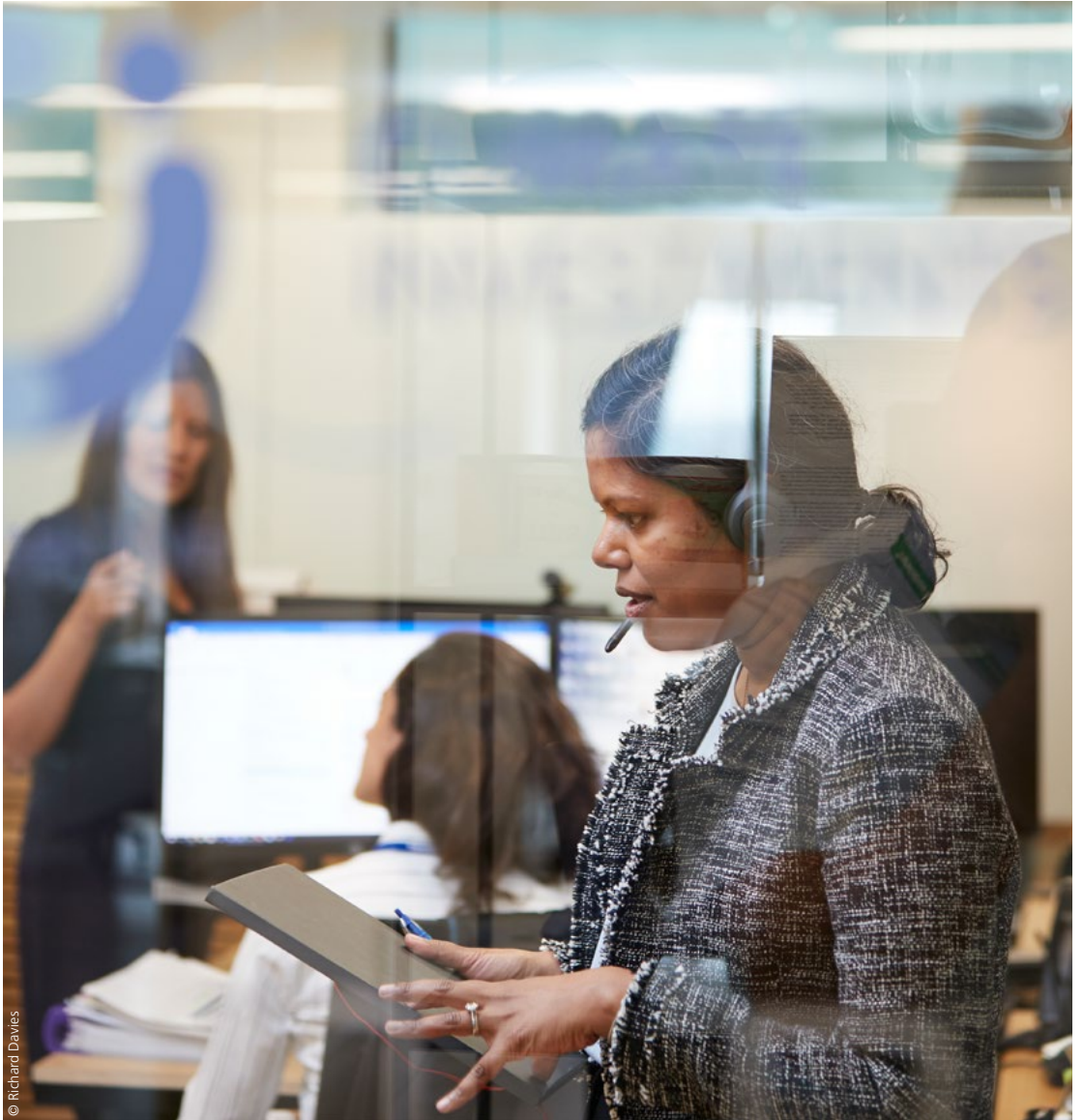


# AT WORK

Committed to climate action



© Richard Davies

**A report from the Oil and Gas Climate Initiative  
September 2018**

# FACTS & FIGURES



## ENERGY PRODUCTION

**41 million**

barrels of oil equivalent per day<sup>1</sup>



## GREENHOUSE GAS EMISSIONS

**600 million**

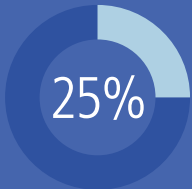
tonnes of carbon dioxide equivalent per year<sup>2</sup>



## CLIMATE INVESTMENT

**\$6.3 billion**

in low-carbon technologies and R&D in 2017



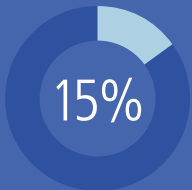
of global oil and gas production



of total energy-related greenhouse gas emissions<sup>2</sup>



of total R&D spend is focused on low carbon<sup>3</sup>



of global energy demand



our 2025 ambition for collective methane intensity



collective commitment through OGCI Climate Investments

<sup>1</sup> Operated production of oil and gas  
Data is 2017 for 10 OGCI member companies

<sup>2</sup> Direct emissions (Scope 1)

<sup>3</sup> Based on data from eight companies

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# FOREWORD

**Patricia Espinosa**  
**Executive Secretary, United Nations**  
**Framework Convention on Climate Change**



**Patricia Espinosa**  
UNFCCC

**"We need increasingly ambitious action from a growing number of stakeholders."**

The Paris Agreement tasked national governments with developing climate action plans that will limit a rise in average global temperatures to 2°C above pre-industrial levels, and ideally 1.5°C. But governments cannot achieve this alone. Both the public and private sector must act urgently to decarbonize their economies and avoid the worst impacts of climate change.

We see considerable momentum in the private sector. The Paris Agreement provided the signal and unleashed a willingness to take action. According to the We Mean Business Coalition, more than 700 companies – with a market capitalization of more than \$16 trillion – have made far-reaching climate commitments. At the same time, investors are engaging with the world's largest corporate greenhouse gas emitters to improve governance on climate change, reduce emissions and improve climate-related financial disclosures.

I am pleased that OGCI – representing more than 15 per cent of the world's primary energy needs, including both national and international oil companies – is among the leaders in private sector efforts to reach global

net zero emissions. We are happy to work with OGCI as it introduces targets and actions to lower the greenhouse gas footprints of the energy and industrial sectors, while securing access to clean and affordable energy.

The continued accumulation of greenhouse gases in the atmosphere shows that our progress to date must be amplified. We need to see more stakeholders leading by example. We also need increasingly ambitious action from a growing number of stakeholders – and the energy industry must be at the forefront of this action.

**There are three areas where we believe OGCI could accelerate ambition:**

**1. Influence the broader energy industry.** Reducing the carbon footprint of oil and gas production is important, but this needs to take place across the entire energy sector to have a substantial impact on climate change. We encourage OGCI to engage with downstream players, joint venture partners, utilities and energy-intensive industry to collaborate on accelerating the reduction of emissions.

## 2. Accelerate the policy agenda.

We encourage OGCI to take steps that facilitate further public sector action – be it procuring clean products, investing in carbon capture, use and storage infrastructure or helping to develop natural sinks. That requires greater commitment of financial and human resources, but it also means deepening engagement with governments at all levels and with coordinating organizations such as the United Nations.

## 3. Link closely with the sustainable development goals.

Climate action is crucial, but it will only happen within a global context that leverages innovation to reduce poverty and spread prosperity. We encourage OGCI to build its aspirations within this framework, setting clear long-term pathways with measurable milestones and commitments.

I look forward to our closer collaboration over the coming years.



At the Bonn Climate Change Conference, 2017

Seven of the OGCI CEOs (left to right):  
Claudio Descalzi (Eni)  
Josu Jon Imaz (Repsol)  
Amin H. Nasser (Saudi Aramco)  
Bob Dudley (BP)  
Ben van Beurden (Shell)  
Eldar Saetre (Equinor)  
Patrick Pouyanné (Total)



# FOREWORD FROM THE CEOS

We launched OGCI with the ambition that putting together a proactive, engaged and diverse group of global oil and gas companies could make a difference to the way we respond to the challenge of climate change. Strengthened by our common commitment to the ambitions set by the Paris Agreement, we have built an organization that is helping us to accelerate our own efforts to reduce and mitigate carbon dioxide and methane emissions, while supporting actions that help other energy and industrial companies to reduce theirs.

As the CEOs of OGCI member companies, we balance our responsibilities as major global energy providers with the essential need to tackle the threat of climate change. Each of our companies is pursuing its own strategy to reduce greenhouse gas emissions and build on the opportunities presented by the energy transition.

OGCI, as an organization, aims to leverage our collective strength to be a catalyst for practical cli-

mate action on a significant scale.

As members of the OGCI CEO Steering Committee, we talk and meet formally at least six times a year to shape OGCI strategy, consider ways to strengthen our ambition and check that our words are followed by real and meaningful actions. We bring together leading experts from within our companies to work together directly and support OGCI on a daily basis.

We have actively participated in over a dozen technical and policy studies – some of them ground-breaking – that also guide us as companies in our strategic approaches to climate and low carbon technology and will help us to significantly improve our contributions to the energy transition.

In addition, we are actively investing in promising carbon reduction technologies, business models and deployment through OGCI Climate Investments, a \$1 billion investment vehicle with its own dedicated team of venture and technical professionals.

We regularly discuss our com-

mitment to climate action with peers in the industry and engage with potential new members who may share our determination to play an active role in tackling this challenge. At the start of this year, we had the pleasure of welcoming Petrobras into OGCI. Together we now represent around 25% of our global industry by production and are active in over 130 countries.

In 2018, we have focused, in particular, on how we can reduce methane emissions – an area where we aim to achieve a quick and meaningful win for climate action. A growing share of renewables and natural gas constitute a unique package to reduce greenhouse gas emissions and ensure sufficient base load globally for power generation. Natural gas has been a significant part of the path to low emissions in the power sector in a number of countries. To ensure that it can fully realize its role in a low-emissions future, we have worked to make our ambition of near zero methane emissions concrete, actionable and measurable.



We have set a target to reduce the collective average methane intensity in OGCI's aggregate upstream gas and oil operations by more than one-fifth to 0.25% by the end of 2025, with the ambition of achieving 0.20%, from a baseline in 2017 of 0.32%. While each company within OGCI will have its own approaches and circumstances, we have identified specific measures that can help achieve this reduction, including explicit support of the aims of Zero Routine Flaring by 2030 for all OGCI members.

Methane emissions can occur anywhere along the gas value chain, so we cannot focus on our upstream methane emissions alone. It would not be enough to achieve climate impact at scale. We have started engaging with downstream gas operators and aim to encourage concrete actions to help them reduce their methane emissions and improve quantification along the entire gas value chain.

To support the industry to achieve lower methane emissions, OGCI Climate Investments

has identified promising new methane detection, measurement and prevention technologies. We plan to support these technologies with investment, as well as by piloting and deploying them within the OGCI companies and potentially with our partners too.

We will also focus on realizing our aspiration to play a major role in the emergence of a commercially viable, safe and environmentally responsible carbon capture, use and storage (CCUS) industry which would help our economies to become carbon neutral in the second half of the century.

OGCI's consensus around CCUS has grown strongly in the past few years as we see the vital role it can play in achieving net zero emissions. OGCI Climate Investments has already invested in three emerging CCUS technologies and one project, and is working on a strategy to catalyze global CCUS projects that have the potential to reduce costs and demonstrate commercially viable business models. Alongside these invest-

ments, OGCI is now working on a series of ambitious initiatives to leverage the unique capabilities of our industry and help CCUS to contribute to several of the United Nations Sustainable Development Goals and the Paris Agreement.

Beyond the direct benefits of storing gigatonnes of carbon dioxide which would otherwise be emitted to the atmosphere, a thriving CCUS industry could play a key role in enabling the emergence of hydrogen and negative emission technologies – both likely to be of major significance for tackling the climate challenge in the longer term.

In the coming years, OGCI will look at how we can accelerate these long-term climate solutions. We are also starting to intensify our efforts to identify new approaches to the key areas of energy efficiency and transport efficiency, while also exploring the potential of carbon neutralization through nature-based solutions.

OGCI represents around two million member company employees who are increasingly



supportive of changing the way we do things to respond to the climate challenge. We would like to thank them – and all the stakeholders that trust OGCI and engage with us – for helping our industry to play a proactive role in the energy transition. As

our ambition grows with the scale of the challenge, we look forward to working closely with policy-makers, regulators and all stakeholders to help develop the levers that can economically and sustainably accelerate the pace of the low carbon transition.

The Paris Agreement has set an incredibly ambitious agenda that we all support and in which everyone has a role to play. We don't have all the solutions but we believe that together we can galvanize action that makes a difference.

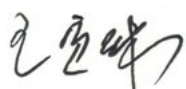
New York, September 24, 2018



**Bob Dudley**  
BP plc



**Carlos Alberto Treviño Medina**  
Petróleos Mexicanos



**Wang Yilin**  
CNPC



**Josu Jon Imaz,**  
Repsol S.A.



**Claudio Descalzi**  
Eni S.p.A.



**Ben van Beurden**  
Royal Dutch Shell plc



**Eldar Saetre**  
Equinor ASA



**Amin H. Nasser**  
Saudi Aramco



**Ivan Monteiro**  
Petroleo Brasileiro SA



**Patrick Pouyanné**  
Total S.A.

Role of Gas workstream lead, Rosanna Fusco (left), working on the OGCI methane intensity target



# 1

## FURTHER AND FASTER TOGETHER





**Viviana Coelho**  
Petrobras

**"We really appreciate the way truly open collaboration moves the agenda further than companies acting individually."**

Photo: OGCI Executive Committee breakfast with Repsol's CEO (right)

## OGCI AT WORK

The Oil and Gas Climate Initiative (OGCI) announced its formation during the UN Secretary General's Climate Summit in New York four years ago. Our vision was to become a recognized and ambitious provider of tangible, credible and transparent solutions to the climate change challenge, focusing on energy efficiency and reducing greenhouse gas emissions. We still have a way to go to reach this goal, but we have carved a role as a catalyst for climate action – not duplicating or competing with the efforts of other organizations, but finding ways to use our combined expertise to amplify and accelerate our impact.

Both directly as individual member companies and through our fund, OGCI Climate Investments, we are investing to accelerate activities that will reduce greenhouse gas emissions. Together, we are also working closely with governments, research institutions and, increasingly, other industries, to target areas where we can have the greatest impact in contributing significantly to the goals of the Paris Agreement and to several of the Sustainable Development Goals.

This year we have set a challenging

target to reduce our collective methane emission intensity significantly by 2025. We are now working on a set of actions to help us play a major role in the emergence of a commercially viable, safe and environmentally responsible carbon capture, use and storage (CCUS) industry. Next year, we will also explore ways to achieve a step change in energy efficiency and analyse the potential of natural sinks.

Our activities have found broad support, especially after the Paris Agreement pushed climate action higher up the agendas of governments and businesses. As our activities expand, we want to ensure that anyone engaged in finding climate solutions – policy-makers, regulators, industries, researchers, innovators, investors and NGOs – understands what is driving OGCI, how we function as an organization, and how they can work with us.

### **Our motivation**

OGCI member companies are based around the world and have different ownership structures. We have different interactions with our stakeholders, and different strategic responses to addressing the challenge of climate change. What we all have in common





## THE UN SUSTAINABLE DEVELOPMENT GOALS



OGCI is starting to work on how our actions feed into and build on the United Nations' 17 sustainable development goals (UN SDGs). We look forward to deepening our engagement over the coming year.



OGCI activities contribute to a number of the SDGs, but one goal is of paramount importance to OGCI – **Climate Action**. We are committed to reducing the greenhouse gas footprint of the energy and industrial sectors. We support the Paris Agreement and we aim to accelerate and participate in the energy transition.



We recognize the dual challenge society has of decarbonizing economies, while providing access to clean energy for more than 7 billion people. We support the UN focus on providing **Affordable and Clean Energy**.



Our focus on carbon capture, use and storage aims to help lower the carbon footprint of energy and industry, while unlocking opportunities for new technologies that are critical for the future of **Industry, Innovation and Infrastructure**.



Our work on reducing methane emissions is an example of **Responsible Consumption and Production** within the gas value chain. We aim to show leadership to tackle this challenge as an industry. Our work on energy efficiency, to be launched in 2019, will also support responsible production.



All of our activities draw on the strength of engagement and collaboration, taking us outside of our industry as we pursue **Partnership for the Goals**.

is a desire to be at the forefront of our industry's transformation and to be a credible and valuable partner to support the realization of the Paris Agreement goals.

Each of the OGCI member companies has already been taking individual actions, but close collaboration is crucial to make real progress on an issue as complex and urgent as climate change. Tackling the climate challenge is not about philanthropy or public relations. We see climate change as a major risk – and we see a low carbon economy as one of our most promising business opportunities.

While our focus is external, one of our greatest impacts, to date, has probably been the acceleration of the transformation inside our companies as a result of our joint work. OGCI currently has over 150 leading experts drawn from across the 10 member companies working together closely on a variety of climate-related issues and actions. Each organization has brought something unique to the table from which others have had a chance to learn – be it on-the-ground best practice in reducing flaring or methane emissions, modelling long-term mitigation pathways, approach-

es to climate reporting and targets, or technical experience with capturing and storing carbon dioxide.

### **Growing commitment**

Our CEOs meet regularly throughout the year to reinforce OGCI's strategic direction, and their growing commitment has pushed climate issues to the top of their own corporate agendas. This inspires greater confidence within our member companies to advance climate change initiatives, knowing they have top-level support. It has also helped to build ambition levels within OGCI, giving those involved the mandate to act more boldly within their own companies. These multiple internal transformations have enabled us to build consensus and grow our collective commitment to strive for more, together.

OGCI's overall strategy is set by the CEO Steering Committee and defined by an Executive Committee, made up of all member companies. To translate this strategy into action, we have established two interlinked vehicles – OGCI Climate Investments and a set of focused Policy and Strategy workstreams – and may in future create new tools if needed to achieve our goals.

If you would like to learn more about OGCI and our collaborative work, do get in touch:  
[contact@ogci.energy](mailto:contact@ogci.energy)



# OGCI MEMBER COMPANIES IN 2018



**Pemex**  
Headquarters: Mexico  
Output\*: 2.9  
Countries with operations: na  
Employees: 125,000  
CEO: Carlos Alberto Treviño Medina



**Shell**  
Headquarters: The Netherlands  
Output\*: 3.7  
Countries with operations: 70  
Employees: 86,000  
CEO: Ben van Beurden



**PETROBRAS**

**Petrobras**  
Headquarters: Brazil  
Output\*: 2.8  
Countries with operations: 9  
Employees: 63,000  
CEO: Ivan Monteiro



**REPSOL**

**Repsol**  
Headquarters: Spain  
Output\*: 0.7  
Countries with operations: 37  
Employees: 25,000  
CEO: Josu Jon Imaz



\* Million barrels of oil equivalent per day



**Equinor**  
 Headquarters: Norway  
 Output\*: 2.1  
 Countries with operations: 36  
 Employees: 20,000  
 CEO: Eldar Saetre



**BP**  
 Headquarters: UK  
 Output\*: 2.5  
 Countries with operations: 80  
 Employees: 74,000  
 CEO: Bob Dudley  
 OGCI Chairman



**CNPC**  
 Headquarters: China  
 Output\*: 5.9  
 Countries with operations: 35  
 Employees: 1,400,000  
 Chairman: Wang Yilin



**Eni**  
 Headquarters: Italy  
 Output\*: 1.8  
 Countries with operations: 71  
 Employees: 33,000  
 CEO: Claudio Descalzi



**Total**  
 Headquarters: France  
 Output\*: 2.6  
 Countries with operations: 130  
 Employees: 98,000  
 Chairman and CEO:  
 Patrick Pouyanné



**Saudi Aramco**  
 Headquarters: Saudi Arabia  
 Output\*: 13.1  
 Countries with operations: 6  
 Employees: 71,000  
 CEO: Amin H. Nasser





**Jerome Schmitt**  
Chairman, OGCI Executive  
Committee

**"Each time we  
make progress  
together, I  
believe we set  
a new positive  
milestone."**

## **WHAT IT MEANS TO BE AN OGCI MEMBER**

OGCI has evolved rapidly over the past four years. Initially, our common goals were to be proactive and share best practice across a broad range of companies. As we grew and had the opportunity to work more closely together, our collective commitment to a low carbon future has grown. Over time, we have agreed on an increasingly ambitious set of membership criteria, and these are likely to continue to evolve as our actions expand. These criteria ensure that, as we grow as an organization, new members will add to the strength of our ambition.

### **From 2019, these criteria include:**

- Show clear support for the goals of the Paris agreement
- Commit to the CEO's personal and regular involvement in the OGCI CEO Steering Committee
- Contribute \$100 million to OGCI Climate Investments over a ten-year period and share equally the annual OGCI budget
- Report key data, using common methodologies, to measure OGCI progress in key areas
- Support delivery of OGCI's methane intensity target
- Support OGCI's carbon capture, use and storage aspiration
- Make senior staff and experts available for OGCI activities
- Share appropriate information on low-carbon best practices and experience
- Support explicitly the aims of Zero Routine Flaring by 2030



© Marc Morrison

The World Economic Forum, which was instrumental in helping OGCI to get started, still supports us with their big-picture perspective and advice.

We see our role as a proactive partner for a broad ecosystem of industries, policy-makers, climate investors, scientists and non-government organizations. We aim to catalyze practical actions that will significantly reduce greenhouse gas emissions from the direct and indirect use of oil and gas. It could be through co-investment, financial support of scientific research, pilot deployment or targeted research within member-companies, sharing best practices and technical expertise where appropriate, and developing joint action plans.

No organization can tackle the challenge of climate change alone, so we aim to identify the opportunities for collaboration and leverage them.

We want to work with other companies within the oil and gas industry – upstream and downstream – that share our commitment to contribute towards meeting the goals embodied in the Paris Agreement. We are also eager to cooperate with energy-intensive industries that need to decarbonize, as well as automotive manufacturers that want to achieve a step change in engine efficiency. If our actions help other fossil fuel companies to reduce their emissions, we regard that as a benefit.

Entrepreneurs greeted by OGCI Climate Investments CEO Pratima Rangarajan (middle) at the Methane Venture Day



## OGCI Climate Investments

OGCI Climate Investments is a \$1 billion fund set up by OGCI to invest in technologies, projects and business solutions that have the potential to significantly lower the carbon footprint of the energy and industrial sectors. We invest in innovative companies and projects with promising technology and business models that are ready to be commercialized. We co-invest, provide expertise and pilot technology within our member-company operations.

OGCI Climate Investments has already made eight investments since it became operational in 2017 and is working with the investee companies to help them pilot and deploy their technologies.

As an independent entity with its own dedicated team of venture and technical professionals based around the world, OGCI Climate Investments can move quickly to capture opportunities, supported by a growing global network of partners and co-investors that help us to achieve speed and scale. That means we draw on OGCI members' expertise, experience and deployment potential and work closely

### We focus on three objectives



#### Reduce methane emissions

during the production, delivery and usage of oil and gas



#### Reduce carbon dioxide emissions

by increasing energy efficiency in power, industry and transport



#### Mitigate carbon dioxide

produced during power generation or industrial processes by using it in products or storing it

If you have an inquiry for our investments team, please contact: [investments@climateinvestments.energy](mailto:investments@climateinvestments.energy)

with the CEO Steering Committee to define priorities. Our activities also bring new insights and perspectives into OGCI workstreams and help to unlock new opportunities for action by OGCI.

Although OGCI Climate Investments is an impact-driven fund, it has strong business drivers, focusing on solutions and companies that are commercially viable. Our belief is that only commercially successful solutions will be adopted by the market and gain the scale required to deliver impact.

We are continuing to conduct due diligence on a number of promising ventures and projects. Our first proactive call for proposals this year on technologies to detect, measure and mitigate methane emissions has already yielded two investments. We are planning to issue calls next year in the areas of energy efficiency and CCUS. We are looking to work with driven and experienced entrepreneurs and teams that have the determination to turn their innovations into outcomes. We are also building a global network of like-minded co-investors to achieve speed and scale. If you are taking action on climate change, we want to talk to you.

## OGCI Climate Investments' portfolio



### REDUCE METHANE EMISSIONS



May 2018

GHGSat provides accurate, low-cost greenhouse gas monitoring data and services covering any facility in the world. GHGSat launched its own demonstration satellite in 2016, the first that could measure facility-level emissions of both carbon dioxide and methane.

**GHGSat plans to launch new high-resolution satellites and very high resolution aircraft platforms for measuring greenhouse gases, building on lessons learned from its demonstration satellite.**



September 2018

Kairos Aerospace provides actionable data on major sources of methane emissions from aerial surveys. Their patented sensors and proprietary software make continual monitoring of methane emissions over large areas of land cost-effective.

**Over the coming year, Kairos will expand internationally, hire additional resources and increase capital expenditure.**



September 2018

Clarke Valve designs and manufactures proprietary control valves for the industrial market. Its patented Shutter Valve is cost-effective, energy efficient and virtually eliminates fugitive methane emissions.

**Clarke Valve is working to deploy its technology faster and grow its customer base.**



### REDUCE CO<sub>2</sub> EMISSIONS










September 2017

Achates is developing high fuel-efficiency opposed-piston engines that aim to significantly reduce carbon dioxide, particulate and nitrogen oxide emissions.

**Achates is currently demonstrating and testing its engines, while accelerating its technology deployment worldwide.**

IMPACT



| MITIGATE CARBON DIOXIDE   |  | IMPACT   |
|---|--|--|
|  <p>October 2017</p>    | <p>Inventys aims to halve the cost of carbon capture through its breakthrough scalable technology and use a distributed supply model to build a physical CO<sub>2</sub> marketplace that can enable the utilization of carbon dioxide on a gigatonne scale.</p>  | <p><b>Inventys is currently working on a carbon capture pilot plant demonstration programme and manufacturing capabilities in 2019, allowing the company to go to market in 2020.</b></p>   |
|  <p>October 2017</p>    | <p>Solidia has developed patented systems for producing lower-emissions cement and concrete cured with carbon dioxide rather than water. Together, these innovations lower the carbon footprint of cement and concrete by 70% and water usage by 80% throughout the concrete production process.</p>                     | <p><b>Solidia is expanding its commercial traction with large-scale pilot facilities in three countries, leveraging machine learning to enhance measurement and control of production, as well as accelerating R&amp;D in ready-mix applications.</b></p>   |
|  <p>February 2018</p> | <p>Econic uses pioneering catalyst technology to incorporate carbon dioxide as a raw material into polyols, the basis of all polyurethanes. Its aim is to replace 30% of polyol production with its new production technologies, potentially reducing carbon dioxide emissions by up to 3.5 million tonnes per year.</p> | <p><b>Econic opened a demonstration plant in 2018 and is moving towards adoption of this technology by existing polyol producers at full scale.</b></p>    |
|  <p>August 2017</p>   | <p>An early-stage UK-based concept that aims to build the world's first commercial gas power plant using CCUS and provide carbon transport and storage infrastructure for a surrounding industrial hub.</p>  | <p><b>Our investment is helping the project team to develop a commercially viable concept and basic engineering design to demonstrate the project's technical and commercial viability, for both the government and private sector to support with confidence.</b></p>    |

Impact estimates based on numbers provided by portfolio companies





**Luis Fernando Betancourt**  
Pemex

**"OGCI has built a clear pathway and structure to help fight climate change. Pemex is an enthusiastic participant."**

Julien Perez, Strategy and Policy Director (left)

## Policy and strategy workstreams

Led by senior experts from member companies, the workstreams are tasked with collective engagement and action in areas where OGCI believes it can be a valuable catalyst. Dedicated working groups, made up of small teams of experts, focus on technical solutions, engage with governments and other stakeholders in

specific countries, and prepare new themes for consideration.

The workstreams also work closely with OGCI Climate Investments to provide technical expertise and explore opportunities for targeted investments. There are currently four active workstreams, focusing on Low Emissions Opportunities, the Role of Gas, CCUS and Transport Efficiency. An Energy Efficiency workstream is under development.



© Christophe Mairesis/Corbis Pictures

# OGCI WORKSTREAMS IN 2018

## ROLE OF GAS

**FOCUS** Research and actions that help to quantify and reduce methane emissions across the oil and gas value chain.

**AIM** Ensure that natural gas can play a positive role in the energy transition.

**WHY?** Natural gas can immediately lower carbon dioxide emissions by replacing coal in the energy mix. It can support intermittent renewables by providing sufficient flexible and base-load power. Longer-term, it can be used as a feedstock for hydrogen, when combined with CCUS.

**1. METHANE TARGET** Developed OGCI's 2025 methane intensity target and started to engage with downstream operators to help reduce the methane footprint of the full gas value chain.

**2. METHANE QUANTIFICATION** Providing financial and technical support for a series of independent global methane emission studies, launched in 2017 under the auspices of the UN Climate and Clean Air Coalition and managed by the Environmental Defense Fund. These scientific studies aim to improve the quantification of methane emissions from different types of oil and gas assets.

**3. LIFE CYCLE ANALYSIS** Cooperating with Imperial College London on research that aims to provide a more accurate picture of lifecycle greenhouse gas emissions across the natural gas value chain.

**4. INVESTMENT SUPPORT** Working with OGCI Climate Investments to identify methane technology solutions.

## TRANSPORT EFFICIENCY

**FOCUS** How OGCI can be a catalyst for reducing carbon dioxide emissions from transport on a significant scale.

**AIM** Our efforts are designed to improve collaboration between manufacturers and refineries to develop optimal fuel-engine systems and to overcome barriers such as the lack of economic incentives for collaboration and disparate regulatory structures.

**WHY?** There is a sizeable opportunity to improve transport efficiency by supporting and deploying innovative technologies that focus on the interplay between fuel and engine – especially in segments such as heavy-duty vehicles where electrification is challenging.

**1. ENGAGEMENT** Organized a workshop for a range of companies in the fuels and vehicles markets (from car manufacturers to retail fuel outlets and regulators) to start exchanging ideas on how OGCI – as a group of 10 major fuel producers – could collaborate with others to develop fuel-engine system solutions that bring significant energy efficiencies at an affordable cost.

**2. TECHNOLOGY** The team is currently working with researchers to assess innovative engine-fuel system technologies for heavy-duty vehicles, identify major players in major markets and better understand the challenges they face in implementing technologies.

## CARBON CAPTURE, USE AND STORAGE (CCUS)

**FOCUS** Actions that could enable the rapid scale-up of a commercially viable, safe and environmentally responsible CCUS industry, both globally and in specific regions.

**AIM** Ensure that CCUS facilities are able to mitigate carbon dioxide emissions on the scale required to meet the Paris goals.

**WHY?** As governments develop mid-century climate strategies, many are taking a new interest in CCUS as a cost-effective and readily available way to meet climate targets.

CCUS technology can help to decarbonize industries such as cement and steel and support clean-industry clusters. CCUS with gas generation could be a valuable back up to intermittent renewable power. It could also facilitate the emergence of hydrogen and, more broadly enable net negative emissions.

**1. ENGAGEMENT** Created country-based teams that are leading engagement with governments, industries and other stakeholders on how to catalyze CCUS deployment and help to create clean-industry clusters. The teams have worked with the governments of the UK and Netherlands and are expanding to additional regions including the Arabian Gulf and China.

**2. COMMERCIALIZATION** Supported a study that analyzed the range of potential policy mechanisms available to governments to facilitate CCUS. Now participating in an innovative initiative to articulate a new narrative for CCUS based on its value and urgency for decarbonization.

**3. STORAGE** Sub-surface experts are working to assess existing storage estimates and explore what is needed in new areas, using a methodology for classifying carbon storage capacity they co-developed with the Society of Petroleum Engineers in 2017.

**4. INVESTMENT SUPPORT** Working with OGCI Climate Investments to mature specific CCUS projects through investment.

## LOW EMISSIONS OPPORTUNITIES

**FOCUS** Explore issues of relevance to mid- and long-term global emission reduction pathways.

**AIM** Provide OGCI member companies with a deeper understanding of key long-term issues and raise the level of awareness among all companies to facilitate joint climate action.

**WHY?** Over the past few years, we have identified the most impactful opportunities for OGCI member companies to collectively reduce emissions, and analyzed the implications of achieving net zero emissions in the second half of the century.

**1. ANALYSIS** Commissioned synthesis analysis to explore the potential to reduce net emissions from agriculture, forestry and other land use and enhance the ability of natural sinks to absorb greenhouse gas emissions.

**2. ENGAGEMENT** Running workshops in different parts of the world with a broad range of external stakeholders to ensure greater dialogue and understanding on all sides.

Creative energy  
through collaboration



# COMMITTED TO CLIMATE ACTION

# 2







# TACKLING THE CHALLENGE OF METHANE EMISSIONS

Photo: Bob Dudley, Chairman of OGCI at Methane Venture Day

OGCI aims to increase the scope, speed and scale of actions to help reduce manmade greenhouse gas emissions from the production and use of oil and gas in power, heating, industry and transport. Together, these account for over half of global greenhouse gas emissions associated with energy consumption, or more than 17 gigatonnes of carbon dioxide equivalent per year.<sup>1</sup> To achieve a well below 2°C goal, as called for by the Paris Agreement, annual global emissions from all sources must be at net zero in the second half of the century.

As companies, we are already focused on reducing both carbon dioxide and methane emissions from our own operations. This year we have focused our collective attention, in particular, on tackling the broader challenge of methane emissions.

Carbon dioxide is the main greenhouse gas, but manmade methane emissions – from agriculture, energy and waste – also play a significant role. Based on IPCC data,<sup>2</sup> methane in the atmosphere causes around a quarter of the global warming we’re experiencing today, even though it has a much shorter life-time in the atmo-

sphere than carbon dioxide, at around a decade. That means reducing methane emissions can have a relatively quick impact on global warming.

According to the International Energy Agency,<sup>3</sup> the energy industry is among the largest emitters of manmade methane emissions, together with agriculture. It is therefore critical that we act rapidly and transparently to help minimize both upstream and downstream emissions.

As OGCI announced last year, our intention is to move towards near zero methane emissions. We have now developed a demanding target to reduce methane intensity<sup>4</sup> in OGCI’s aggregate upstream gas and oil operations by more than one-fifth (from a baseline of 0.32%) to 0.25% in 2025, with the ambition of achieving 0.20%.

Meeting our 0.20% methane intensity ambition would imply a collective reduction in methane emissions of around 600,000 tonnes a year by 2025. That’s a contribution to meeting the Paris goals, but we have been working on reducing methane emissions for several years and our methane intensity levels are considerably lower than the IEA’s estimated average of the industry.<sup>5</sup>

1 International Energy Agency, CO<sub>2</sub> Emissions from Fuel Combustion, 2017, based on IEA estimates for CO<sub>2</sub> from fuel combustion and EDGAR version 4.3.2 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions and 4.2FT2010 for the F-gases; based on 100-year Global Warming Potential (GWP).

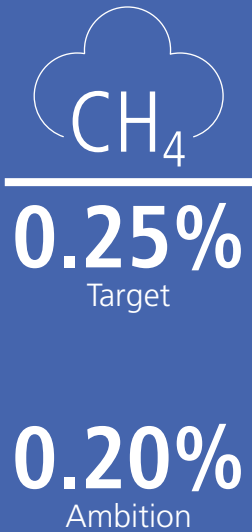
2 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), Working Group I, The Physical Science Basis, Chapter 8: Anthropogenic and Natural Radiative Forcing, pages 697-698

3 International Energy Agency, World Energy Outlook 2017

4 Methane intensity refers to the ratio of emissions to gas produced and sold.

5 International Energy Agency; World Energy Outlook 2017, Methodological Appendix, page 55





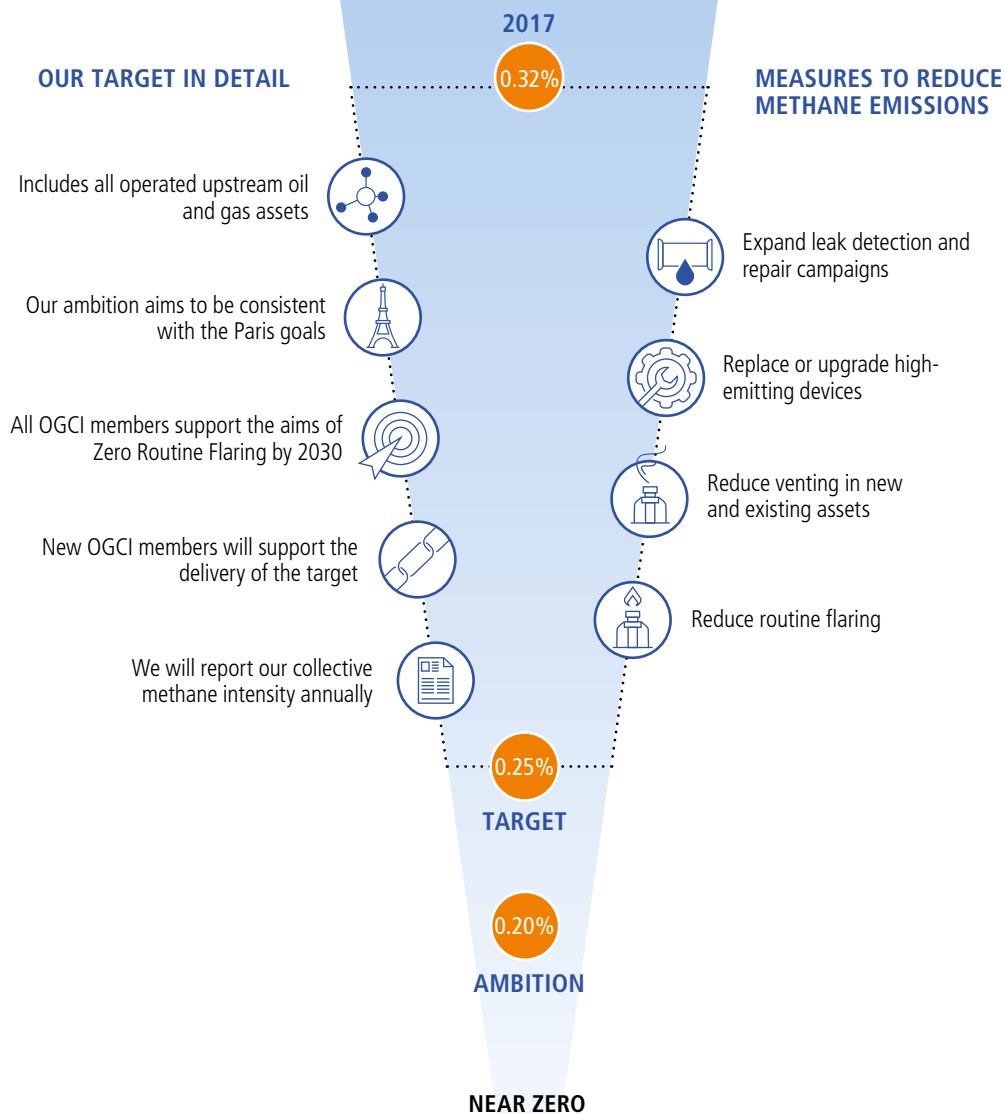
## 2025 METHANE INTENSITY TARGET

**OGCI companies set a target to reduce by 2025 the collective average methane intensity of our aggregated upstream gas and oil operations to below 0.25%, with the ambition to achieve 0.20%.**

- Our baseline in 2017 is 0.32%. It accounts for our total upstream methane emissions from all operated gas and oil assets. Emissions intensity is calculated as a share of marketed gas.
- Achieving our 0.25% intensity target level would mean that we need to reduce collective methane emissions by more than one-fifth or over 350,000 tonnes of methane annually by the end of 2025, compared with 2017 (assuming consistent levels of gas reaching the market). Reaching our ambition of 0.20% would mean reducing our collective methane emissions by more than one-third or approximately 600,000 tonnes of methane annually by the end of 2025, compared to the same reference.
- Our ambition aims to be consistent with the global attainment of the Paris goals.
- To address methane emissions from flaring, all OGCI members will be required from 2019 to explicitly support the aims of Zero Routine Flaring by 2030.
- New OGCI members will be required, on joining, to support the delivery of the target, embrace our ambition and take proactive steps to reduce emissions in their own operations.
- We will report our collective methane intensity annually on the basis of transparent reporting rules, methodology and assumptions, with data aggregated by an independent third party. We aim to progressively improve the quality of our process and data.

The data and methodology is available at:  
[www.oilandgasclimateinitiative.com](http://www.oilandgasclimateinitiative.com)

# OUR 2025 TARGET AT A GLANCE



Source: OGCI

We believe we can keep progressing by better stimulating and leveraging innovation and respective skills in this critical field, hence our target and ambition. However, if we can catalyze action in the rest of the industry, including the downstream part of the value chain, the total impact could be significantly greater. Indeed, the size of the reduction of methane emissions in our industry could potentially be at a comparable order of magnitude as the total methane emissions linked to rice cultivation, or to biomass and biofuels burning across the world.<sup>6</sup> That is why we see our target as a meaningful step towards solving the methane challenge – and a quick win in the effort to slow the pace of global warming.

## Reducing methane emissions

To reduce the OGCI’s collective methane emissions intensity, member companies will target key emissions sources through appropriate measures such as:

- Expand coverage and increase frequency of leak detection and repair campaigns.
- Replace or upgrade devices where

methane emissions are known to occur.

- Reduce operational venting in new and existing assets by collecting gas for reutilization.
- Eliminate routine flaring by 2030 by collecting gas for reutilization, and also implement high efficiency flares when flaring is necessary for safety reasons.

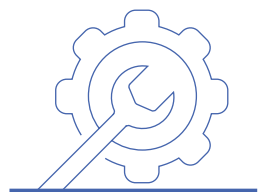
OGCI companies are among the world leaders in reducing methane emissions, an experience that will be vital in order to reach our 2025 ambition of reducing collective methane intensity by one-third.

### BP

Complementary to the OGCI ambition, BP is targeting methane intensity of 0.2% for gas marketed from its operations. In 2017, half of the company’s methane emissions came from its 9,000 onshore gas wells in the USA and it is here, especially, that BP has garnered vast experience in reduction techniques. The company has upgraded 99% of high-bleed controllers for ones that emit less methane. It is also using new technologies such as enhanced automation to reduce

6 The global methane budget 2000-2012, M. Saunio et al, Earth System Science Data, 2016

Taking the IEA’s high-end estimate of 76 million tonnes of methane emissions from the industry as a whole, the annual methane emission level for the global oil and gas value chain could be reduced by up to 25 million tonnes, given a similar effort to OGCI’s ambition for 2025. International Energy Agency, World Energy Outlook 2017



**99%**  
of high-bleed  
controllers  
upgraded at BP



**Fernando Ruiz**  
Repsol

**"Working closely with OGCI companies and experts has been key to defining our methane strategy."**

<sup>7</sup> [www.bp.com/en/global/corporate/sustainability/climate-change/case-studies/tackling-methane-in-our-lower-48-business.html](http://www.bp.com/en/global/corporate/sustainability/climate-change/case-studies/tackling-methane-in-our-lower-48-business.html)

<sup>8</sup> See Eni, Path to Decarbonization, 2017

emissions when liquid is removed from wells so gas can flow. BP is now trialling pumps powered by solar energy rather than gas, and testing the use of drones and truck-mounted sensors to detect leaks.<sup>7</sup>

### **CNPC**

Reducing upstream methane emissions from oil and gas operations is an important component of CNPC's Green Action Plan, launched in 2011. Routine flaring is now avoided in new sites as well as in existing major ones. Coverage of LDAR, which has been used comprehensively in downstream operations, is now being expanded to all CNPC operated sites. At the same time, finding ways to ensure gas recovery has become part of standard operations. Compressed natural gas integrated units are used to recover venting from remote wells that have no pipelines access, low-pressure associated gas is pressurized into gathering pipelines to make it marketable, and recovered gas is used to provide drilling power to rigs and auxiliary generators.

### **Eni**

Eni has a target to reduce upstream fugitive methane emissions by 80%

in 2025, compared to 2014 levels, an effort that is complementary to OGCI's target and ambition. By 2017, it had achieved a 66% reduction.<sup>8</sup> One reason for this success has been the strong effort in implementing LDAR campaigns, using optical gas imaging with infrared cameras. In addition to that, sizeable investment in gas infrastructure in remote areas has cut routine flaring volumes by 75% since 2007, achieving further methane emission reductions. Gas associated with oil production is now used to produce local electricity, sold or reinjected in natural gas reservoirs.

### **Equinor**

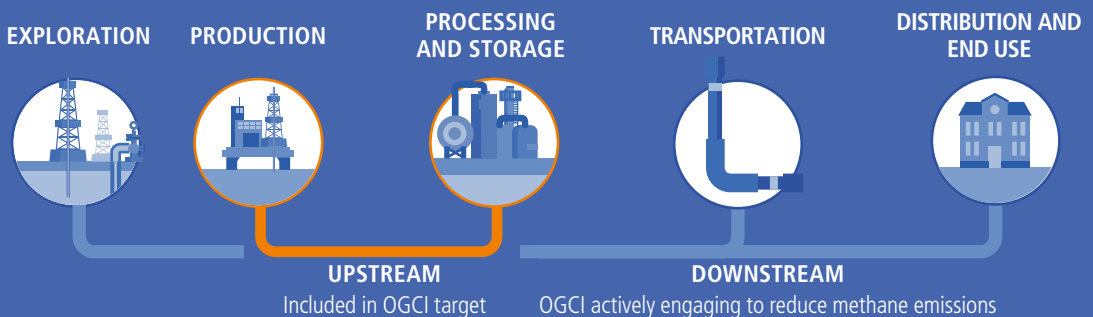
The methane intensity from Equinor's oil and gas operations is very low. This is a result of the high focus on limiting methane emissions at offshore installations due to safety risk, zero routine flaring and the low gas leakage rate from subsea welded pipelines. In 2017, Equinor extended its use of infrared cameras to its mid-stream facilities, leveraging experience gained in US onshore and Norwegian offshore assets. Equinor has also started using optical path laser spectroscopy to accelerate the detection and repair of methane

## UNDERSTANDING THE METHANE CHALLENGE

Natural gas is produced onshore or offshore and distributed to consumers by pipelines, trucks and ships. It is also present when oil is produced, sometimes in large amounts that can be marketed or used, and sometimes in smaller amounts as a by-product. Natural gas is primarily composed of methane, so when we quantify methane emissions intensities, we are evaluating how much of the natural gas that we produce is lost to the atmosphere rather than marketed or used. Methane intensity is sometimes called the methane leakage rate. Methane emissions from natural gas and oil activities largely come from three sources:

- Venting, which is the planned release of gas, where re-injection or utilization are not seen as feasible, or for unplanned emergency safety purposes.
- Incomplete combustion, including flaring where the gas is burnt off in the absence of infrastructure to collect and use it. OGCI companies are committed to reducing flaring, though it may still occur for safety reasons.
- Fugitives, which are unplanned releases in the form of leakages from equipment such as valves and pumps.

Our target covers upstream production, where we have control of operations. The diagram below defines which natural gas activities are included in our target and where we are engaging with downstream operators to reduce methane emissions.



leaks, and verify the outcome of reduction measures at onshore facilities. These optical sensors are mounted on a drone which enables assessment of individual leaks from specific equipment types as well as total emissions from an entire facility.

#### **Pemex**

In 2017, Pemex recorded a decrease of 30% in greenhouse gas emissions, compared to 2016, mainly due to an increase in the use of associated gas from three fields. The gas usage level rose to 97% in 2017, up from 91% as a result of key investments undertaken as part of a strategic plan for upstream operations that allow for greater operational flexibility in gas management and utilization, while handling greater volumes. These measures, which came into effect in 2017, included the start-up of a new gas pipeline, the replacement of pneumatic pumping by electro-centrifugal pumping and a new submarine interconnection.<sup>9</sup>

#### **Petrobras**

In 2010 Petrobras launched a major programme to increase gas utilization and reduce flaring. As a result, gas recovery is over 96% today and

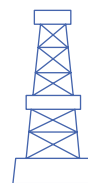
upstream flaring intensity was reduced by two-thirds between 2009 and 2017. Petrobras has recently approved a new methane mitigation programme to be implemented until 2025. It focuses on introducing better fugitive emissions control technology, while continuing to reduce flaring and venting intensity.<sup>10</sup>

#### **Repsol**

After many years of reporting and taking action to reduce methane emissions, Repsol set a new multi-year methane reduction strategy in 2018. The main focus is on venting mitigation, fugitive emissions surveys, flaring management and the retrofitting of pneumatics devices. As part of the strategy, Repsol is rolling out LDAR programmes, using an internally developed hybrid procedure. It is also substituting more than 5,000 high-bleed pneumatic devices for low-bleed ones in Canadian onshore assets.

#### **Saudi Aramco**

Since 1980, instead of flaring the gas that accompanies crude oil production, Saudi Aramco began recovering it for other higher value applications, significantly reducing emissions from



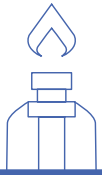
**97%**

gas usage level  
at Pemex

<sup>9</sup> [www.pemex.com/en/responsibility/sustainable/Documents/20171123\\_IS\\_2016\\_ENG\\_FINAL\\_assurance%20letter.pdf](http://www.pemex.com/en/responsibility/sustainable/Documents/20171123_IS_2016_ENG_FINAL_assurance%20letter.pdf)

<sup>10</sup> [www.investidorpetrobras.com.br/en/annual-reports/integrated-report](http://www.investidorpetrobras.com.br/en/annual-reports/integrated-report)





**80%**  
reduction in  
routine flaring  
at Total

its operations. Now, after years of investment in infrastructure, the gas is captured and used to diversify the domestic energy mix and support the petrochemical industry. Incomplete flaring is now a relatively small source of methane emissions and Aramco's focus has shifted to controlling fugitive emissions. It is implementing LDAR programmes across the entire company to identify and repair leaking equipment and components. That involves detailed process analysis, tagging millions of components, performing field surveys, repairing leaking equipment and verifying the outcome of repair results. Aramco is now assessing and introducing new methane monitoring technologies, including thermal cameras and laser detection and quantification sensors.

### **Shell**

Shell works closely with other companies to reduce methane emissions. In addition to OGCI, it is part of the Environmental Partnership of 45 US-based companies, which are focusing initially on implementing best practice LDAR programmes, replacing high-bleed pneumatic controllers with low or zero-emitting devices and minimizing

emissions associated with the removal of liquids from wells. Shell is also an active member of the Methane Detectors' Challenge, designed to get next generation detection technology to market more quickly. It is currently piloting a methane detector that uses sensors to continuously monitor methane emissions in shale sites.<sup>11</sup>

### **Total**

Total has been reporting methane emissions since 2006. In 2017, emissions from oil and gas operated production were less than 0.3% of gas sold. Its intention is to sustainably decrease and hold emissions intensity below 0.2%, in consistency with OGCI's ambition. Total's current intensity level was achieved through an ambitious programme which reduced global flaring by 67% between 2005 and 2017 and cur routine flaring by more than 80%. Further reduction efforts will continue to eliminate routine flaring by 2030, as part of Total's commitment to the World Bank Zero Routine Flaring initiative.

11 [theenvironmentalpartnership.org](http://theenvironmentalpartnership.org)

[edf.org/methane-detectors-challenge](http://edf.org/methane-detectors-challenge)

12 International Energy Agency, World Energy Outlook 2017, page 414.

## The full gas value chain

OGCI's target for our own upstream production facilities is important, but our aim is to work towards near zero methane emissions from the full gas value chain, including transport and distribution to final customers (downstream), which in most cases we do not own or control. We are currently working to estimate and improve the methane emissions intensity of the key gas value chains associated with OGCI member company production.

The collective intensity of our upstream gas operations was 0.25% in 2017 (this is different from the 0.32% baseline because it only takes into account methane emissions from assets where marketed gas is produced and/or processed.) IEA research suggests an emission intensity threshold of 3% is needed for natural gas to retain its climate advantages over coal when burnt for power. Today, the IEA estimates, the global average intensity for the full gas value chain is 1.7%, which is well below the 3% threshold.<sup>12</sup>

Beyond working on our part, we have begun to engage with operators of downstream gas value chains and we are committed to working closely



**Omar S. AbdulHamid**  
Saudi Aramco

**"Our collective experience and expertise makes us confident in our ability to address the greenhouse gas challenge."**

with them to stimulate the development of actions that would help them improve quantification and reduce their methane emissions in downstream operations.

### Initiatives

As part of our methane reduction endeavour, we are developing a work plan with external downstream operators. Our aim is to actively engage with the full value chain, including initiatives such as:

- Work together with downstream operators to improve quantification and reporting standards for methane performance across the gas value chain
- Share best practice and information on new technologies to control methane emissions with downstream operators
- Support OGCI Climate Investments start-up companies to deploy methane reduction technologies in downstream operators
- Introduce schemes to recognise improved methane performance

In the coming year, we also intend to develop a similar action plan for engaging with our joint venture part-

Aerial monitoring of methane emissions by Kairos Aerospace



© Kairos Aerospace



**Pratima Rangarajan**  
 Chief Executive Officer  
 OGCI Climate Investments

**"CI is not just an investment fund - we work with OGCI members to test and deploy our new technologies."**

<sup>13</sup> Sauniois et al 2016, ESDD; Kirschke et al, 2013, Nature Geo; IPCC 2013 5AR; Voulgarakis et al, 2013

<sup>14</sup> [www.ccoalition.org/en/activity/oil-and-gas-methane-science-studies](http://www.ccoalition.org/en/activity/oil-and-gas-methane-science-studies)

ners, with the aim of raising standards across the industry.

## Quantifying methane emissions

The amount and concentration of methane in the atmosphere are known and generally acknowledged to be correct.<sup>13</sup> Scientists do not have clarity, however, about the main drivers behind the growth in methane concentration, and that lack of knowledge makes it difficult to prioritize actions to stop it. As an industry, we also do not have a clear view of the main emitting sources on a global scale across the sector. That is why we are supporting independent research to better understand methane emissions in different regions and types of operations around the world.

Getting to a clearer understanding requires a transparent and credible partnership between independent scientists and emitters, so that researchers can quantify known man-made sources and identify previously unknown ones. Since 2017, OGCI has been working closely with the UN Climate and Clean Air Coalition and

the Environment Defense Fund (EDF) to support a structure that will allow this partnership to develop on a global scale for oil and gas operations.

Most independent methane emission studies to date have focused on US onshore oil and gas facilities. Their findings show wide variances across operations, with a few large emitters pushing overall levels higher than originally estimated, but it is not known how far their findings can be extrapolated more generally. To fill some of the gaps, OGCI is supporting a series of peer-reviewed studies, conducted in different parts of the world and targeting different types of oil and gas facilities, with the aim of helping companies and governments prioritize actions and policies to reduce methane emissions.<sup>14</sup>

Several teams of independent scientific researchers have been given the funding and flexibility to measure emissions wherever they expect to find them, based on the outcome of a phase 1 mapping study carried out by the National Energy Technology Laboratory and the International Energy Agency. The studies use multiple methodologies – ground-based, by air, by sea – and collect data on differ-

ent types of infrastructure and age of facilities to allow a better understanding of what is behind the measured emissions.

The first tranche of studies is underway, each run by separate teams of scientists and coordinated by the Chief Scientist of EDF. One team has run flights at different altitudes across production and refinery operations in and adjacent to the Gulf of Mexico, measuring methane, ethane and carbon dioxide concentrations, while taking air samples to enable a better separation between fossil and biogenic methane.

A separate team has made ship-based studies of the same region. A third team has worked on British and Dutch infrastructure in the southern North Sea, looking for high-emission hot spots to better understand the emissions from these specific offshore installations.

Efforts are also underway to take measurements on a number of liquefied natural gas value chains, as well as to measure emissions from mid-stream and downstream operations in several European regions, the Middle East and Australia, selected to enable comparisons with the US findings.

## Investing in innovation

Achieving near-zero methane emissions will require technological innovation to provide comprehensive detection and early mitigation of detected leakages. That is why OGCI Climate Investments decided to issue a call for proposals to proactively identify and support technologies focusing on the detection, measurement and mitigation of methane emissions.

Offering a total of \$20 million in investment, along with our expertise and opportunities to pilot deployment for selected technologies, we received 56 applications, which were screened on the basis of technical, commercial and climate impact criteria. Ten companies were selected to present their cases in front of around 100 potential investors and deployment companies at a Venture Day in Washington DC during the World Gas Conference in June 2018.

We have selected two of these companies for initial investment, with more still in the pipeline. One of these is Clarke Valve, a US company founded in 2011 that has used aerospace design techniques to develop a control valve that is low-cost and virtually eliminates fugitive methane emissions.

We are hoping to accelerate deployment through OGCI member companies. The other is Kairos Aerospace, a California-based company founded in 2014 that uses its own sensors and software to provide actionable data on major sources of methane emissions from aerial surveys. We are aiming to help them expand their geographical coverage.

### Next steps

Next year, we will report on our efforts and progress towards executing the methane intensity target, the results of our engagement with the downstream industry, the findings of the first methane quantification studies and our progress in helping to develop and deploy the new methane technologies we have invested in.



© Christie's





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# ACCELERATING DECARBONIZATION THROUGH CCUS



**Song Lei**  
CNPC

**"Collaboration with OGCI's experts helps us – especially the younger generation – to address climate together."**

To achieve the well below 2°C goal embraced by the Paris Agreement, annual global greenhouse gas emissions from all manmade sources must be reduced rapidly in the coming decades. This will require a substantial increase in renewables, energy efficiency and gas consumption. Remaining emissions that cannot be absorbed by natural means must be captured and used or safely stored in order to reach a level of net zero in the second half of the century.

OGCI aspires to play a major role in the emergence of a commercially viable, safe and environmentally responsible carbon capture, use and storage (CCUS) industry contributing significantly to the goals of the Paris Agreement and to several of the UN Sustainable Development Goals.

There is a growing recognition that CCUS is a potentially cost-effective and readily available way to decarbonize large parts of the economy. CCUS is especially important for industries, such as steel or cement, where carbon emissions are produced as part of the industrial process. The availability of capture and storage infrastructure could potentially enable a regeneration of industrial areas, by helping

existing companies to preserve value and jobs as they decarbonize, and attracting new clean-tech businesses to CCUS hubs. CCUS can be used with gas in the power sector, providing low carbon back-up to intermittent renewables. It can also facilitate the widespread use of zero-carbon hydrogen in power, transport, industry and heating, and provide the infrastructure for net-zero or negative emissions technology (such as direct air capture or bio-energy CCS).

Only 30 million tonnes of carbon dioxide are currently captured and stored or used each year. To remain on track to reach the well below 2°C goal, the world needs to capture, store or use some 850 million tonnes of carbon dioxide annually by 2030, according to the International Energy Agency.<sup>15</sup> That means a 25-fold increase in current CCUS activity.

OGCI aims to help realize the full potential of CCUS. That requires the creation of a commercially viable, safe and environmentally responsible CCUS industry, based on a circular carbon model, in which remaining carbon dioxide emissions generated from energy production or process activities can be locked into products or stored.

<sup>15</sup> International Energy Agency, Tracking Clean Energy Progress 2018

Photo: CCUS is one of OGCI Climate Investments' priorities

**OGCI at work**

Committed to climate action

Our industry has the collective expertise, resources and motivation to play a leading role. We are already in action. Of the 17 CCUS facilities in operation today, 16 involve oil and gas companies, including five operated by OGCI members. In addition, OGCI's billion-dollar fund, Climate Investments, has CCUS as one of its priorities.

**Local engagement**

As countries work on their mid- to long-term decarbonization strategies, there is a growing recognition of the need to move beyond a narrow view of climate action, based largely on renewables and electrification, to a more comprehensive one that addresses the economic impact of fully achieving the Paris goals. In particular, there is a growing awareness of the need to ensure that measures designed to implement climate targets in one country do not just push industrial companies to relocate or go out of business.

From this perspective, some governments are starting to consider CCUS as a valuable building block in their broader decarbonization effort, and one that can support the devel-



**Julien Perez**  
Strategy and Policy Director  
OGCI

**"We bring to climate action an unprecedented combination of technical expertise, international presence, support for research and innovation, investment capacity and deployment opportunities."**

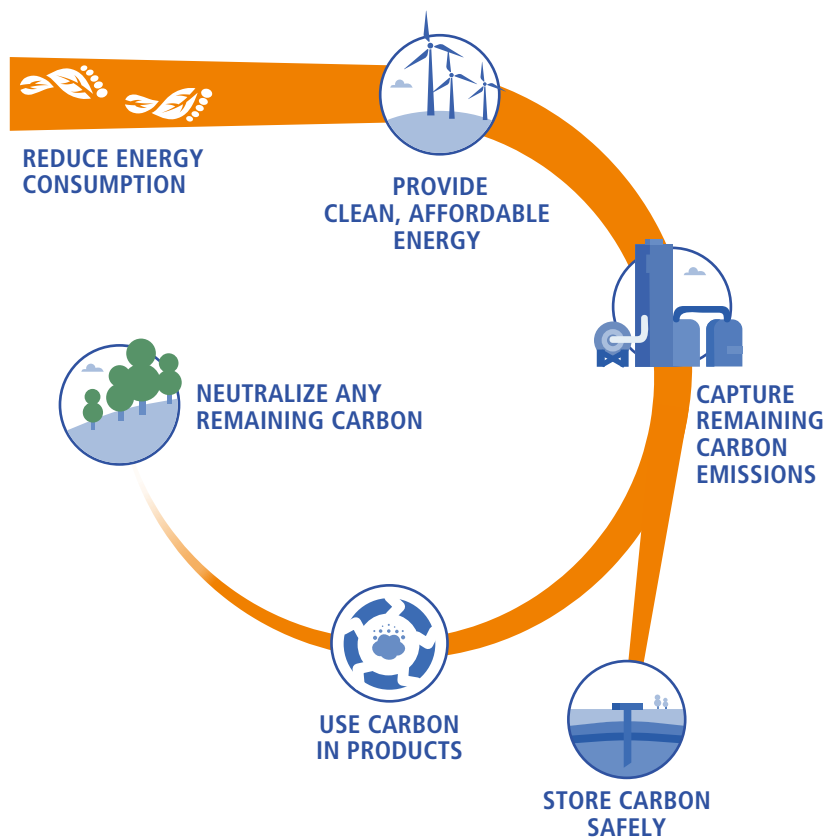
opment of competitive low carbon industries that will be necessary to underpin regional development and create jobs for the future.<sup>16</sup>

In the **Netherlands**, for example, the government aims to make CCUS a key component of its plan to reduce industrial emissions by 2030, so it can achieve its target of reducing carbon dioxide emissions by 49% over 1990 levels.<sup>17</sup> Its focus on CCUS for industry is based on government research<sup>18</sup> showing that electrification alone could not decarbonize heavy industry, which accounts for over 30% of carbon dioxide emissions, quickly enough to reach its target. The main focus is likely to be on refineries, steel production and hydrogen production from gas. A number of OGCI member companies have participated in the consultative process to reach consensus around climate policy. OGCI is engaged with a number of key stakeholders and is available to support their plans going forward.

In the **UK**, the government sees CCUS as an opportunity to regenerate industrial areas, gain competitive advantage as a technology leader and meet targets to reduce greenhouse gas

## TOWARDS CIRCULAR CARBON

We are taking our first steps towards developing a circular carbon model, where energy resources are used highly efficiently to reduce emissions, while remaining carbon dioxide is captured and used, stored or neutralized through offsets or investment into natural sinks.



16 Zero Emissions Platform (ZEP), Role of CCS in a below 2 degrees scenario, July 2018

17 [www.rijksoverheid.nl/documenten/publicaties/2017/10/10/regeerakkoord-2017-vertrouwen-in-de-toekomst](http://www.rijksoverheid.nl/documenten/publicaties/2017/10/10/regeerakkoord-2017-vertrouwen-in-de-toekomst)

18 Netherlands Environmental Assessment Agency (PBL), Kosten Energie – en Klimaattransitie in 2030 – Update 2018



© Christophe Mairets/Canva Pictures

emissions by 80% on 1990 levels by 2050.<sup>19</sup> The Department for Business, Energy and Industrial Strategy set up a Cost Challenge Task Force, with active OGCI participation.

The taskforce's final report, published in July 2018, stressed the importance of:

- focusing on CCUS in industrial clusters to create new low carbon industry regions that can take advantage of economies of scale and that will attract new low carbon businesses
- creating separate business models for capture and for transport and storage infrastructure to realize value and lower costs
- enabling early investment in different carbon capture applications.

On the back of this progress, the Clean Gas Project, a UK project concept acquired by OGCI Climate Investments in 2017 from the UK Energy Technologies Institute, has begun to engage with industrial and government stakeholders in the Teesside region to put a cluster in place that aims to ensure demand for the carbon transport and storage infrastructure provided. A decision on further financial investment will be made after the

Photo: CNPC's Song Lei discussing a workshop on commercializing CCUS in China

government announces its intentions for CCUS, clarifying the viability of the project. At this stage, OGCI will seek co-investment for the detailed engineering (FEED) and project investors for the build phase.

In the **Middle East**, oil producing countries are exploring the potential of ramping up their CCUS activities to accelerate the development of a diversified clean manufacturing industry. The aim is to achieve both national diversification and global climate goals.<sup>20</sup> OGCI will hold a workshop in Saudi Arabia in November 2018, bringing together government and industry leaders to discuss how OGCI might support their efforts for CCUS in the Gulf region.

In the **USA**, the extension of enhanced 45Q tax credits this year – \$50 per tonne for carbon captured and stored and \$35 a tonne for associated storage through enhanced oil recovery brought entrepreneurial energy into the CCUS world. The principle of giving carbon a value could help bridge the commercial gap needed to deploy CCUS projects. The USA is already a significant player accounting

for over half of the large-scale CCUS projects currently operating. A number of OGCI member companies are also actively participating in the National Petroleum Council CCUS project, commissioned at the request of the US Secretary of Energy.

## Next steps

As we explore how OGCI member companies can best be a catalyst for CCUS over the coming year, we will look at a broad range of potential areas. These include unlocking and de-risking storage capacity, investing in projects, helping to develop policy mechanisms and mobilize capital, and supporting critically important R&D and technology. Our aim is to cooperate closely with governments, industries and financial institutions to design solutions that are technically feasible, economically viable, safe and at sufficient scale to have an impact on climate change.

<sup>19</sup> [www.gov.uk/government/publications/clean-growth-strategy/clean-growth-strategy-executive-summary](http://www.gov.uk/government/publications/clean-growth-strategy/clean-growth-strategy-executive-summary)

<sup>20</sup> Communication from Saudi Aramco

Developing a common data methodology for methane intensity





# OGCI PERFORMANCE DATA

# 3



# OGCI DATA REPORTING

This year marks a step-change in OGCI’s data reporting. For the first time, all 10 member companies have been able to provide the bulk of data requested using a common methodology, enabling us to produce full aggregate OGCI data for most indicators.

We have also introduced three new intensity indicators – for greenhouse gases (GHGs), upstream methane emissions and gas flaring – that will allow us to monitor progress as we incorporate data from new members in future. Absolute numbers will continue to be reported where they contribute to understanding.

When OGCI was set up in 2014, a number of member companies either did not collect the requested data or did not have the ability to release it. Close collaboration within the OGCI data group to align reporting definitions and share quantification methods has played a significant role in

helping members to progressively improve the way they quantify their emissions performance. Data is now collected, anonymized and aggregated by an independent third party, EY, contracted by OGCI.

For all OGCI members, GHG data, including methane emissions, has been produced using internationally recognized best practices for GHG accounting and reporting. In future, OGCI members will work to expand independent third party verification on data published in the annual report.

The addition of new contributors, as well as additional data points, has generated some challenges in showing consistent trends over time and we aim to improve this aspect moving forward. Having data from all 10 companies has meant, however, that we are now able to start leveraging key data points to set targets, monitor progress and improve performance.

**ABBREVIATIONS:**

|                    |  |
|--------------------|--|
| Mboe/day           | Million barrels of oil equivalent per day    |
| Mm <sup>3</sup>    | Million cubic metres                         |
| ktCO <sub>2e</sub> | Thousand tonnes of carbon dioxide equivalent |
| Mtoe               | Million tonnes of oil equivalent             |
| MtCO <sub>2</sub>  | Million tonnes of carbon dioxide             |
| MtCH <sub>4</sub>  | Million tonnes of methane                    |

Aggregate OGCI data is also available on our website at [oilandgasclimateinitiative.com](http://oilandgasclimateinitiative.com)



## OIL AND GAS PRODUCTION

The 10 companies were able to provide a full set of production data. Compared to production data published in last year's report, the inclusion of new OGCI data contributors has increased aggregate oil and gas production, but overall for the 10 OGCI member companies, operated oil production declined slightly in 2017, while operated gas production remained stable. OGCI member companies now represent around 25% of the global oil and gas industry and 15% of total primary energy demand.<sup>1</sup>

The share of natural gas in operations has fallen, compared to data published last year, since all new data contributors have a smaller percentage of gas in their overall production. The gas share in OGCI's operated portfolio was 29% in 2017. OGCI companies represent almost 20% of global natural gas production.

### Notes:

1 According to data from IEA WEO-17, global oil and gas production in 2016 was 158 mboe/day. Oil production in 2016 was 95 mboe/day, natural gas production was 63 mboe/day (calculated at a conversion rate of 1bcm to 0.017399 mboe/day). Total global energy consumption in 2016 was 275 mboe/day (calculated at a conversion rate of 1 mtoe to 0.019985 mboe/d). OGCI member companies' share of total oil and gas production is 26% on an operated basis and 23% on an equity basis. The share of total global energy consumption is 15% on an operated basis and 13% on an equity basis.

2 Operated production refers to total output that is produced under a company's control and responsibility.

3 Equity production means total output in operations that are owned by a company (calculated according to its ownership share)

| OGCI Indicators   | Unit   | 2015 | 2016 | 2017 |
|---|--|------|------|------|
|   | (number of companies providing data if not all 10) |      |      |      |
| Total OGCI oil production (operated)                      | M boe/day  | 28.7 | 29.7 | 29.1 |
| Total OGCI gas production (operated)                      | M boe/day  | 11.2 | 11.7 | 11.7 |
| Total OGCI oil and gas production (operated) <sup>2</sup> | M boe/day  | 39.9 | 41.4 | 40.8 |
| Share of natural gas in OGCI operated portfolio           | %  | 28.0 | 28.3 | 28.7 |
| Total OGCI oil and gas production (equity) <sup>3</sup>   | M boe/day  | 34.9 | 36.9 | 37.2 |



## GREENHOUSE GAS EMISSIONS

For greenhouse gas emissions, eight of the 10 companies were able to provide data over three years, while two additional companies provided it for 2017 only.

Upstream greenhouse gas (GHG) intensity showed a sharp fall in 2017, although aggregate absolute GHG emissions rose as more contributors provided data. Upstream GHG intensity, a new indicator for OGCI that was introduced to monitor the climate performance of our upstream operations, currently stands at 143ktCO<sub>2</sub>eq/Mtoe, down from 172 in 2016, due largely to the inclusion of two new data contributors with a significantly lower upstream GHG intensity.

Nevertheless, the eight companies reporting data in 2016 also showed a decline of 10% in their absolute upstream GHG emissions in 2017 compared to 2016. This was largely due to major investments in upstream energy efficiency and a significant reduction in the volume of flaring.

Notes:

1 This figure includes direct emissions (Scope 1) from all relevant operated activities (upstream, downstream, petrochemical etc, where these are operated by the company) and the relevant GHGs (CO<sub>2</sub>, CH<sub>4</sub> and, when relevant, N<sub>2</sub>O). The GWPs used for conversion are 25 (CH<sub>4</sub>) and 298 (N<sub>2</sub>O).

2 Upstream activities comprise all operations from exploration to production and gas processing (up to the first point of sale), including LNG liquefaction plant.

| OGCI Indicators  | Unit   | 2015    | 2016    | 2017 |
|--|--|---------|---------|------|
|  | (number of companies providing data if not all 10) |         |         |      |
| Upstream GHG Intensity   | ktCO <sub>2e</sub> /Mtoe                           | 172 (8) | 172 (8) | 143  |
| Total operated greenhouse gas emissions - all sectors <sup>1</sup> | MtCO <sub>2e</sub>                                 | 372 (8) | 362 (8) | 601  |
| <i>of which: upstream<sup>2</sup></i>                              | MtCO <sub>2e</sub>                                 | 183 (8) | 184 (8) | 292  |



## METHANE EMISSIONS

As part of our work in setting a methane intensity target this year, we have standardized data collection on operated upstream methane emissions from both oil and gas production. This precise data is only available for 2017. We do, however, have total methane emissions (all sectors) for eight companies for the three years.

The methane intensity level for upstream oil and gas operations is measured as a share of natural gas delivered to market. This intensity is currently at 0.32% and will be monitored closely as we target a maximum of 0.25% by 2025, and aim to reach 0.20%.

Taking into account only the eight companies that reported in 2016, there has been a 19% decrease in total methane emissions from all sectors. This is partly the result of a reporting improvement, but equipment upgrades and boundary changes have also improved performance.

### Notes:

1 This indicator is the tracker for OGCI's 2025 upstream methane target. It includes total upstream methane emissions from all operated gas and oil assets. Emissions intensity is calculated as a share of marketed gas.

2 This figure includes relevant operated activities (upstream, downstream, petrochemicals etc), where these are operated by the company).

| OGCI Indicators   | Unit   | 2015     | 2016     | 2017 |
|---|--|----------|----------|------|
|   | (number of companies providing data if not all 10) |          |          |      |
| Upstream Methane Intensity <sup>1</sup>                     | %  | na       | na       | 0.32 |
| Total operated methane emissions - upstream                 | M tCH <sub>4</sub>                                 | na       | na       | 1.76 |
| Total operated methane emissions - all sectors <sup>2</sup> | M tCH <sub>4</sub>                                 | 1.06 (8) | 1.23 (8) | 1.86 |



## FLARING

Flaring is one area that has seen major improvement in 2017. Upstream flaring intensity more than halved in 2017, again partly due to new data contributors with very low flaring intensity. Nevertheless, the eight companies that provided historical data also saw a drop in total upstream flaring volumes of 17% in 2017, compared to 2016, largely due to measures to stop routine flaring. On a constant basis, GHG emissions from flaring fell by 23%.

Notes:

1 Upstream Flaring Intensity is calculated on the basis of the volume of gas flared per million tonnes of oil equivalent produced on an operated basis.

2 The anomaly in 2016, whereby flaring volumes fell but flaring GHG emissions rose, is a result of a reporting requirement on combustion efficiency that was imposed in 2016 in one country. The 2017 figures are in line with international standards.

| OGCI Indicators                                  | Unit   | 2015       | 2016       | 2017   |
|--|--|------------|------------|--------|
|  | (number of companies providing data if not all 10) |            |            |        |
| Upstream Flaring Intensity <sup>1</sup>          | Mm <sup>3</sup> /Mtoe                              | 17 (8)     | 16 (8)     | 7      |
| Total natural gas flared - upstream <sup>2</sup> | Mm <sup>3</sup>                                    | 17,631 (8) | 17,257 (8) | 14,888 |
| Flaring GHG emissions - upstream                 | MtCO <sub>2e</sub>                                 | 51 (8)     | 53 (8)     | 44     |



## INVESTMENT AND R&D IN LOW CARBON TECHNOLOGIES

All 10 companies have started to provide data on low carbon energy investment and we aim to break this data down further in coming years. In 2017, OGCI companies invested \$5.5 billion in low carbon energy projects and acquisitions (in addition to OGCI Climate Investments). Outside of renewable energy and CCUS, other significant areas were energy efficiency, hydrogen and storage.

In addition, research & development (R&D) spending in low carbon energy (reported by eight companies) now accounts for over a quarter (27%) of total R&D expenditure, reaching almost \$800 million in 2017. A preliminary breakdown shows that half of low carbon R&D focuses on renewables and a quarter on carbon capture, use and storage.

### Notes:

1 Low carbon energy technologies include but are not limited to: energy efficiency, wind, solar and other renewables, CCUS, hydrogen, biofuels, energy storage and sustainable mobility

2 R&D spending is additional to investment.

Additional information is available on our website at [oilandgasclimateinitiative.com](http://oilandgasclimateinitiative.com)

| OGCI Indicators   | Unit   | 2015      | 2016      | 2017    |
|---|--|-----------|-----------|---------|
|   | (number of companies providing data if not all 10) |           |           |         |
| Total investment in low carbon energy technologies <sup>1</sup> | \$ million   | 3,704 (6) | 4,859 (5) | 5,525   |
| <i>of which: acquisitions</i>                                   | \$ million   | 114 (1)   | 809 (1)   | 276 (7) |
| R&D expenditures on low carbon technologies <sup>2</sup>        | \$ million   | 843 (7)   | 640 (7)   | 773 (8) |
| Low-carbon R&D as a share of total R&D spend                    | %  | 21 (7)    | 24 (7)    | 27 (8)  |



# GLOSSARY

## **Carbon Capture, Use and Storage (CCUS)**

A range of technologies that prevent carbon dioxide from reaching the atmosphere. Carbon dioxide is emitted by the burning of fuels and from some industrial processes like curing cement or making steel. With CCUS, the carbon dioxide is separated from other emissions (Capture) and can be locked into products (Use) or transported and stored safely underground (Storage).

## **Decarbonization**

The process by which countries and companies aim to achieve a low-carbon economy in order to reduce manmade greenhouse gas emissions and so prevent the irreversible impacts of global warming, in line with the Paris Agreement objectives.

## **Flaring**

Combustion of excess gas during production for safety reasons, operational needs (such as start-up and maintenance) or in the absence of sufficient facilities or amenable geology to re-inject the produced gas, use it on-site, or dispatch it to a market.

## **Global warming**

Global warming is the gradual increase in surface temperature as a result of the radiative or “greenhouse” effect of manmade emissions. Global Warming Potential (GWP) is a way of expressing the warming impact of different greenhouse gases, relative to carbon dioxide. It is expressed over a specific time period to reflect the amount of time different gases remain in the atmosphere.

## **Greenhouse gases (GHG)**

The key energy-related greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). They are measured in carbon dioxide equivalents, using GWPs of 25 for methane and 298 for nitrous oxide. GHG Intensity measures the volume of greenhouse gas emissions as a share of hydrocarbon production.

## **Leak Detection and Repair (LDAR)**

These are programmes that identify high-bleed equipment, detect leakage points, perform necessary repairs and monitor performance. In some countries, LDAR is obligatory, but in most it is a voluntary effort.

|   |  |
|---|--|
| <b>Methane</b>                                | Methane is the main component of natural gas and when burned, it becomes carbon dioxide and water. Although methane has a relatively short life time in the atmosphere (around a decade) it has a high Global Warming Potential. Methane intensity, for the OGCI target, refers to the volume of methane emissions in upstream gas and oil operations as a percentage of the volume of the gas delivered to market.                        |
| <b>Negative Emissions Technologies (NETs)</b> | Technologies that have the effect of reducing the concentration of carbon dioxide in the atmosphere. Currently at a pilot stage of development, these technologies capture and storing carbon dioxide directly from the air or from the combustion of biomass. They are considered to have a negative or net negative impact because more greenhouse gases are stored than released into the atmosphere through the use of the technology. |
| <b>Net zero</b>                               | The sum of greenhouse gas sources is equal to the amount absorbed by forests, oceans, soil and other natural systems (or sinks). This is also called carbon neutrality.  |
| <b>Operated production</b>                    | Oil and gas production coming from assets that are operated by an OGCI company, meaning it has operational control and has specific reporting routines and standards on the corresponding asset.   |

**Legal disclaimer**

While all OGCI member companies have contributed to the development of this report, the views or positions it contains may not fully reflect the views of a particular OGCI member company. Similarly, this report does not cover all relevant activities of OGCI member companies; nor do all member companies participate in all of the activities described.

**Cautionary statement**

This document contains certain forward-looking statements – that is, statements related to future, not past events and circumstances – which may relate to the ambitions, aims, targets, plans and objectives of OGCI and/or its member companies – as well as statements related to the future energy mix. Forward-looking statements involve risk and uncertainty because they relate to events and depend on circumstances that will or may occur in the future and are outside of the control of OGCI and/or its member companies. Actual results or outcomes may differ from those expressed in such statements, depending on a variety of factors.



## What is OGCI?

The Oil and Gas Climate Initiative is a CEO-led initiative which aims to lead the industry response to climate change. Launched in 2014, its members pool expert knowledge and collaborate on action to reduce greenhouse gas emissions. Our billion-dollar fund, OGCI Climate Investments, supports the development, deployment and scale-up of technology and business models that lower the carbon footprint of the energy and industrial sectors.



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