or comparable terminology. These statements include, among other things, statements about expectations in connection with the company's ESG initiatives, including the targets and goals set forth in this Report.

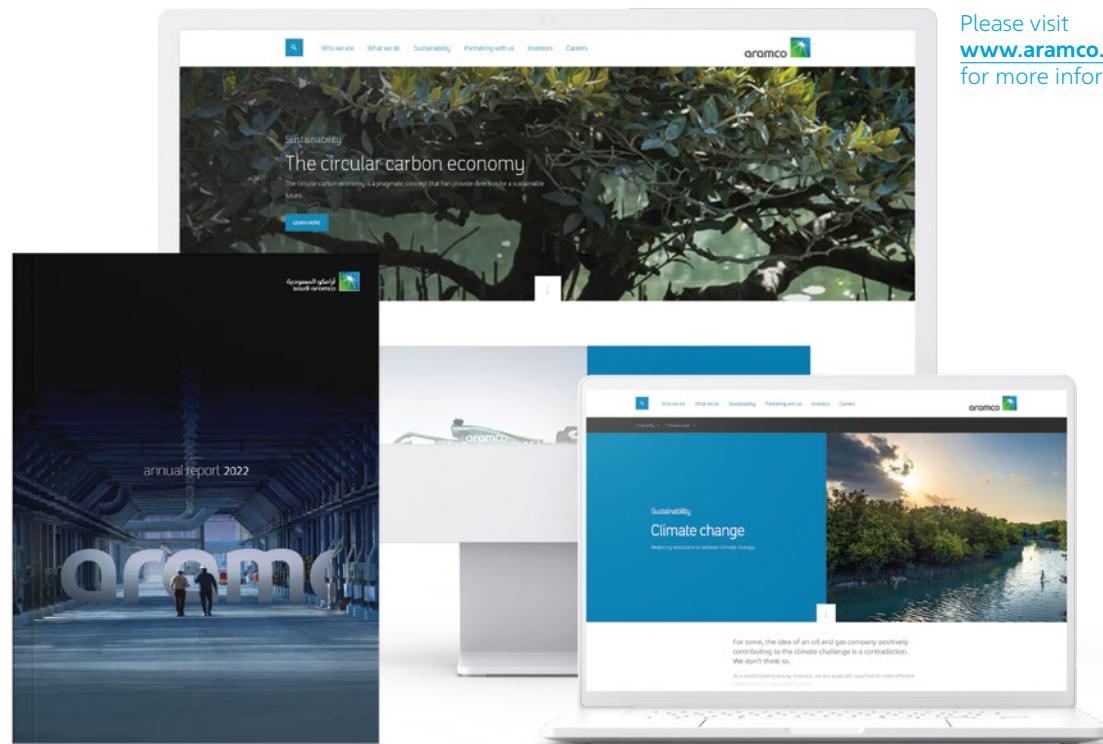
The company cautions that its forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from those expressed in, or implied or projected by, the forward-looking information and statements. Our ability to reach our goals, including our goals related to ESG and minimizing our environmental impact, safe operations and people development and growing societal value within the Kingdom could be affected by factors including, but not limited to: the inability to successfully meet the targets set forth in this Report, including through the management GHG emissions; the inability to meet our plastic waste and water management targets or successfully protect biodiversity; the inability to develop and deploy technology solutions to allow us to deliver the benefits of oil and gas hydrocarbons for future generations; the success of our partnerships with local and global organizations; the inability to ensure a healthy and safe environment for employees; natural disasters and public health pandemics or epidemics (such as COVID-19); competition in the industries in which Aramco operates; conditions affecting the transportation of products; operational risk and hazards common in the oil and gas, refining and petrochemicals industries, including with respect to the ikta program; the cyclical nature of the oil and gas, refining and petrochemicals industries; weather conditions; political and social instability and unrest and actual or potential armed conflicts; managing Aramco's growth; risks in connection with projects under development and recent and future acquisitions and joint ventures, including with respect to SABIC; managing Aramco's subsidiaries, joint operations, joint ventures, associates and entities in which it holds a minority interest, including their performance with respect to ESG initiatives; risks related to operating in a regulated industry and changes to oil, gas, environmental or other regulations that impact the industries in which Aramco operates; and international trade litigation, disputes or agreements.

In light of these and other risks, uncertainties and assumptions, the forward-looking events described in this Report may not occur. The forward-looking statements speak only as of the date of this Report. We undertake no obligation to update or revise any forward-looking statement, whether as a result of new information, future events or otherwise. All subsequent written and oral forward-looking statements attributable to us or to persons acting on our behalf are expressly qualified in their entirety by the cautionary statements referred to above and contained elsewhere in this Report.

Except where noted, the information covered in this Report highlights the company's performance and initiatives in fiscal year 2022. The inclusion of information in this Report should not be construed as a characterization regarding the materiality or financial impact of that information. Sections of this Report have been prepared with reference to and guidance from various reporting frameworks, standards and guidelines, as outlined at the start of this report. The Company's application of the various frameworks, standards and guidelines is based on its interpretation and judgment.

This Report may contain links to or information from other internet sites. Such links and information are not endorsements of any products or services in such sites, and no information in such site has been endorsed or approved by Aramco.

This document should be read together with Aramco's public reporting, including our Annual Report, our website and our policies.



Please see our 2022 Annual Report at www.aramco.com/en/investors/reports-and-presentations

Please visit
www.aramco.com
for more information

Contact us

We hope you find this Report engaging and informative, and we continue to welcome your input and views:



sustainability@aramco.com

Social media

We are also active on the below social media platforms, so please follow us to learn more about Aramco and our sustainability journey:



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