

Moving Together, Into Tomorrow

Oil & Gas Industry Solutions Towards 2030 and 2050



Our industry's action to support EU climate neutrality

2050

Net-Zero
Emissions

H2 and low-carbon
liquid fuels in transport

H2 value chain development
with decarbonised natural gas

Waste-to-chemical feedstock

Carbon sinks to offset emissions
in hard-to-decarbonize sectors

Large-scale deployment of CCUS

Large-scale alternative and renewable
energy deployment

2030

50-55%
GHG Target

Methane Emission Mitigation

Energy Efficiency improvements

Kickstart CCUS early deployment

Reduction of operational emissions

Progressive biogas & H2 injection into gas grid

LNG, CNG and low-carbon liquid fuels in transport

2020

20% GHG Target

What can the EU do?

- ▶ Incentivize Coal to Gas & Renewables switch
- ▶ Completion of Internal Gas Market & gas grid
- ▶ Secure funding access for gas projects
- ▶ Help create markets for CCS, CCU, P2G and LCLF
- ▶ R&D&I programmes open to CCS, CCU, P2G and LCLF
- ▶ Assessment and correction of H2 blending limits

Summary

The European upstream oil and gas industry shares the global ambition to tackle climate change in the framework of the Paris Agreement, and supports the EU's objective to reach climate neutrality by 2050.

We encourage the EU to step up its engagement with its global partners to combine decarbonization efforts, and put in place much needed enabling measures.

The energy transition will require **investments from businesses and from public financing**, as well as profound behavioral change from European citizens.

It will also depend upon **a policy framework which promotes all relevant technologies equally**, including fuel-switching to gas in power

and transport, lower carbon gases, nature-based solutions, and large-scale deployment of Carbon Capture (Use) and Storage.

Policymakers must **raise awareness** about the scale and extent of this challenge and **promote an open and inclusive debate** on the European Green Deal to make sure no one – consumers, businesses, or workers – is left behind.

Our industry can make strong contributions to the European journey towards climate neutrality by 2050 through:

- ▶ Providing **cost-effective solutions** to boost emission reductions **by 2030** → pages 4-9
- ▶ Developing and deploying **longer-term low-carbon and offsetting solutions** required to achieve the EU's climate neutrality objective **by 2050** → pages 10-15



The scale of the climate challenge requires a broad coalition encompassing governments, investors, companies and everyone else who is genuinely committed to reducing emissions. That effort requires the oil and gas industry to be firmly and fully on board.

– **Fatih Birol**, Executive Director of IEA

Immediate and cost-effective emission reductions

Reaching 2030 climate objectives will be the first step to reaching the EU's goal of climate neutrality by 2050. Using the full range of solutions offered by the oil and gas industry will help put Europe on track.

Efficiency and fuel switching first

Wherever possible, energy efficiency and a switch to lower carbon intensity fuels should be prioritized. This directly leads to emission and cost savings, and strengthens industrial competitiveness.

We deploy a number of solutions to do so in our own operations, including the processing and/or marketing of associated gases, or the electrification of platforms.

We also encourage consumers to use energy responsibly, be it at home, on the road, or at work.



2030



Technology Neutrality

Every transition has a cost for society. A technology neutral and market-based approach that builds on existing strengths and assets can minimize it compared to a one-dimensional approach relying mainly on electrification.

A transparent and economy-wide price on carbon offers the best opportunity to achieve emissions reductions efficiently and cost-effectively.

This should be supported by R&D&I in all meaningful emissions abatement technologies, including negative emissions options, as well as investment in enabling infrastructure to incentivize the move from development to deployment.





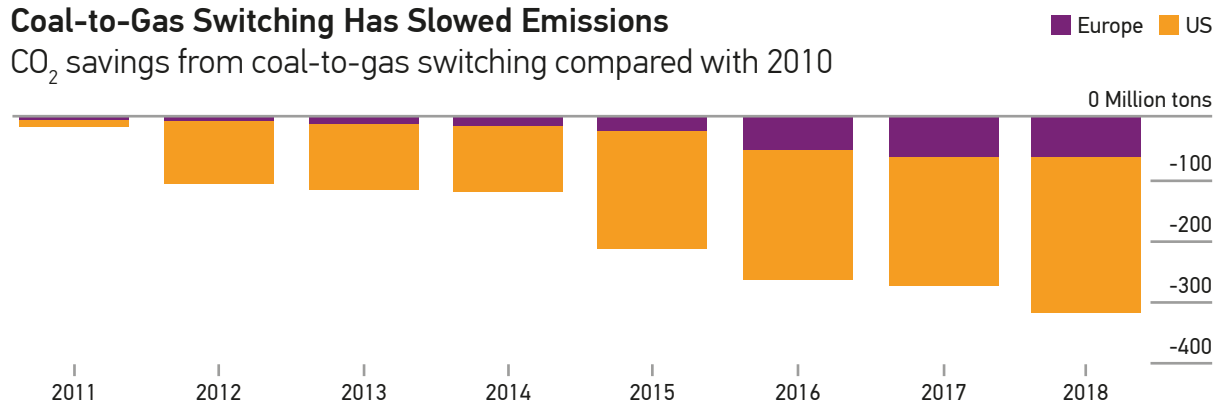
Power Generation

For many Member States, switching from coal to gas and renewables remains the most cost-effective and immediate option to reduce power generation emissions. The benefits of doing so are becoming increasingly visible around the world, from the US to UK, and from China to Spain.

Alongside demand-side response and energy storage, the flexibility of gas power plants also enables indirect emission savings, by effectively facilitating the integration of renewables into the system. In the long-term, gas power plants can also be retrofitted with Carbon Capture and Storage.

Coal-to-Gas Switching Has Slowed Emissions

CO₂ savings from coal-to-gas switching compared with 2010



Source: BLOOMBERG, IEA





Transport

No options should be left out to reduce transport-related emissions in Europe: electrification, energy efficiency gains in internal combustion engines (ICEs) and the increased penetration of low-carbon gaseous and liquid fuels.

While the share of Electric and Compressed Natural Gas-fueled passenger cars is expected to rise, switching to LNG is one of the cost-effective ways to reduce GHG and air pollutant emissions immediately for the transport and shipping industries.



Heating

Over 230 million Europeans use gas to heat their households¹, while 20 million still rely on coal stoves to heat their homes². Wherever electrification is too expensive, impractical or face public acceptance challenges, switching to natural gas or LPG provide an immediate, affordable and cleaner alternative for households.

Switching to high-efficiency gas boilers or gas heat pumps can help reach GHG and efficiency targets for the heating sector by 2030 in a cost-effective manner for consumers.

Gas Combined Heat and Power (CHP) can also help increase the efficiency and lower the carbon footprint of energy and heat in a cost-effective manner, in particular when combined with district heating.

In the absence of a scalable and cost-effective large-scale electricity storage solution, the existing gas storage and transport infrastructure is well-placed to balance swings in seasonal energy demands cost-effectively.

Sources: ¹Eurostat, Eurogas (IOGP calculation based on average number of people per EU household (2,3) multiplied by number of EU households (221 million) multiplied by household gas appliance market share (46%)),
²Eurostat, Energy products used in the residential sector

Improving our own environmental footprint

Tackling climate change requires efforts from all sectors of the economy, including ours. The production of oil and gas emits greenhouse gases, which can be reduced.



Methane Emissions Reduction

For natural gas to deploy its full GHG savings potential, especially when compared to higher carbon intensity fuels such as coal, methane emissions throughout the value chain should be addressed.

The oil and gas industry has already undertaken numerous steps to minimise methane emissions and remains strongly committed to continuing these efforts through various initiatives including: methane quantification studies, Monitoring, Reporting, and Verification (MRV) standard, methane reduction targets, leak detection and repair (LDAR) programs, and upstream Best Available Techniques.

IOGP is signatory to the Methane Guiding Principles (MGP) set up in 2017 to tackle emissions across the entire natural gas value chain. In 2019, courses in implementing the MGPs for managers and employees were launched by the signatories in partnership with Imperial College London. With around 20 signatories and supporting organizations, the Guiding Principles contributes to:

- a) Continually reduce methane emissions***
- b) Advance strong performance across gas value chains***
- c) Improve accuracy of methane emissions data***
- d) Advocate sound policy and regulations on methane emissions***
- e) Increase transparency***



METHANE
GUIDING
PRINCIPLES

methaneguidingprinciples.org

IOGP encourages all natural gas value chain actors to join the Guiding Principles.



Credit: Ole Jorgen Bratland ©Copyright Equinor



Policy recommendations

Fast and cost-effective emission reductions are still possible in Europe.
We call on policymakers to:

- ✓ **Maintain and expand carbon pricing as the central market-based tool to achieve emission** reduction goals, both at European and Global levels: it remains the most cost-effective and efficient emission reduction policy measure. Internationally linked carbon pricing and an agreement on Article 6 of the Paris Agreement at COP26 will be critical to achieve global emission reduction goals.
- ✓ **Encourage a rapid switch from coal to gas and renewables** in power generation and heating as national circumstances allow.
- ✓ **Address methane emissions along the value chain and across all sectors of the economy:** this requires accurate data collection and estimation approaches, a robust Monitoring, Reporting and Verification standard (built on OGMP 2.0 reporting) applicable inside the EU and promoted outside of it, and the development of sound policy in the upcoming Methane Strategy.
- ✓ **Continue to secure access to finance for transitional activities such as gas energy projects and other meaningful solutions** in the Sustainable Finance and Cohesion Policy in order to enable sector coupling.
- ✓ **Encourage public entities, businesses and consumers to consider using natural gas** (LNG or CNG) and low-carbon liquid fuels as complementary to electrification to reduce carbon and air pollutant emissions in urban, rural, and port areas.

Supporting innovative technologies for the longer term

Alongside other carbon management solutions such as reforestation, there is now broad consensus among expert organizations that the higher our climate ambition is, the more necessary hydrogen and Carbon Capture & Storage become, thanks to their ability to reduce emissions in hard-to-abate sectors.

The oil and gas industry is actively driving the development and deployment of these large-scale carbon management solutions. This will increase the EU's chances of reaching its climate neutrality goal by 2050.



Carbon Capture & Storage

CCS will be a necessary part of the decarbonisation of industry, representing one of the most cost-effective ways to avoid post-combustion and process-related emissions.

Where can CCS make a difference?



Emission cuts in **industrial processes** where mitigation potential is high, like steel, cement/lime, chemicals, and refining



Low-carbon, flexible **electricity from gas-fired power plants with CCS** to complement an energy system with a growing share of variable renewables



Large-scale production of **hydrogen from natural gas with CCS**, providing clean energy for industry, power, transport and heating



Removal of CO₂ from the atmosphere by combining **CCS with bioenergy (BECCS)**, using **direct air capture (DAC)**, or through **nature based solutions**

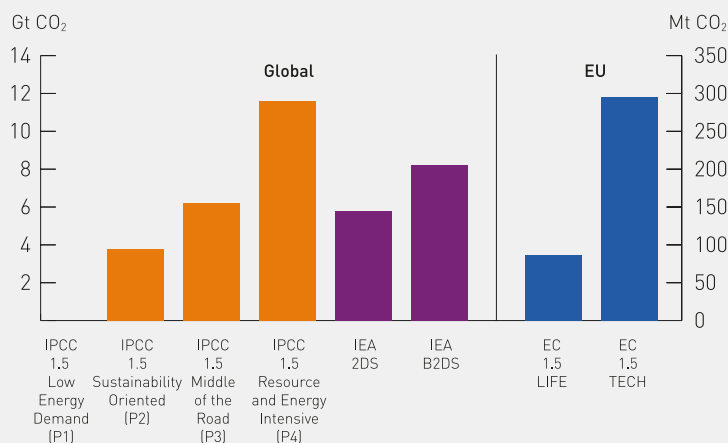


2050

Gas-fired power plants with CCS can help ensure grid resilience as renewable generation grows, supporting decarbonised energy system flexibility.

CCS is also critical to achieving negative emissions e.g. when applied to bioenergy, which is viewed by the IPCC as crucial to achieving the 1.5 °C objective under the Paris Agreement.

Role of CCS in global and EU 2°C and 1.5°C scenarios - CO₂ stored in 2050



Source: data from IPCC (2018), IEA (2017), GCCSI (2018).

Overview of **existing** and planned CCS facilities

Norway

1. **Sleipner CO₂ Storage***
2. **Snøhvit CO₂ Storage***
3. Northern Lights*

Republic of Ireland

4. ERVIA

UK

5. Acorn*
6. Caledonia Clean Energy
7. H21 North of England*
8. Liverpool-Manchester Hydrogen Cluster
9. Net Zero Teesside*
10. Humber Zero Carbon Cluster*

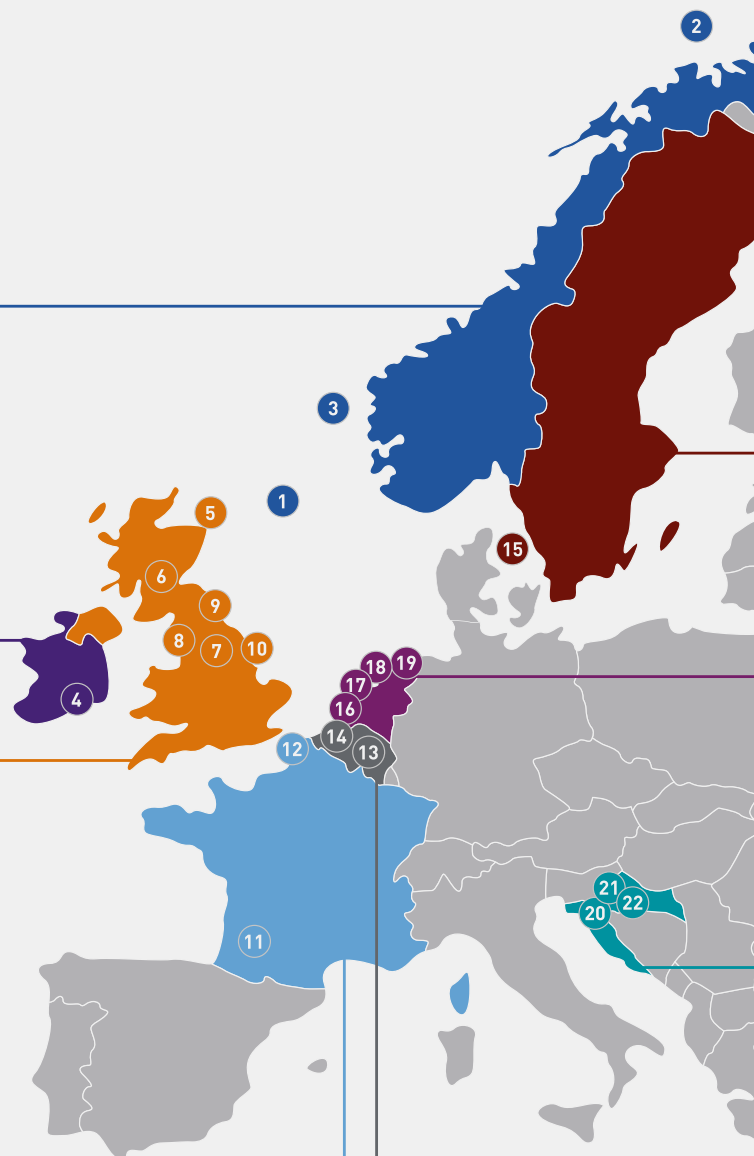
* Project where IOGP members are involved
Projects listed in **bold** are in operation

France

11. Lacq*
12. DMX Demonstration in Dunkirk*

Belgium

13. Leilac
14. Port of Antwerp*





Sweden

15. Preem CCS*

The Netherlands

16. Porthos (Port of Rotterdam)*

17. Athos (Ijmond)

18. Aramis (Den Helder)

19. Magnum (Eemshaven)*

Croatia

20. iCORD*

21. CO₂ EOR Project Croatia*

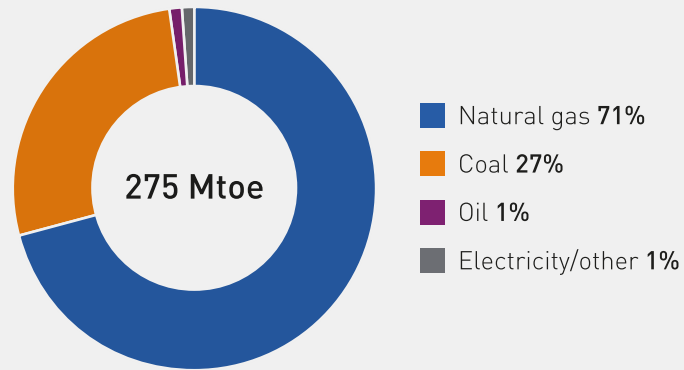
22. Bio-Refinery Project*

2050

Hydrogen has the potential to provide significant volumes of storable near-zero carbon energy to the EU, across the heating, transport, industrial, and power generation sectors.

How we produce hydrogen today

World dedicated hydrogen production
- Energy input by source



Source: IEA (2019)

Hydrogen Applications



As a feedstock in the **chemical, refining and steel industry**, and as low-carbon fuel in energy-intensive processes



Used into the gas grid to decarbonise **residential and commercial heating**



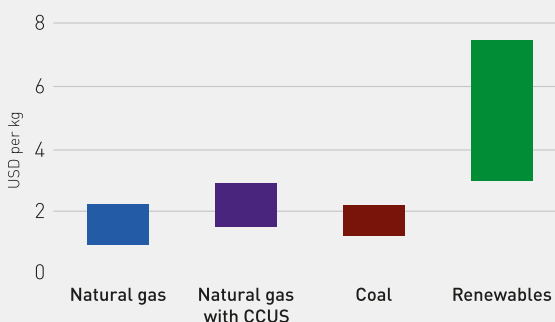
In **passenger cars**, as well as **heavy** and **long-haul road** and **maritime transport**



In the **power sector**, supporting the transition towards net-zero emissions

The potential of CCS applied to hydrogen production

Hydrogen production costs, 2018



Source: IEA (2019)

Most hydrogen is made by gas reforming technologies today. They chemically separate the carbon and hydrogen contained in natural gas.

Production of hydrogen from natural gas with CCS could allow the EU to kickstart a large-scale market for clean/ low-carbon hydrogen which will also enable and support the future deployment of hydrogen from renewable energy via power-to-gas.



Policy recommendations

Policymakers can boost the deployment of these solutions.
We call on them to:

- ✓ **Ensure a level playing field in life-cycle-based analysis between clean/low-carbon hydrogen production methods** by adopting a technology-neutral approach, necessary for a cost-effective European energy transition.
- ✓ **Facilitate the construction of CO₂ and natural gas/hydrogen infrastructure where necessary**, as well as the cross-border trade of physical CO₂ volumes and hydrogen through the Connecting Europe Facility.
- ✓ **Remove legal and administrative barriers to the injection of hydrogen into the gas grid as of 2020.**
- ✓ **Enable companies to transport and store hydrogen and CO₂ as either a commercial or regulated activity** overseen by National Regulatory Authorities (NRAs) with appropriate mandates.
- ✓ **Expand R&D&I programmes to early-stage pre-commercial technologies**, including hydrogen from gas and CCS/CCU, direct air capture, biomethane conversion to renewable natural gas, power-to-gas, and low-carbon liquid fuels.
- ✓ **Allowing the transport of CO₂ by ship, train and truck in the EU ETS**, while also allowing the entity that captured that CO₂ to be rewarded under the ETS would help bring optionality and flexibility to CCS business models across Europe.
- ✓ **Promote a market framework for low-carbon products and services produced with CCS**, including Guarantees of Origin and/or other accreditation schemes, to incentivise new business models and support market uptake.
- ✓ **Ensure CCS and clean/low-carbon hydrogen are recognised as an economic activity** contributing to climate change mitigation in the taxonomy developed in the context of the action plan on sustainable finance.
- ✓ **Ensure State Aid Guidelines enable the integration of CCS, CCU, and clean/low-carbon hydrogen into the EU energy system.**

Carbon Border Adjustment Mechanism

Should the EU assess the possibility of introducing a carbon border tax, this should be based on the market-based price of carbon (e.g., ETS) and could be levied on goods and services from jurisdictions that do not have carbon pricing systems or whose pricing systems place considerably lower per ton costs. Such systems should be carefully constructed to focus on mitigating economic and emission leakage while avoiding a perception of trade protectionism that can harm European consumers and the economy.

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Our Members



About us

The International Association of Oil & Gas Producers (IOGP) is the voice of the global upstream industry.

Our Members account for 90% of Europe's oil & gas production.

We advance the views and position of oil & gas E&P companies to international and EU regulators, legislative bodies, and other relevant stakeholders.

We also act as a uniquely upstream forum in which our Members identify and share knowledge and good practices to achieve improvements in health, safety, the environment, security and social responsibility.