

key figures

< 1%
flaring intensity

230
patents granted by
the U.S. Patent and
Trademark Office

11.5
million boe
of high value
liquids displaced
with nonassociated
gas during peak
summer demand



securing the future

At Saudi Aramco, sustainability is an ethos that infuses all aspects of our company — in Saudi Arabia and wherever we do business around the world.



At a glance: Key achievements in sustainability

- Demonstrated CO₂ emissions reduction in a vehicle with a fully integrated octane on demand system
- Aramco Performance Materials sold its first consignment of CONVERGE® products — high performance polyols created, in part, from CO₂
- Began construction of a new research center at KAUST to support innovation in upstream and downstream domains and in environmental protection
- Completed the installation of multiple flare gas recovery systems

At Saudi Aramco, sustainability is an ethos that infuses all aspects of our company — in Saudi Arabia and wherever we do business around the world.

For us, sustainability means improving our environmental performance, and the positive social impacts of our operations, while increasing our efficient use of resources, assets, and capital. Our commitment to sustainable practices governs our corporate and professional behavior and guides us to conduct our business dealings and interactions in accordance with legal and ethical standards.

Sustainability steers our future outlook, spurring us to develop and implement meaningful solutions to global energy and climate challenges by pushing the limits of innovation and technology — all while being a steadfast contributor to the world's energy needs.

Working responsibly and ethically

Our continued commercial success is dependent upon meeting the highest standards of business practices. By doing so, we seek to ensure the continuation

and growth of our business, foster new partnerships, and maintain the trust of the communities that host our operations.

Our corporate values underpin all our operations and guide our business conduct. They are the basis for a suite of policies, codes, and guidelines that govern our employees as they implement the company's business strategy. These same components shape our Compliance Program that serves as the benchmark against which we measure our performance and that of our partners — contractors, consultants, suppliers, affiliates, and joint ventures within the Kingdom of Saudi Arabia, and globally.

We have a dedicated Corporate Compliance office charged with monitoring and supporting our Compliance Program, and with tracking external legal and regulatory developments.

Our employees are required to review our Conflict of Interest and Business Ethics Policies on a regular basis. Any ethics concerns from our employees or third parties can be clarified through our established communication and reporting channels. For example, our General Auditor Hotline provides

a secure method for anyone to report suspected fraud, unethical conduct, and business irregularities related to Saudi Aramco business.

Additionally, our Supplier Code of Conduct promotes our values and extends and maintains our ethical standards across our supplier network, helping enable long-term, mutually beneficial partnerships.

Securing a sustainable future with technology

At Saudi Aramco, we believe that continued investments in further reducing the greenhouse gas intensity of crude oil and its derivatives will reap benefits for energy producers and consumers alike.

Our R&D programs address four areas of strategic importance: Sustaining low carbon intensity crude oil, growing non-fuel applications for crude oil, advancing sustainable transport, and driving high-impact solutions. And to address these areas we are harnessing the power of the Fourth Industrial Revolution with technologies that include big data, advanced analytics, and artificial intelligence. For example, our Engineering Solutions Center combines operational data, advanced analytics, and in-house technologies and expertise to monitor company energy consumption and achieve near zero flaring intensity.

Sustaining low carbon intensity crude oil

A study conducted in 2017 and published in early 2018 in *Nature Energy* examined the well-to-refinery carbon intensity of all crude oil grades supplied to the Chinese

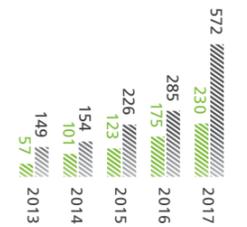
market, including those imported or produced locally. In crude oil production and processing, carbon intensity is a measure of the greenhouse gas emissions associated with producing a barrel of oil from the well to the refinery. The study examined crude oil grades supplied from over 100 oil fields in 20 countries and concluded that Saudi Arabian crude oils have the lowest carbon intensity.

The low carbon intensity advantage of Saudi Arabian crude oil is a result of multiple factors, including our long-standing practices in well completion, reservoir management, and flare minimization. For example, technologies such as mobility geosteering, multilateral wells with smart completions, and peripheral water flooding, have led to low water production per barrel (or water cut) relative to the depletion stage of the reservoir, which directly translates to lower energy requirements to process and recycle water, and consequently reduces our greenhouse gas emissions in oil production and processing.

Growing non-fuel applications

We are pursuing non-fuel uses for crude oil to unlock greater value, create more economic opportunities, and reduce greenhouse gas emissions.

We are collaborating with SABIC, the Saudi-based global chemicals company, on a crude oil to chemicals project. In 2017, we signed a Memorandum of Understanding to pursue the next phase. The project — the first between Saudi Aramco and SABIC, two of the largest economic entities in the Kingdom — is anticipated to process 400,000 bpd of crude oil to produce approximately



New United States patents filed and granted

Granted
Filed

At Saudi Aramco, we believe that continued investments in further reducing the greenhouse gas intensity of crude oil and its derivatives will reap benefits for energy producers and consumers alike.

9 million tons of chemicals and base oils annually in addition to transport fuels.

Our own **crude oil to chemicals** technology program aims to expand petrochemicals manufacturing by eliminating intermediate refining steps and converting crude oil directly to chemicals. In 2017, we successfully piloted a thermal crude oil to chemicals technology (TC2C) that resulted in higher chemicals yield than previously achievable. We also established a strategic partnership with leading technology providers, Chicago Bridge & Iron and Chevron Lummus Global, to de-risk and scale up this technology.

We continued to expand the use of innovative **nonmetallic materials**, including the deployment of more than 2,300 km of nonmetallic pipes, resulting in significant life cycle cost avoidance across company operations. Expanding applications for nonmetallic materials, including for the automotive, building and construction, packaging, and renewable energy sectors could create additional markets for our crude oil and enable potential opportunities for local manufacturers.

Advancing sustainable transport

In collaboration with engine technology developers and major automakers, we are advancing new engine and fuel technologies to reduce exhaust emissions and improve fuel economy — twin goals that help address the global climate challenge and contribute to continued mobility and economic growth.

A key research area for us is the development of efficient and affordable

fuel engine systems that achieve high efficiencies with very low emissions. For example, our researchers are working on novel technologies that can use **low octane gasoline fuels** in light-duty vehicles, potentially achieving an estimated efficiency improvement of 25%.

Our **octane on demand** technology program, which uses two fuels to attain the necessary anti-knock quality, strives for an estimated efficiency improvement of 8% compared to gasoline engines. In 2017, we completed a vehicle demonstration at our Paris research center with a fully integrated octane on demand system that reduced CO₂ emissions.

We are also seeing promising opportunities to significantly increase efficiency in heavy-duty vehicles. At our Detroit research center, we are developing and demonstrating efficient and affordable fuel engine systems that can use low octane gasoline fuels such as **Gasoline Compression Ignition (GCI)** technology with the potential to lower CO₂ emissions.

Driving high-impact solutions

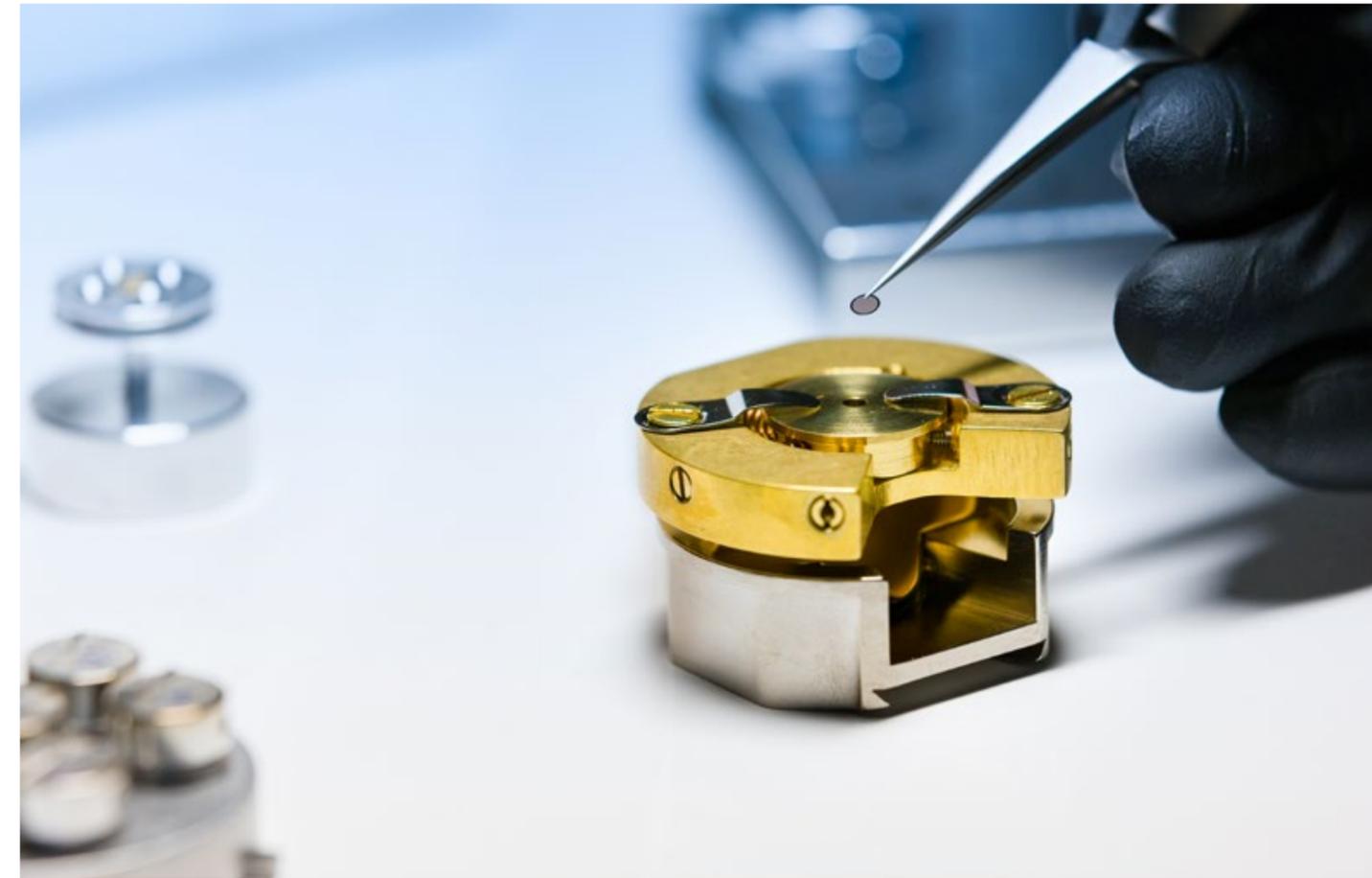
Our carbon management programs help support our efforts to address climate challenges, contribute to global energy supply, and enable the sustainable growth of our business. To achieve these aspirations, we are investigating cost-effective and efficient low-carbon footprint technologies, including carbon capture, utilization, and storage, and improved energy efficiency and energy mix diversification.

Our intent to contribute to reducing

“We are committed to reducing greenhouse gas emissions by focusing our research, development, and funding on high-impact technologies that reduce cost and create significant environmental advantages.”

Amin H. Nasser, President and CEO, Saudi Aramco

At our Boston R&D Center, materials are prepared for nanoscale analysis via a scanning electron microscope, which helps inform the development of advanced materials for corrosion prevention and mitigation.



greenhouse gas emissions while helping provide the energy the world needs is illustrated by our founding membership of the **Oil and Gas Climate Initiative (OGCI)**. Together, the 10 OGCI members produce more than one-fifth of oil and gas globally, and our collective efforts have the potential to reduce greenhouse gas emissions on a significant scale.

In 2016, the OGCI announced an investment of \$1 billion over the next 10 years through OGCI Climate Investments to develop and accelerate the commercial deployment of innovative low emissions technologies. OGCI Climate Investments announced its first three investments in 2017. These investments deliver on the organization's commitments to concrete action to spur the growth of promising low-emission technologies. The investments include:

- A company that is developing innovative, high efficiency opposed piston engines with the potential to substantially reduce the greenhouse gas emissions produced by vehicles — a technology Saudi Aramco showcased at the North American International Auto Show in Detroit in early 2018
- A cement and concrete production company that uses CO₂ to produce cement and cure concrete, with the potential to lower CO₂ emissions in concrete production up to 70%, and water consumption by 80%
- A project to design the first commercial scale gas power plant with carbon capture and storage capability

Creating value from emissions

We see CO₂ not just as an emission to be controlled, but as an opportunity



Energy intensity required to produce one barrel of oil equivalent
(thousands of Btu)

“Improving the internal combustion engine remains the most cost-effective and timely means to reduce greenhouse gas emissions from the transport sector — and those improvements can yield dramatic results.”

Ahmad O. Al-Khowaiter, Chief Technology Officer

to create additional value. Our CONVERGE® polyols technology converts CO₂ into cost competitive and sustainable polyols used in a broad range of high performance applications from automobile seating to insulation. Containing up to 50% CO₂, CONVERGE® polyols have a significantly reduced carbon and energy footprint when compared to conventional petroleum-based polyols.

Our Aramco Performance Materials affiliate in the U.S. commenced commercial operations in 2017, selling its first consignment of CONVERGE® products in the first quarter of 2017.

Driving energy efficiency, reducing emissions

Our energy efficiency efforts seek to reduce energy consumption at company facilities, design new facilities to be energy efficient, increase overall energy efficiency, and influence and promote energy efficiency at the national level.

In 2017, Saudi Aramco flaring intensity remained at less than 1% of annual gas production and we continued progress toward our eventual goal of zero routine flaring. As part of our **Flaring Minimization Program**, we completed the installation of multiple flare gas recovery systems, including at our onshore Safaniyah facilities.

In line with our efforts to boost energy efficiency, our **Energy-to-the-Kingdom (E2K)** initiative contributed to the

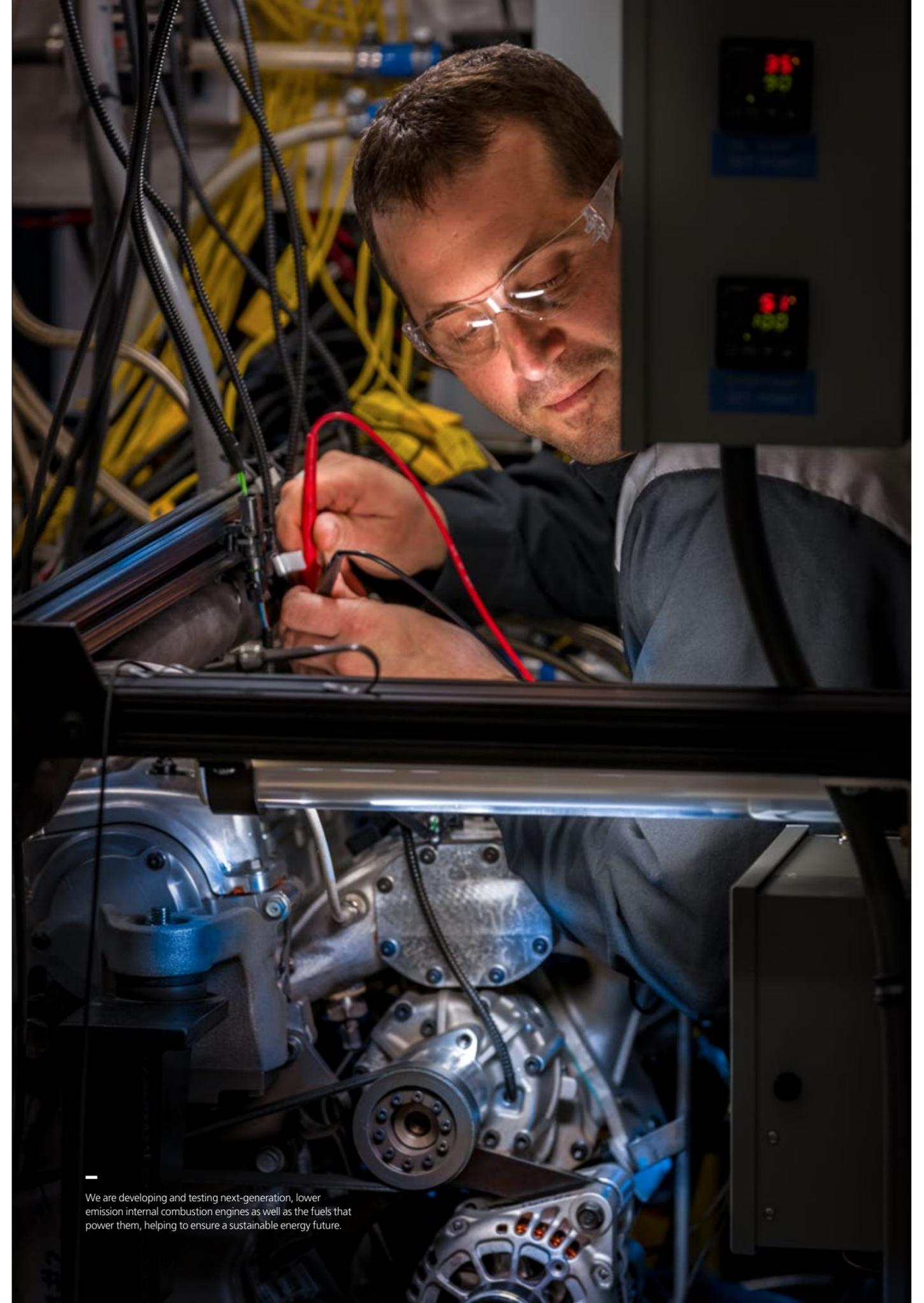
Kingdom raising its utility sector efficiency to 37.9% by year-end, an improvement of nearly 6 percentage points since 2013.

Our **Peak Summer Production Program** provided additional volumes of nonassociated gas to reduce the use of liquids in power generation during the summer. In 2017, we displaced 11.5 million barrels of crude oil equivalent, freeing up higher value liquids while reducing emissions. We also continued our collaboration with the Saudi Energy Efficiency Program to promote energy efficiency practices through awareness campaigns.

Leading by Example

Our Lead by Example Program, established in 2012, strives to achieve a 35% reduction by 2020 in non-industrial energy consumption in company buildings, transportation, and communities. Phase two of the program to replace 60,000 fluorescent lights in office buildings and facilities with more efficient LED lighting was nearly complete at year-end. In addition, motion sensor switches were installed in closed office spaces, resulting in a 60% reduction in power usage from office lighting, and 16 power meters were installed in office facilities during the year to monitor consumption.

In transportation, we have replaced more than 4,000 company vehicles with more efficient six cylinder models and affected the conversion of nearly 3,000 hydrocarbon tankers operated by



We are developing and testing next-generation, lower emission internal combustion engines as well as the fuels that power them, helping to ensure a sustainable energy future.



Energy conservation savings in company operations

(thousands of boe per day)

■ Year's increment
■ Carry-over from previous years

All figures revised based on further data reconciliation.

contractors from steel to lighter weight aluminum to reduce fuel consumption.

Accelerating innovation through collaboration

In a challenging environment, no one player is able to succeed on its own. Collaboration enhances our competitiveness and further enables the expansion and strategic integration of our global business. And as our business has grown into new markets and products, so too has our collaborative network expanded, encompassing other energy producers, engineering companies, service providers, equipment manufacturers, R&D institutions, and universities.

In the Kingdom, we engage and participate with key national stakeholders, including the King Abdulaziz City for Science and Technology (KACST), King Fahd University of Petroleum and Minerals (KFUPM), and KAUST in the pursuit of high-impact research and technology initiatives of strategic importance to our business. Our participation centers on initiatives aimed at advancing nascent

technologies, accelerating the Kingdom's ability to conduct advanced scientific research, and promoting entrepreneurship and the development of new technology enabled businesses.

In a separate project with KFUPM, we are working to establish a world-class Petroleum Engineering and Geosciences College. In 2017, we completed retrofitting a building and the construction of two new buildings to house state-of-the-art laboratories on the KFUPM campus and at the Dhahran Techno Valley Science Park.

In our local region, we signed Memoranda of Understanding with the Abu Dhabi National Oil Company (ADNOC) and with Masdar, a renewable energy and sustainable urban development company based in Abu Dhabi, UAE. With ADNOC, we plan to collaborate to identify technologies that could deliver improved performance and efficiency across the oil and gas value chain. The agreement with Masdar enables collaboration on sustainable and renewable energy development to yield advancements in clean electricity generation and carbon capture.

“As energy demand continues to rise, Saudi Aramco will encourage the adoption of energy efficient technologies as we move toward reduced energy intensity, a more diversified energy mix, and a smaller environmental footprint.”

Ahmad A. Al Sa'adi, Senior Vice President, Technical Services

Internationally, we collaborate with a network of academic and industry research partners, including the Massachusetts Institute of Technology, Stanford University, Imperial College, Tsinghua University, KAIST (the Korean Advanced Institute of Science and Technology), and IFPEN on topics related to the global challenge of a sustainable energy future.

Exploring energy solutions through our Global Research Network

Our Global Research Network enables innovative research in high-impact, long-term, value-creating domains. Comprised of three in-Kingdom research centers and eight satellite research centers and technology offices in strategic international locations, the network is dedicated to addressing global energy and sustainability challenges and creating substantial competitive advantage for our business.

In 2017, we started construction to expand our Exploration and Petroleum Engineering Advanced Research Center (EXPEC ARC) in Dhahran. The expansion project includes laboratories and offices for 850 professionals and support staff. We also launched construction of our new R&D center at KAUST.

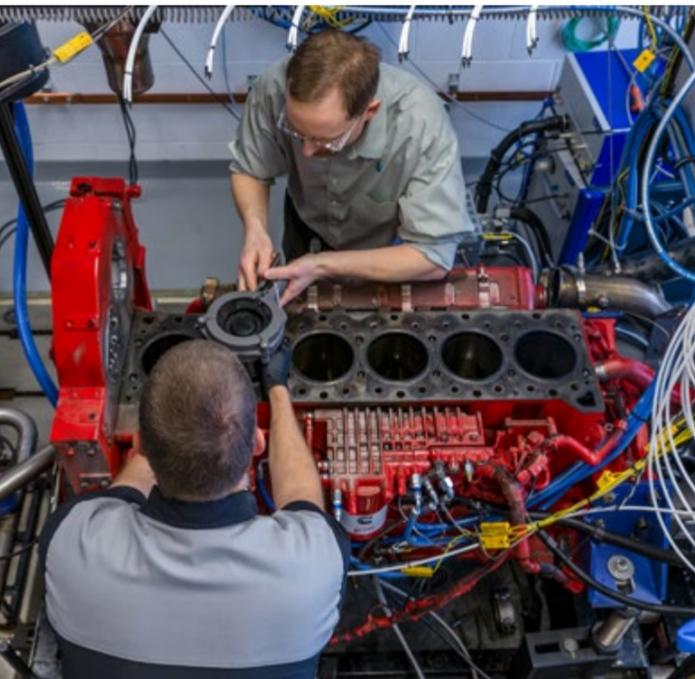
Investing in energy

Saudi Aramco Energy Ventures (SAEV), our technology and energy venture

capital affiliate, continued its mission to appraise promising opportunities and invest globally in startup and high growth technology companies of strategic interest to us. In 2017, SAEV made six new investments and piloted five technologies from its portfolio companies.

Conserving water resources

We continued to implement our water conservation strategy to conserve the Kingdom's nonrenewable groundwater resources and serve as a role model for water conservation practices. We completed a slate of water conservation strategies, including using wastewater in a variety of applications, assessing conservation opportunities, implementing best practices, and promoting water conservation awareness. Significant savings were achieved at industrial facilities and in communities by applying best practices and water saving technologies.



We seek to advance sustainable transport by developing ultra-clean fuel engine systems at our Detroit R&D Center, and by converting CO₂ into cost competitive and sustainable polyols through our CONVERGE® technology.