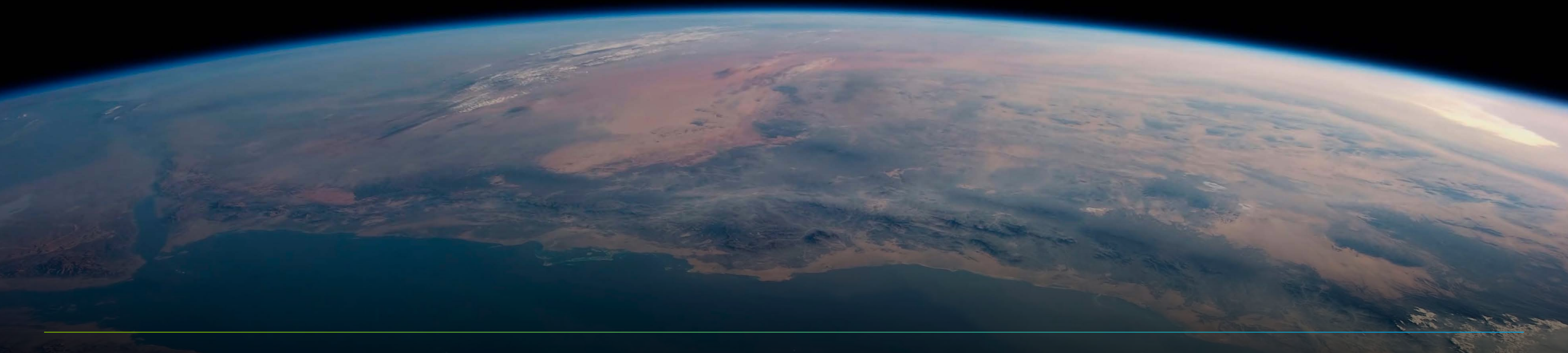


Case study

How is Aramco advancing hydrogen solutions?

Contents

Promise of hydrogen	03	Aramco Ventures	11
Market growth	05	Hydrogen investments	14
Policy & Regulation	07	Conclusions	20
Potential & Challenges	08		
Aramco's contribution	10		



The promise of hydrogen

Looking to the stars

Hydrogen or H₂ is the simplest and most abundant element known to man. It has an energy density high enough to fuel a star and unlike many other fuels it releases steam when burned. As a primary element in oil and gas, hydrogen has significant potential to be used in existing infrastructure to help lower-emissions in various sectors — from transportation, to industry, to power.

Addressing global Net Zero ambitions will require a wide range of solutions from across industries, governments, and communities, to ensure that people everywhere have opportunities to improve their lives and to balance their needs with the needs of the planet. The hydrogen industry is emerging as an essential part of the solution set, particularly in hard-to-abate industries that account for a large percentage of global emissions.

The industry presents significant **economic opportunities**, including job creation, technological innovation, and the development of new export markets for hydrogen and related technologies. From the Americas to Asia, from Europe to the Middle East, industrialized nations are spending billions on infrastructure, and charting out hydrogen road maps to ensure that they have concrete plans to work this fuel into their energy mix.

Disclaimer

Aramco is a leading energy and chemicals company with oil and gas production as its primary business. The solutions mentioned here are still in the early stages of development.

How can we unlock the true potential of hydrogen?

Despite being the most abundant element in the universe, it is not easy to produce or transport hydrogen efficiently. There are multiple production methods, each process consuming differing levels of energy and consequently emitting differing amounts of CO₂.

Hydrogen must be stored and transported at low temperatures, so is sometimes combined with nitrogen to make it easier to utilize. Hydrogen is often converted to ammonia in order to be transported for use as a lower-emission source of energy.

New technologies, supply chains and partnerships are needed to unlock the true potential of the hydrogen industry. **The question is: How can we work together to turn ideas into action?**

At Aramco, we believe that people deserve opportunities to improve their lives; that innovation powers progress; and that leading companies must support their communities to build a better tomorrow.

That's why Aramco is exploring a range of hydrogen, ammonia, and carbon management solutions, including:

- Building one of the largest carbon capture and storage (CCS) hubs in the world
- Joining forces with leading companies worldwide to support the industry and share expertise and ambition

This case study will review the opportunities and barriers for hydrogen energy as well as demonstrate Aramco's ambition and momentum, including how Aramco's venture capital arm is taking promising hydrogen startups to the next level.

“Hydrogen can abate 80 gigatons of CO₂ by 2050”

Hydrogen Council

Production methods:

-  Steam Methane Reforming (SMR) of natural gas.
-  Gasification of biomass or waste.
-  Electrolysis, which splits water into hydrogen and oxygen using electricity, often from renewable sources.
-  Thermal or high-temperature water splitting.

Types of hydrogen:

- **Grey hydrogen:** Produced from hydrocarbons e.g. natural gas, without carbon capture, resulting in CO₂ emissions.
- **Blue hydrogen:** Produced from hydrocarbons with carbon capture and storage (CCS) to reduce emissions.
- **Green hydrogen:** Produced through electrolysis powered by renewable energy sources, considered the most environmentally friendly but hardest to create.

Aramco is not necessarily pursuing active projects in each of these areas.

How large is the global hydrogen market?

Industry analysis: Global hydrogen market and growth projections

The global hydrogen market size surpassed USD 183 billion in 2022 and is expected to expand at 5.5% CAGR from 2023 to 2032.

Source: Global Markets Insights

Three sectors are contributing most towards the hydrogen market's growth:



Transportation

The transportation sector, particularly hydrogen fuel cell vehicles (FCVs), has been a key driver of demand.

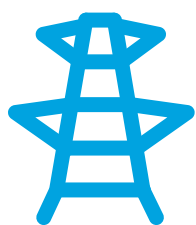
(Source: International Energy Agency - IEA)



Industrial

Industries such as refining, ammonia production, and steel manufacturing are increasingly exploring hydrogen as a cleaner alternative to fossil fuels.

(Source: McKinsey & Company)



Power generation

The integration of hydrogen into power generation, either through fuel cells or hydrogen blending in gas turbines, presents significant growth opportunities.

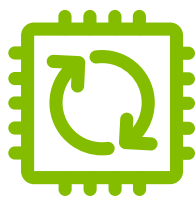
(Source: Global Market Insights)

Three trends are expected to fuel uptake of hydrogen in future:



Supportive policies

Government initiatives, subsidies, incentives, and regulations promoting hydrogen adoption.



Technological advancements

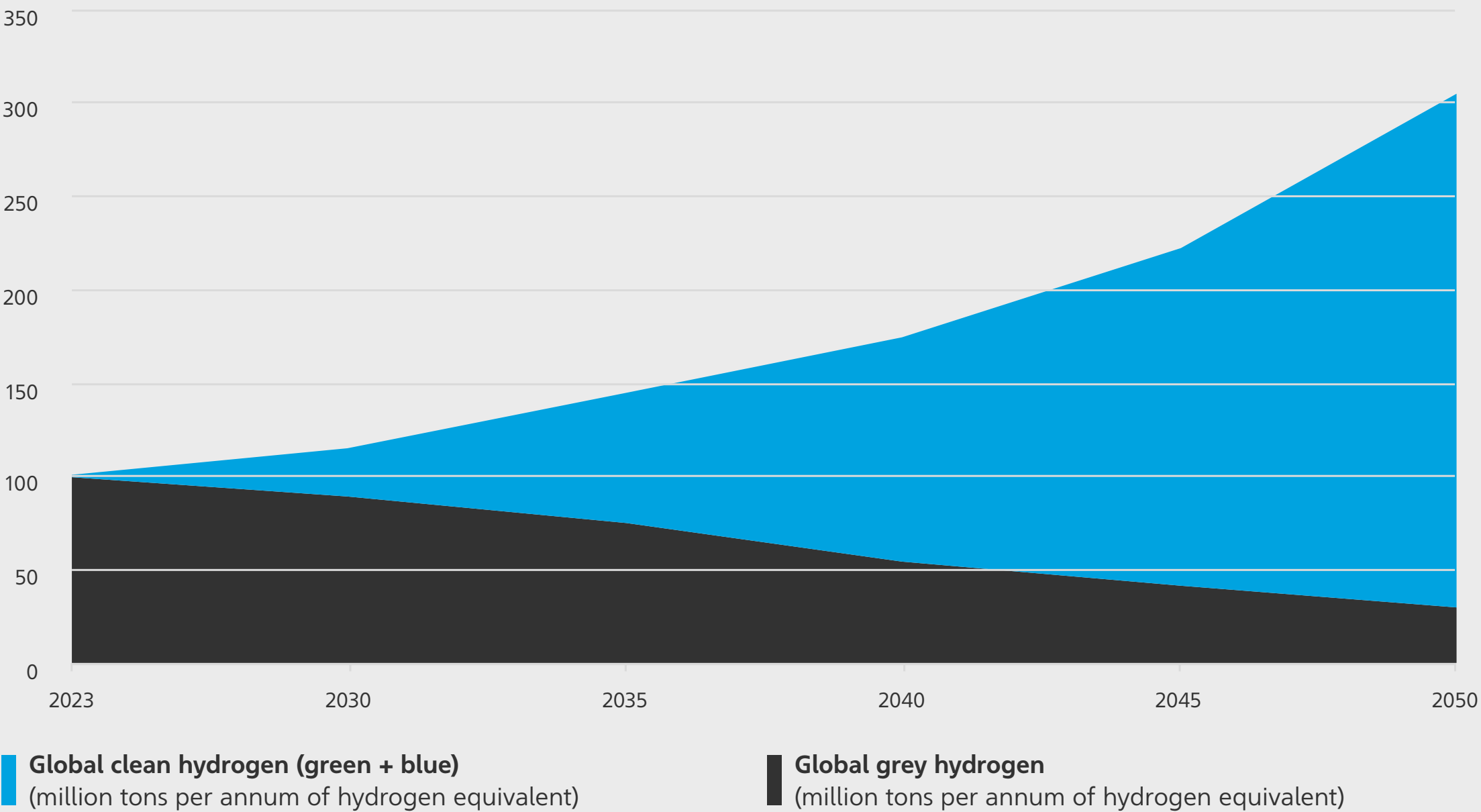
Ongoing advancements in hydrogen production, storage, and utilization technologies, making it more competitive and accessible.



Increasing awareness

Growing awareness of the environmental benefits of hydrogen and the urgency of addressing climate change is driving demand across various sectors.

Current trajectory for global hydrogen demand outlook by scenario



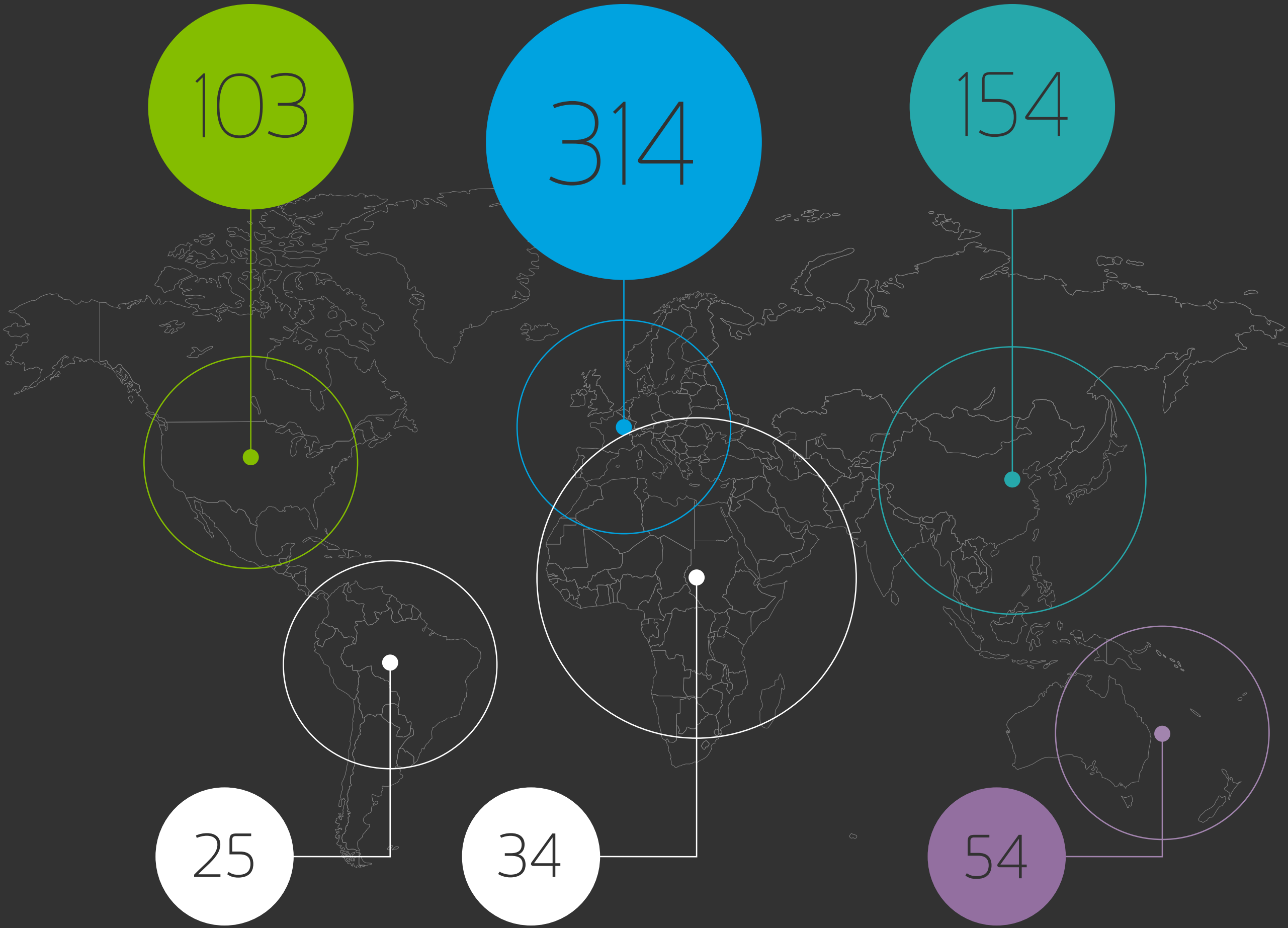
Source: McKinsey Energy Solutions' Global Energy Perspective 2023

How is the world meeting demand?

684

Announced Megawatt-scale projects

314	Europe
154	Asia and China
103	North America
54	Oceania
34	Middle East and Africa
25	Latin America



Source: McKinsey - Five charts on hydrogen's role in a net-zero future

North America

While North America has been relatively slower in adopting hydrogen compared to other regions, there is growing interest, particularly in sectors such as transportation and industrial applications.

(Source: Hydrogen Council)

Europe

The European Union has unveiled its Hydrogen Strategy, aiming to establish a thriving hydrogen economy to support its climate goals. This includes significant funding for hydrogen projects and infrastructure development.

(Source: European Commission)

Asia-Pacific

Countries like Japan, South Korea, and China have been at the forefront of hydrogen adoption, with ambitious targets and substantial investments in hydrogen infrastructure and technology.

(Source: International Energy Agency - IEA)

A complex regulatory environment

The regulatory landscape for the hydrogen industry is evolving rapidly as governments and stakeholders recognize the potential of hydrogen.

Collaboration among governments, industry stakeholders, and other stakeholders is crucial to address regulatory barriers, promote best practices, and unlock the potential of hydrogen.

Governments can play a number of roles in the advancement of the hydrogen industry:



Government policies and targets

- **Hydrogen strategies:** Many countries and regions have developed or are in the process of developing hydrogen strategies outlining their vision, goals, and policy measures to support the development of the hydrogen economy.
- **Targets and incentives:** Governments can set targets for hydrogen production, deployment, and use, along with providing financial incentives such as grants, subsidies, tax credits, and loan guarantees to promote investment and adoption.



Infrastructure development

- **Infrastructure planning:** Regulatory frameworks may address the planning, permitting, and development of infrastructure for hydrogen production, storage, transportation, and distribution, including pipelines, refueling stations, and storage facilities.



Environmental regulations

- **Emission standards:** Regulations aimed at reducing greenhouse gas emissions and air pollutants may drive the adoption of hydrogen as an energy carrier, particularly in sectors like transportation and industry.
- **Carbon pricing:** Carbon pricing mechanisms such as carbon taxes or emissions trading systems can influence the competitiveness of hydrogen relative to fossil fuels.



Research and development

- **Funding and support:** Governments may provide funding, grants, or support for research, development, demonstration, and deployment (RDD&D) of hydrogen technologies to advance innovation and commercialization.
- **Collaboration:** To accelerate technological development and knowledge sharing.



Safety and standards

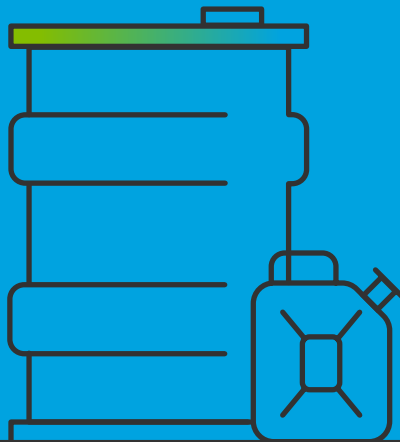
- **Technical standards:** Standardization bodies develop technical standards for hydrogen production, storage, distribution, and utilization to ensure interoperability, safety, and quality across the hydrogen value chain.



International cooperation

- **Bilateral and multilateral agreements:** To promote cooperation, investment, and trade in hydrogen technologies and infrastructure.
- **Harmonization of standards:** International organizations and forums to promote interoperability and market development.

Governments have the ability to remove some of the risk from the pioneers of the hydrogen industry, and the ability to show the world that they are serious about hydrogen.



In 2023 the world's first accredited lower-carbon ammonia shipment for power generation was dispatched from Saudi-Arabia to Japan.

The shipment was the result of a successful multiparty collaboration across the lower-carbon ammonia value chain. The ammonia was produced by SABIC Agri-Nutrients ("SABIC AN") with feedstock from Aramco, and sold by Aramco Trading Company to the Fuji Oil Company ("FOC"). Mitsui O.S.K. Lines ("MOL") was tasked with shipping the liquid to Japan, then the lower-carbon ammonia was transported to the Sodegaura Refinery for use in co-fired power generation, with technical support provided by Japan Oil Engineering Co ("JOE").

Where hydrogen can add significant value

Transportation: Hydrogen-powered fuel cell vehicles offer both high efficiency and lower-emissions. They can play an increasingly important role in reducing emissions from commercial transportation sectors such as long-haul and heavy-duty trucks, trains, marine, and aviation. A fuel cell may be two to three times more efficient than an internal combustion engine running on gasoline.

Another alternative is via hydrogen internal combustion engine vehicles, running in much the same way as a traditional ICE vehicle, the hydrogen variant can significantly reduce costs and deliver reliability.

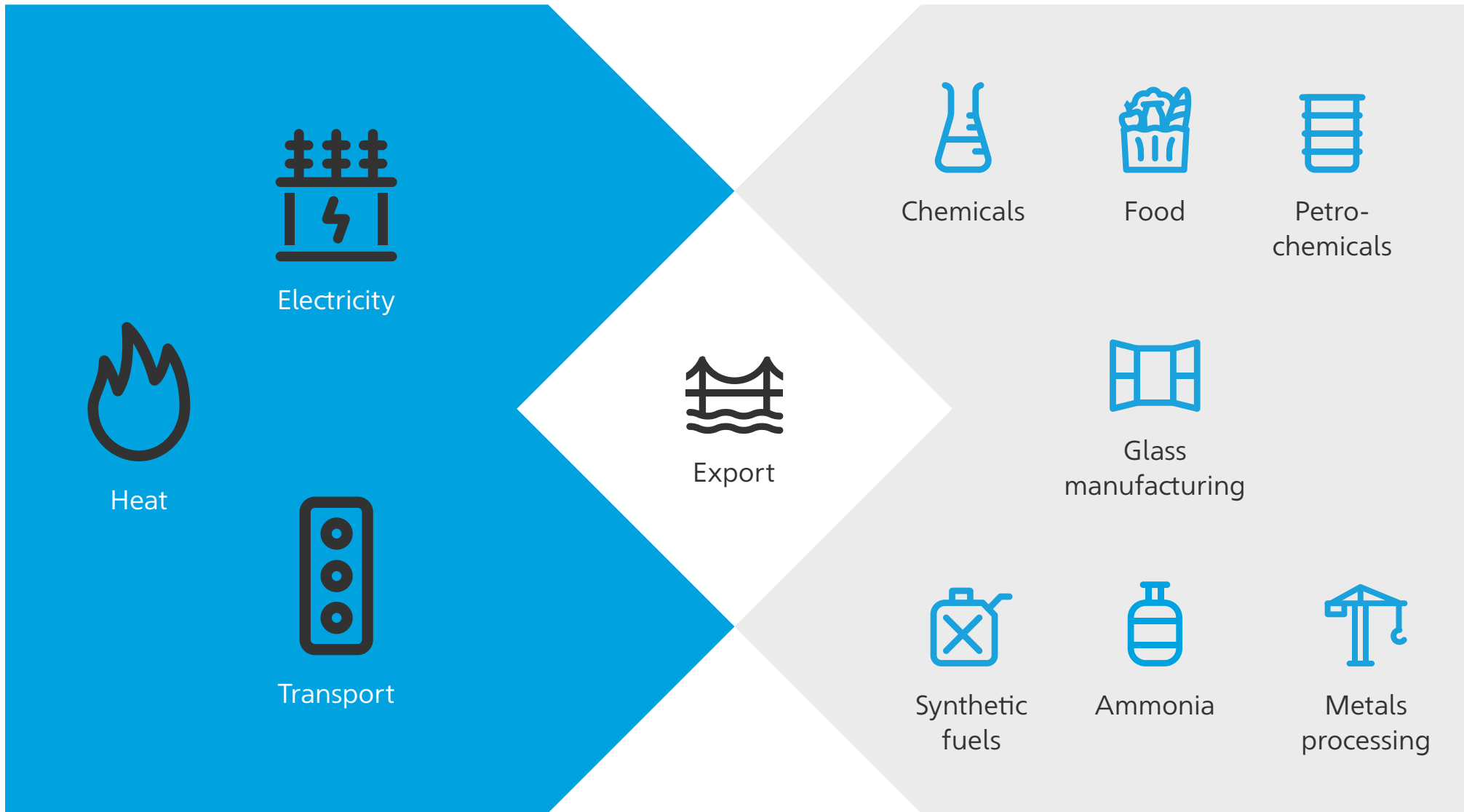
Power generation: Hydrogen use for power generation is negligible today, though there is potential for its role in power production. Hydrogen can be injected into existing natural gas pipeline networks or directly sent into the end-distribution network. Hydrogen-fired gas turbines and combined-cycle gas turbines could also be a source of flexibility in electricity systems.

As of the end of December 2022, the United States had about 205 operating fuel cell electric power generators at 147 facilities with about 350 megawatts (MW) of total nameplate electric generation capacity.

(Source: U.S. Energy Information Administration)

Energy storage/Grid balancing: Hydrogen could become a long-term storage option to balance seasonal variations in electricity demand. Hydrogen storage is an important technology to enable hydrogen use across the global economy. Gaseous storage is currently the most common and the most likely option for expanding hydrogen storage for most uses of hydrogen as an energy source.

Industrial uses: Hydrogen can replace coke and natural gas as a reducing agent in iron and steel production. Similarly, hydrogen can enable decarbonization of industries, such as cement, fertilizer, and petrochemicals.



The potential and challenges of hydrogen

Potential



GHG mitigation potential: Hydrogen offers a pathway to reduce GHG emissions in sectors such as transportation, industry, and power generation that are challenging to electrify directly. It can facilitate the integration of renewable energy sources into various sectors by providing energy storage and balancing capabilities.



Energy security: Hydrogen could enhance energy security by diversifying the energy mix.



Energy transition: Hydrogen can play a crucial role in enabling the transition to a lower-carbon economy by providing a versatile and cleaner energy source.



Versatility and flexibility: Hydrogen is a versatile energy carrier that can be used in fuel cells for transportation, as a feedstock in industrial processes, and for power generation and heating applications. Its flexibility makes it a valuable asset for achieving energy security and resilience in diverse energy systems.



Job creation: The growth of the hydrogen industry has the potential to create jobs across the value chain, from manufacturing and construction to research and development.



Economic growth: The hydrogen industry can stimulate economic growth through investments in infrastructure, technology development, and export opportunities.

Challenges



Cost: Although costs can decrease with technological advancements and economies of scale, hydrogen production, especially green hydrogen, is currently more expensive compared to hydrocarbon-based alternatives.



Scaling up: Scaling up production and infrastructure to meet growing demand also requires significant investments.



Collaboration: To accelerate the development and deployment of hydrogen technologies on a global scale, production requires further collaborations among governments, industries, and research institutions. Deeper international partnerships and initiatives are needed to facilitate knowledge sharing, technology transfer, and investment in hydrogen projects.

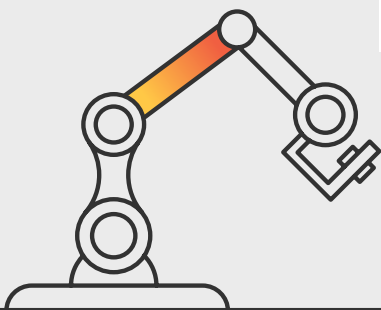


Supportive policies: Government initiatives, incentives, and regulations promoting hydrogen adoption are needed, to make it more competitive and remove initial costs / risks.



How is Aramco helping to scale up blue hydrogen?

Aramco's hydrogen investments and pilot projects



Shipping ammonia

September — Aramco produced and delivered the **world's first shipment of blue ammonia**, a carrier for blue hydrogen, from Saudi Arabia to Japan.

2020

A scalable hydrogen generator

May — Aramco partnered with CoorsTek, one of the world's leading engineered ceramics manufacturer, and international research partners, to use ceramic membrane technology to **develop a scalable hydrogen generator that produces hydrogen from electricity and fuels with near zero energy loss**. Aramco provides financial support to CoorsTek and Aramco is currently running a pilot hydrogen generator at its headquarters in Dhahran.

2022

Innovations in ammonia technology

March — **Aramco and Linde Engineering**, a global leader in the production and processing of gases, signed an agreement to **jointly develop a new ammonia cracking technology**.

April — **First shipment of independently-certified, Aramco produced lower-carbon ammonia** arrived in Japan for use as fuel in power generation.

2023

2021

Collaboration and large-scale operations

January — Aramco signed MoUs with Korean energy companies KEPCO, S-Oil, POSCO, Hyundai Oilbank, H2Korea and LOTTE Fine Chemical to explore potential collaboration in the supply, transportation, utilization and certification of hydrogen and ammonia. The companies also plan to study the feasibility of converting exported ammonia into hydrogen; a process known as ammonia backcracking. This represented a key initial step towards a **potential large-scale production facility for hydrogen and ammonia in Saudi Arabia**.

2022

Certification and scale

August — SABIC AN and Aramco received **the world's first independent certifications recognizing blue ammonia and blue hydrogen production** from TÜV Rheinland, a leading independent testing, inspection and certification agency, based in Germany.

December — Japan signed **two sets of cooperation agreements with Saudi Arabia** in the fields of hydrogen, fuel ammonia and carbon recycling.

December — Aramco and SABIC AN **shipped 25,000 metric tons of blue ammonia cargo** to South Korea, an aspiring global leader of hydrogen energy use.

2023

Lower-carbon hydrogen

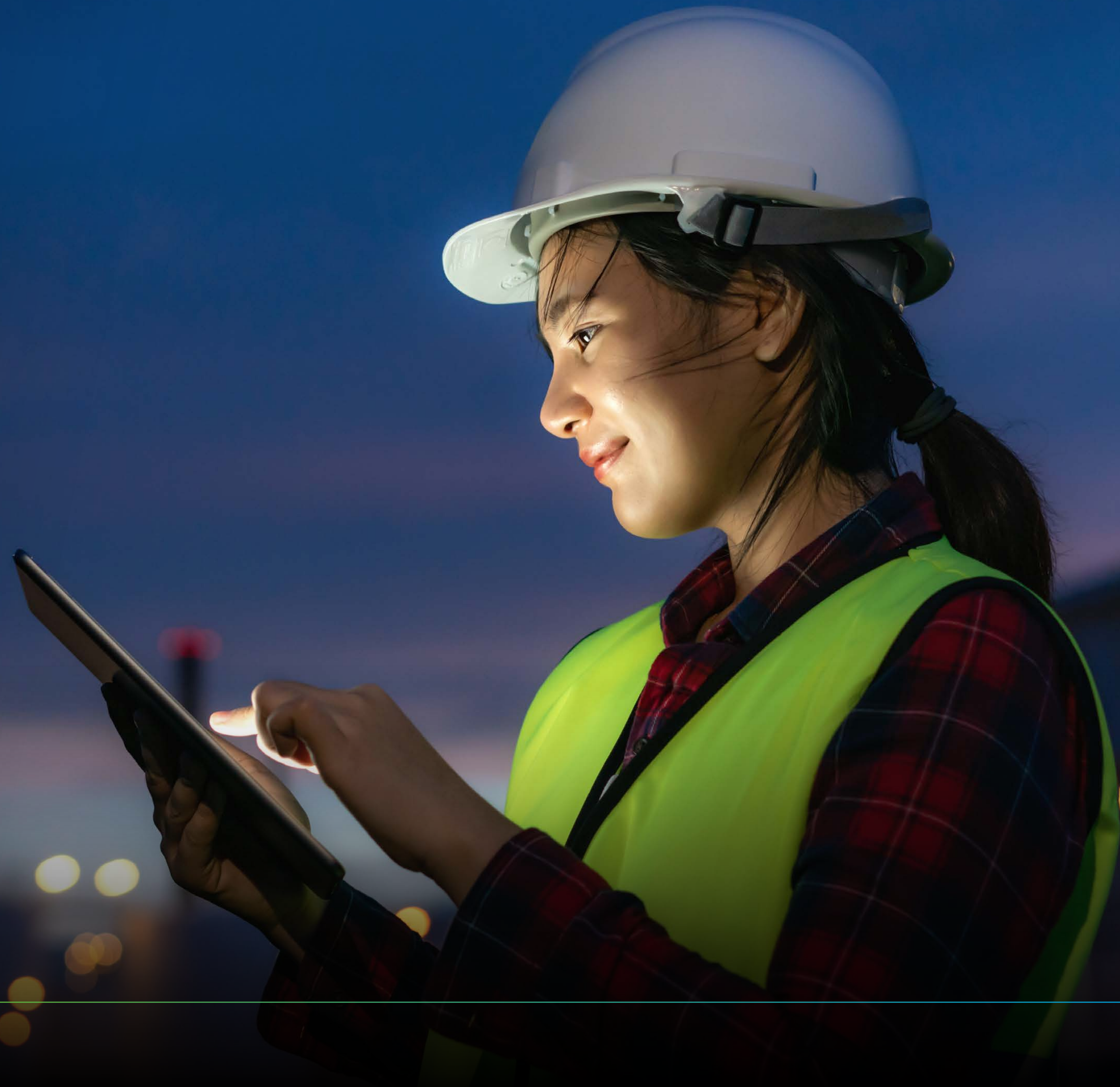
October — Aramco signed an engineering agreement with Topsoe, a leader in energy-efficient technologies, to construct a reduced emissions hydrogen demonstration plant at the Shaybah NGL recovery plant in Saudi Arabia. It is planned to have **a demonstration capacity of about six tons of hydrogen per day and use renewable electricity to produce hydrogen** for use in power generation, with resulting CO₂ being sequestered.

Advancing energy solutions

Learn more

Aramco Ventures

Aramco Ventures is a \$7 billion venture arm of Aramco, one of the world's leading energy and chemicals companies. Aramco Ventures is investing in several promising hydrogen solutions.



Background of Aramco Ventures

Every day, small companies with big ambitions are developing the next innovative solutions. These are the pioneers finding new ways to balance the needs of people with the needs of the planet.

This is particularly true for startups specializing in hydrogen solutions, where challenges from cost, capability gaps and policy can restrict essential curiosity and ingenuity. Aramco believes that innovation powers progress.

Aramco Ventures makes investments globally into innovative start-up companies in line with Aramco's long-term diversification strategy focused on four verticals: New Energies, Chemicals and Transition Materials, Diversified Industrial Businesses, and Digital to help Aramco with its ambition to achieve net-zero Scope 1 and Scope 2 greenhouse gas emissions across its wholly-owned operated assets by 2050.

Aramco Ventures aims to be a value-adding strategic investor across the life cycle of companies. It offers unique opportunities to pilot and deploy the technologies created by the startup companies we invest in and to build later stage companies, looking to grow in new markets.

Aramco Ventures also supports portfolio companies in doing business with Aramco and in accessing the Saudi Arabian and regional MENA market, including facilitating technical collaboration, piloting, business development, and accessing of technical and operational expertise.

Aramco Ventures includes five funds, with a collective value of \$7 billion:

1. Prosperity7 Fund I, invests in **disruptive technologies and business models outside the energy industry** to provide financial returns and diversification opportunities for the company.
2. Prosperity7 Fund II, invests in diversified industrial business opportunities that supports Aramco's long-term strategy.
3. Sustainability Fund supports Aramco's **sustainability ambitions**; namely to achieve net-zero Scope 1 and 2 greenhouse gas emissions across wholly-owned operated assets by 2050, development of new lower-carbon fuels businesses, and furthering Aramco's broader environmental objectives, this includes investments to aid the development of hydrogen solutions.
4. Digital/Industrial Fund focuses on **digital and industrial technologies**.
5. Late-Stage Venturing Fund – creating strategic options for Aramco and our long-term strategic targets



Discover Aramco Ventures, the corporate venturing arm of Aramco today.

Learn more



By 2023, 12 of Aramco Ventures 120 investments have achieved billion-dollar valuations. They operate across three continents with offices in Palo Alto, Houston, New York, Boston, London, Dhahran, Beijing, and Shanghai and plan to expand their focus to include Europe and the Indian sub-continent.

The funds are designed to not just generate returns on investment, but to identify disruptive technologies, provide opportunities to diversify and deliver market access for innovative companies. This makes Aramco Ventures a vital channel for the advancement of the emerging hydrogen industry, to overcome challenges and unlock the potential.

In 2023, Aramco Ventures was ranked Number 10 on Climate 50, an annually published list that aims to recognize the world’s top 50 most impactful climate investors. When Aramco Ventures invests in hydrogen solutions, they look at the whole value chain; from production to end use, and everything in between.

Aramco’s focus is to leverage its extensive global network and exclusive access to some of the world’s largest hydrocarbon reserves, to build capacity to be among the lowest-cost large-scale producers of lower-carbon hydrogen solutions globally.

AMOGY

Providing a powerful, emission-free and clean energy solution that will enable the transportation industry to completely decarbonize by 2050.

S Y Z Y G Y P L A S M O N I C S

A ‘deep-decarbonization company’ that aims to power a cleaner and safer world through all-electric chemical reactors that use light instead of combustion.

HYDROGEN MEM-TECH

Using their fully scalable hydrogen separation technology to enable their clients to convert bio and natural gases into pure hydrogen.



How did Aramco Ventures help Amogy revolutionize commercial transportation?

The opportunity

Amogy is a startup on a mission to build technology that unlocks hydrogen's potential as a energy source than conventional fuels, accelerating the global efforts to reduce GHG emissions.

The company provides lower-emissions energy solutions to mitigate hard-to-abate sectors such as maritime, power generation, and heavy industry. Tested in real-world applications, its patented ammonia cracking technology is mature, scalable, and a more efficient method for splitting liquid ammonia, generating electrical power in combination with hydrogen fuel cells at five times the energy density of lithium batteries. By using ammonia as a hydrogen carrier, Amogy is able to harness ammonia's density and hydrogen's usability.

Amogy's ammonia-to-power technology feeds liquid ammonia through its cracking modules integrated into a hybrid fuel cell system. The resulting hydrogen powers the electric motors.

The role of Aramco Ventures

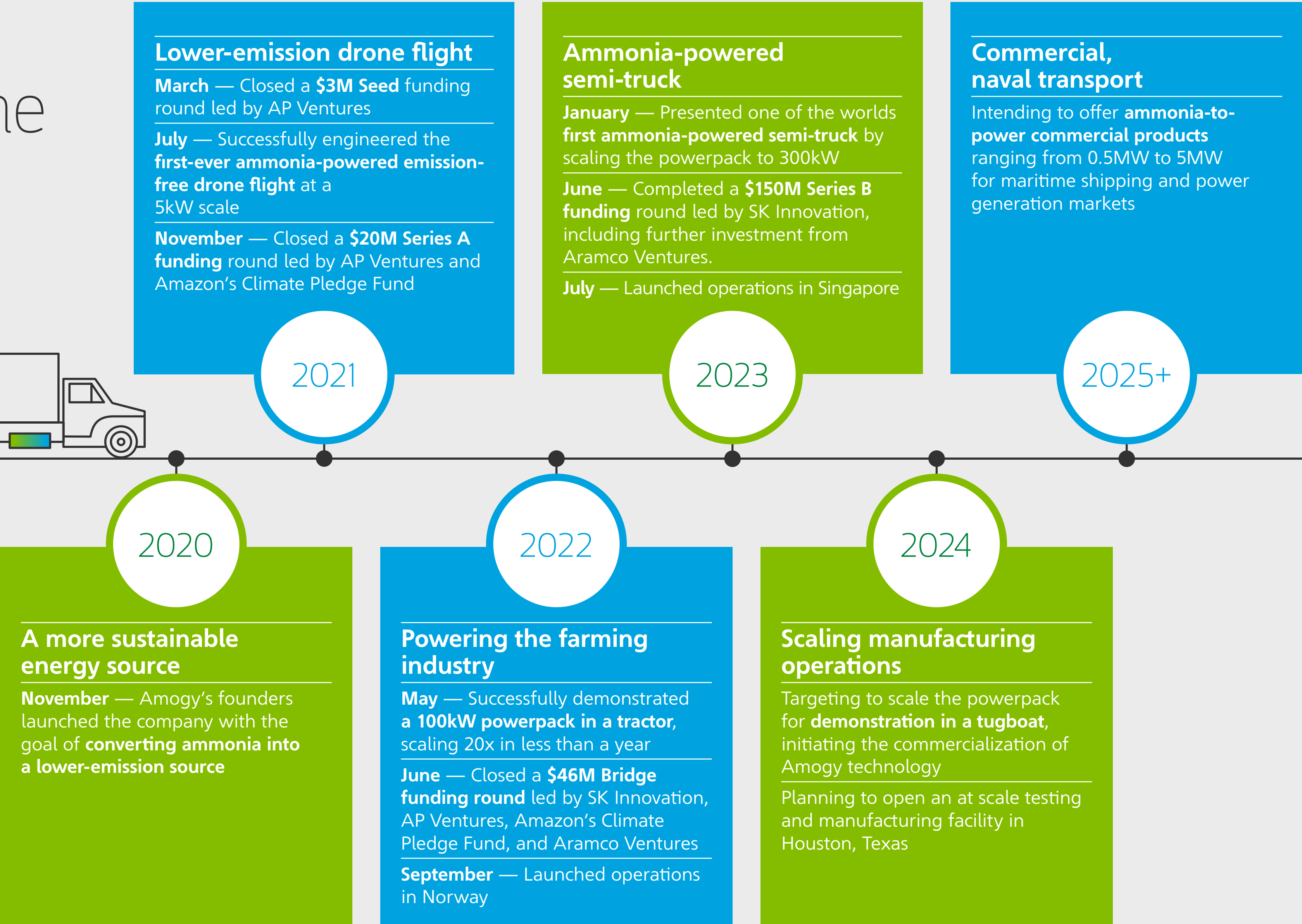
A challenge facing Amogy lay in commercializing its cutting-edge technology, a task involving the establishment of a global network and the development of new manufacturing capabilities. Aramco recognized the potential of Amogy's innovative solution. Aramco Ventures, via its Sustainability Fund, invested in Amogy's Bridge funding round in 2022 and Series B round in 2023, and Aramco Ventures and Aramco continue to support Amogy as it realizes its mission.

Commercial transportation accounts for approximately 13% of today's global CO₂ emissions.





Timeline



Results to date

To date, Amogy's innovative ammonia-to-electrical power system has been demonstrated with success in a 5kW drone, 100kW tractor, and 300kW semi-truck, and the team is currently retrofitting a tugboat, the NH3 Kraken, to be the world's first ammonia-powered vessel.



Amogy is currently retrofitting a 53,000 -square-foot manufacturing facility in Houston, Texas is where Amogy will launch its commercialization efforts. The manufacturing facility will be used for the assembly manufacturing of Amogy's innovative energy solution.



How did Aramco Ventures help SYZYGY to transform hydrogen production?

The opportunity

Syzygy Plasmonics is a 'deep-decarbonization' company that is electrifying chemical manufacturing. Syzygy develops and delivers all-electric reactor systems that eliminate fossil-based combustion from chemical manufacturing and reduce the carbon intensity of hydrogen, methanol, and fuel. Rather than rely on thermal energy, Syzygy Plasmonics harnesses the power of light to energize chemical reactions.

Syzygy combines two major recent breakthroughs to reduce emissions in chemical manufacturing. The first was the development of high-performance photocatalysts. The second was the engineering of a novel reactor that uses common low-cost materials like glass, aluminum, and LEDs instead of high-cost metal alloys.

The result is a scalable, versatile chemical reactor platform that enables the production of high-demand products that emit fewer, greenhouse gases at a competitive unit production costs. Their lower-emissions hydrogen solution enables the efficient

and sustainable transformation of lower-carbon-intensity ammonia into hydrogen via backcracking, while their CO₂-to-fuels solution enables production of sustainable fuels from carbon dioxide and (renewable) Methane. These lower-emissions solutions offer energy importers reliable, sustainable supplies of hydrogen and renewable fuels and are a key element to unlocking global hydrogen and sustainable fuel trade.

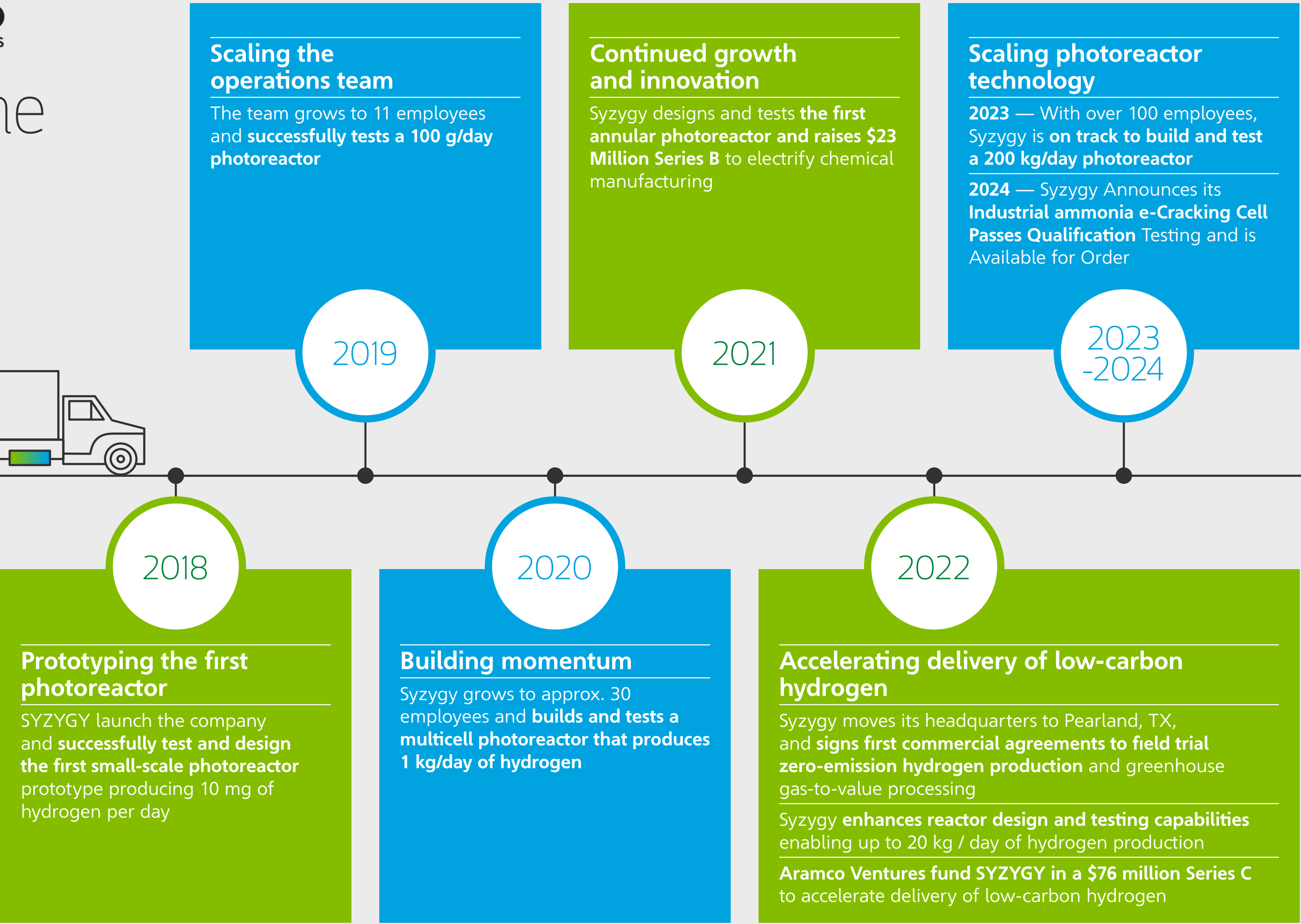
The role of Aramco Ventures

Aramco under the Sustainability Fund of Aramco Ventures invested into the Series C round of funding. By doing so it is hoped that as the business grows, the Syzygy platform can be used to assist in delivering on Aramco's ambitions for hydrogen while complementing its advantaged barrels to lower-emissions.



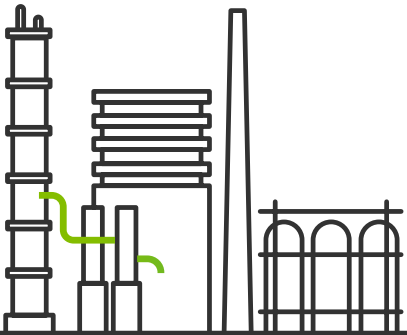


Timeline



Results to date

SYZYGY has developed a range of solutions from their initial research, these are now available on the market and a number of agreements have been signed with leading companies across Japan, South Korea and in the US.



- Lower-emissions hydrogen solution via ammonia back cracking is now available for order.
- The GHG to value solution transforms Methane and CO₂ collected in carbon capture, utilization, and storage (CCUS) facilities or from direct air capture (DAC) into syngas that can then be further processed into lower-emissions fuels and methanol.
- Syzygy has developed a lower-emissions alternative to traditional greenhouse-gas-heavy steam Methane reforming. The combustion-free, all-electric Rigel™ reactors can be integrated into existing hydrogen plants, eliminating combustion from the process and reducing CO₂ emissions by 40%.



How did Aramco Ventures help to develop an innovative hydrogen separation and capture system?



The opportunity

Hydrogen Mem-Tech is an innovative Norwegian company founded in 2017, specializing in hydrogen separation systems based on palladium alloy membranes. Only hydrogen atoms move through the membrane and re-associate as purified hydrogen, efficiently separating hydrogen from other gases, e.g. CO₂, a crucial process for blue hydrogen production.

Their **high performance technology** achieves high hydrogen recovery rates, of up to 99%, enabling more production volume. The process also gives more flexibility, from industrial purity to ultra-high purity grades for fuel cell applications and with a wide range of feed gases ensure process flexibility.

A **modular, compact design** makes the solution scalable, easy to integrate, and install. Ultra-thin palladium membranes are bonded to a substrate plate and stacked securely in cassettes, meaning a low plant footprint and flexible application to optimal performance.

The absence of moving parts or chemicals delivers added **simplicity and safety**. This means high reliability and uptime, with low maintenance costs and operational noise levels.

This technology has applications across transport, pipeline gas distribution, refining, power generation and steel production markets, as well as sub-scale markets for methanol and ammonia.

The role of Aramco Ventures

The challenge facing hydrogen Mem-Tech was scaling up the solution, with a 10x increase in production speed and automation of processes. Aramco’s resources, expertise, scale and track record made them a compelling partner. Aramco Ventures joined hydrogen Mem-Tech in May 2022, funding a state-of-the-art commercial production facility that was completed in 2023.

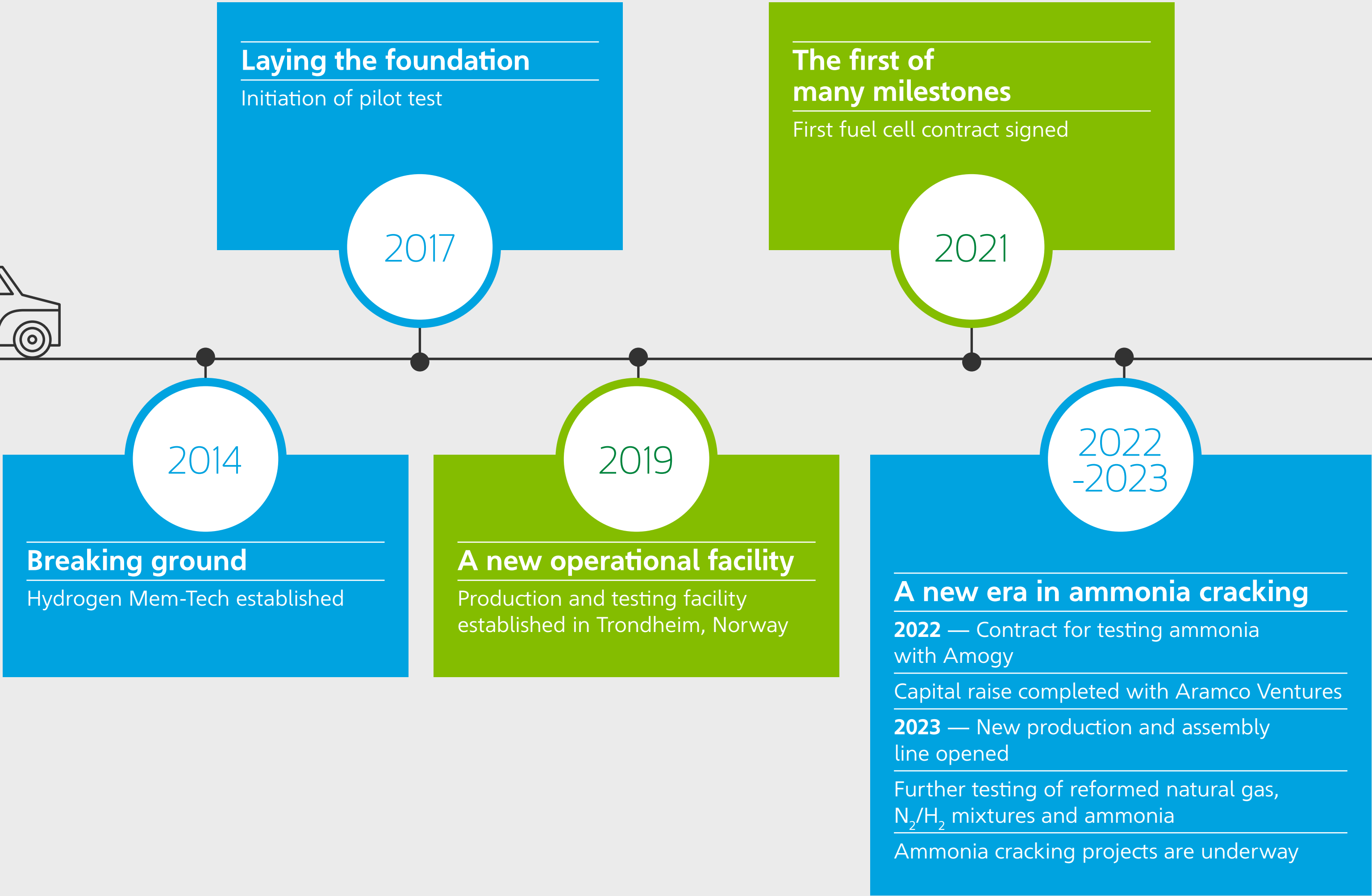
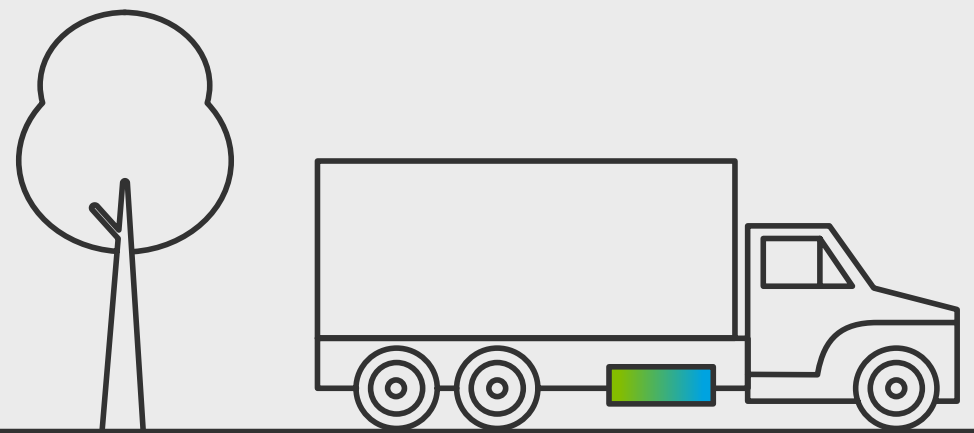
Hydrogen Mem-Tech has a strong fit with Aramco’s carbon reduction strategy and complements other work currently done within the space. hydrogen Mem-Tech is also working with another Aramco Ventures company, Amogy, assisting in controlling the purity of hydrogen used in the Amogy system.

“For Aramco Ventures this investment into hydrogen Mem-Tech is very strategic. hydrogen and carbon capture technologies are of the highest importance to Aramco, and we look forward to working with hydrogen Mem-Tech to use their unique gas separation membranes and realizing the benefits they bring”

Richard Riggs, Investment Director Aramco Ventures.



Timeline



Results to date

Achieved environmental management system (EMS) standard ISO 14001. The company is ahead of schedule on the initial investment plan stemming from the previous capital raise in May 2022.



A key part of the initial investment plan was to substantially expand production. This was completed and the result is a state-of-the-art production facility, 2,500 square meters in total and ten times the capacity, ready to meet the increasing demands of hydrogen.

Conclusions

Hydrogen holds immense promise for the future as a lower-emission and versatile energy carrier.

Ongoing advancements in hydrogen production, storage, and utilization technologies are driving down costs and improving efficiency. Innovations such as low-cost electrolyzers, advanced fuel cell systems, and hydrogen storage solutions are expanding the potential applications of hydrogen.

Continued investment in research and development is essential to realizing the full potential of hydrogen and scaling up, but so is investment in the pioneering start-ups who are leading the way.

Aramco continues to use venture capital to elevate promising startups within the hydrogen industry – and in other industries **but hydrogen will only truly take off when the value chain is developed.**

Government road maps now chart the course for how countries will harness the potential of hydrogen to help meet their Net Zero ambitions, but the plans must still be matched by subsidies, incentives and other mechanisms required to boost investment and implementation.

Aramco is working with partners to activate that development, working to develop transportation networks, efficiency in conversion and in delivery of hydrogen to the end users. The faster we develop a thriving market in hydrogen, the faster we can accelerate progress towards carbon emission reduction goals.

Discover more about Aramco

Learn more

Learn more about Aramco's new energy solutions

Learn more

Learn more about Aramco Ventures

Learn more



Dhahran
Aramco
P.O. Box 5000
Dharan 31311
Kingdom of Saudi Arabia
[Email](#)

Additional resources and references
[Read financial / investor news from Aramco](#)
[Read more news / case studies from Aramco](#)

