



Introduction to OGCI

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OUR MEMBER COMPANIES



ExxonMobil



أرامكو السعودية
saudi aramco



OGCI at a Glance



ENERGY PRODUCTION

49 million
barrels of oil equivalent
per day¹



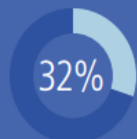
GREENHOUSE GAS EMISSIONS

724 million
tonnes of carbon dioxide
equivalent per year²



LOW CARBON INVESTMENTS

US\$6.5 billion
aggregate investment in low-
carbon technologies and R&D³



of global oil and gas
production



of global energy
demand



share of global
greenhouse gas
emissions²



drop in upstream methane
emissions in 2018



collective commitment
through OGCI Climate
Investments

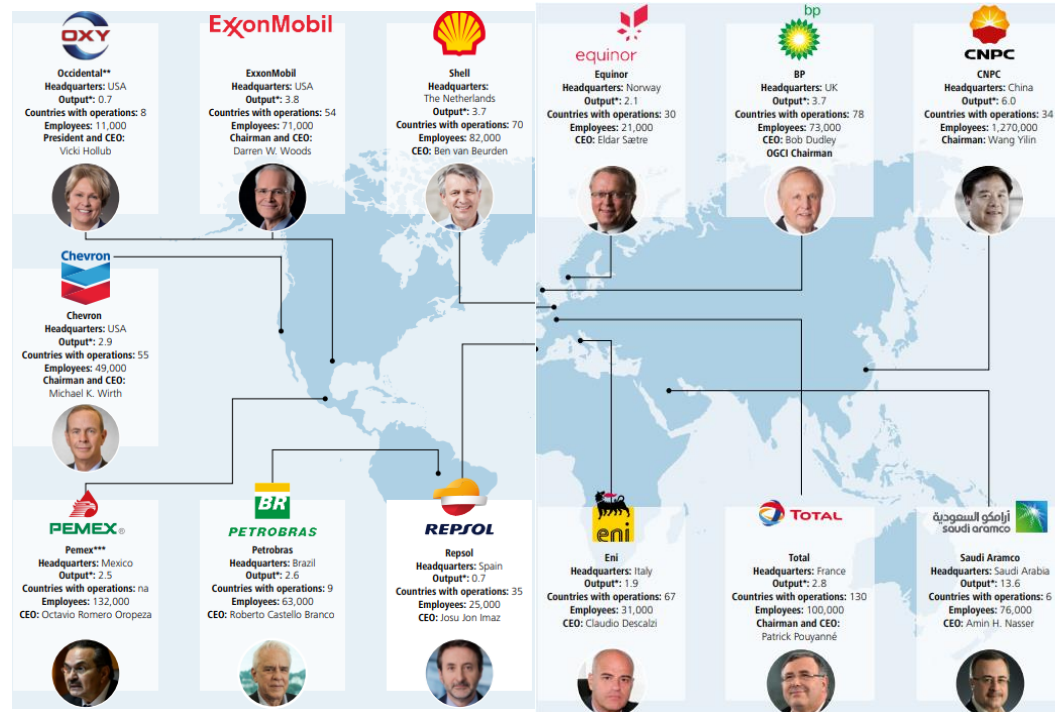


investments in
portfolio of OGCI
Climate Investments

¹ Operated production 2018 for 13 member companies

² Member companies' aggregated upstream and downstream emissions (Scope 1)

³ Data from seven companies



Bob Dudley
Chairman, OGCI



Jerome Schmitt
Chair, OGCI Executive Committee



Pratima Rangarajan
CEO, OGCI Climate Investments

THE INITIATIVE : LOWER CARBON VIA COLLECTIVE ACTION & PARTNERSHIPS



- CEO-led
- Voluntary
- Ambitious
- Additional
- Action oriented



Paris
Agreement

Our Focus

CCUS

Role of
Gas

Transport

Energy
Efficiency

Low Emission
Opportunities

Natural
Climate
Solutions

CLIMATE INVESTMENTS : LOWER CARBON VIA INVESTING IN SOLUTIONS



- Invest
- Implement
- Achieve impact at a global scale



Reduce methane emissions through detection, measurement & mitigation

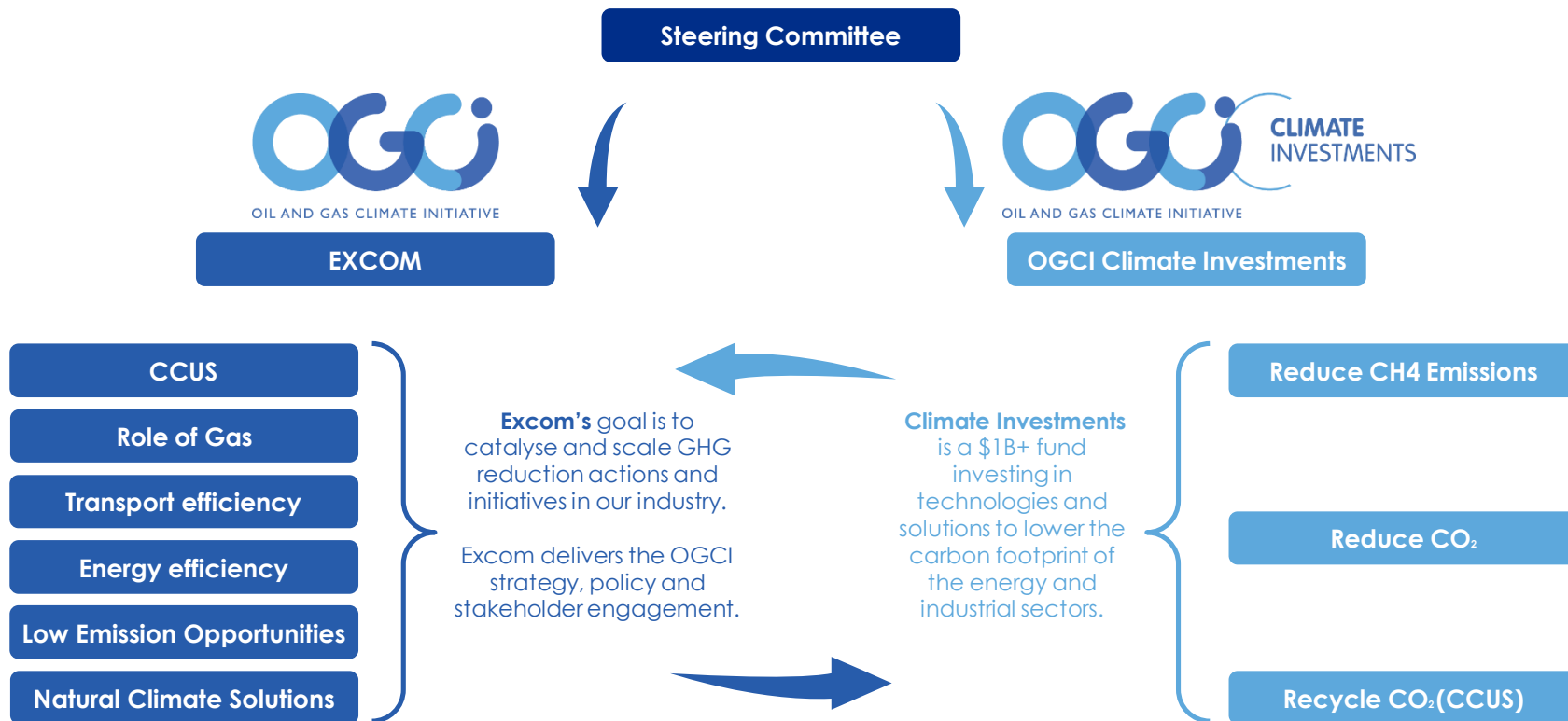


Reduce carbon dioxide emissions, by increasing energy efficiency in power, industry and transport



Recycle and store carbon dioxide (CCUS) in applications such as industrial processes and power generation

OGCI current operating structure



Roadmap: Focus on Delivering Key Actions

**Launch of Climate Investment
& Joint Reporting**

*Invest & deploy decarbonization solutions –
Continue joint reporting & third party verification*

**Methane Intensity Target
announced**

Delivery of methane target

**CCUS Kickstarter launch and CEM -
OGCI partnership announcement**

*Catalyse hubs and
accelerate policy developments*

**Methodology/baseline for
upstream carbon intensity**

*Target for upstream
carbon intensity*

**2020: “Year of
Transport”**

*Collaborative action
plans to accelerate
sustainable transport*

2017

2018

2019

2020

2021

OGCI Climate Investments Portfolio



Reduce methane emissions in oil & gas



(methane satellite)



(methane by aerial surveys)



Seek Ops
(methane sensors)



Kelvin

(O&G system controls)



(leak free valves)



Qnergy

(Stirling engine generators & air compressor systems)



Reduce carbon dioxide emissions in energy & industrial



75F (Building control systems)

(electrode molten steel process)

BOSTON METAL

achatesPOWER
Fundamentally Better Engines

(gasoline engine enhancements)

(after-market truck hybridization)



ONTRUCK

(digital trucking logistics platform)

(mechanical rotor sails for aux propulsion)



NORSEPOWER



Recycle and store carbon dioxide in energy & industrial (CCUS)



(CO2 to cement)

SOLIDIA

(CO2 to polymers) **ECONIC**

Svante

(Novel rotating adsorbent wheel for CO2 capture)

(4 MTPA CCS in UK)



Net Zero Teesside



(1.5 MTPA CCS in US CCGT)



Elk Hills Carbon LLC

(1 MTPA CCS in California)



(1.5 MTPA CCS from coal gasifier in Indiana)

Reducing methane emissions to near zero

1. Increase transparency & accuracy of Methane (CH₄) emissions by carrying scientific studies with Environmental Defence Fund & UN Environment Programme as part of the Climate and Clean Air coalition, as well as Stanford through the CCAC & Imperial College London; Supporting the World Bank & Colorado School of Mines as part of the Global Gas Flaring Reduction Partnership with satellite calibration data

2. Continue methane emission reductions to meet the methane intensity target by 2025 by:
Carrying extensive detection and measurement campaigns across OGCI member's assets;
Supporting the development of a set of best practices for effective methane emissions reduction

0.32% in 2017 → 0.25% in 2025 (ambition 0.20%)

3. Expand outreach to the rest of the Oil & Gas industry by closing policy gaps (e.g. as part of the Global Methane Alliance, alongside UNEP), sharing OGCI & MGP best practices with the rest of the industry & collaborating with the European Commission, SPE, etc

(EE working groups on Best Practice sharing, Electrification)

Working on Scope 1 & 2 emissions from the Oil & Gas Industry

4. Carbon intensity target for OGCI member companies' upstream operated assets & developing a methodology for a carbon intensity for OGCI member companies' refineries

23 kgCO₂e/boe in 2017 → 20 kgCO₂e/boe in 2025

5. Developing regional action plans for targeted interventions where OGCI can enable GHG emission reduction at scale in oil and gas extractive countries

(Permian, Bakken, Nigeria, Angola, Iraq, Australia in progress)

Climate Efforts in Transport, Heavy Industry & Natural Climate Solutions – 2020 Action Plan

Identifying carbon dioxide emissions reduction opportunities from transport on a significant scale

6. Low Carbon Liquid Fuels – Identifying and removing barriers to widespread adoption of low carbon fuels in the marketplace

7. Hydrogen – Working collaboratively to unlock low-carbon hydrogen as a viable transport fuel with a first focus on heavy duty trucks

8. Closing the Carbon Cycle – Demonstrating carbon capture on a marine vessel with potential alignment with CCUS WS Kickstarter Hub project

Play our part in the emergence of a commercially viable, safe and environmentally responsible CCUS industry

9. Helping 5 emerging hubs to reach operations & continue identifying future hubs across the globe

10. Launched a collaboration with Clean Energy Ministerial-OGCI to explore ways to work together to drive CCUS deployment & ultimately accelerate the CCUS industry

**Major OGCI “Kickstarter” hubs could help up to 9 MTPY CCS deployment
(IEA indicates only ~35 MTPY CCS now operating globally, with ~1500 MTPY needed to meet Paris 2030 goals)**

Accelerating the role of nature based solutions in low carbon pathways

11. Committed to support NCS Alliance to advocate for common views & exploring additional options to advance NCS at scale.

Potential Collaboration with ETN (Preliminary Ideas for Discussion Only)

1. (Affordable) Best Practice development & sharing

- Enhancing GT efficiency (O&M, upgrades, WHRU and “wet/dry” OCGT to CCGT conversions)?
- Contribute to CO2 intensity targets (and flare, vent, methane reductions)?
- Compression efficiency/flexibility?
- Power recovery?
- Other?

2. Electrification

- Contribute to case studies on eMotor vs turbine drives (or hybridization)?
- Efficient flexible power plants (CCGT w Renewables/BESS integration)?
- Heat pump development (Downstream or UP/LNG after eDrives)?
- Other?

3. Support CCS

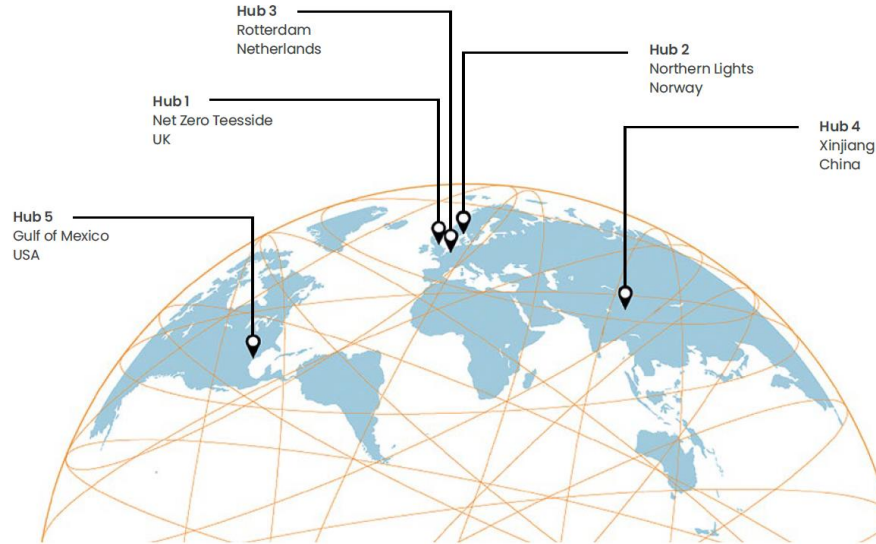
- Help reduce cost of CCS on GT powerplants?
- Continue to develop oxy-firing cycles (Netpower Allam, closed sCO2 Brayton, etc)?
- Continue to enhance GT hydrogen firing flexibility?
- Other?

4. Other Areas?

- ?

Back-Up Slides

Example of action: OGCI CCUS Kickstarter



Hubs' Industrial Characteristics

- | | | |
|----------------------|------------------|---------------------------|
| • Biomass power | • Fertilizers | • Steel |
| • Gas power | • Petrochemicals | • Aluminium |
| • Waste incineration | • Hydrogen | • Refineries |
| | • Cement | • CO ₂ imports |

Objective

- Play our part in the emergence of a commercially viable, safe and environmentally responsible CCUS industry
- Help facilitate large scale commercial investment in CCUS
- Bring stakeholders together to enable multiple low carbon industrial hubs

OGCI efforts

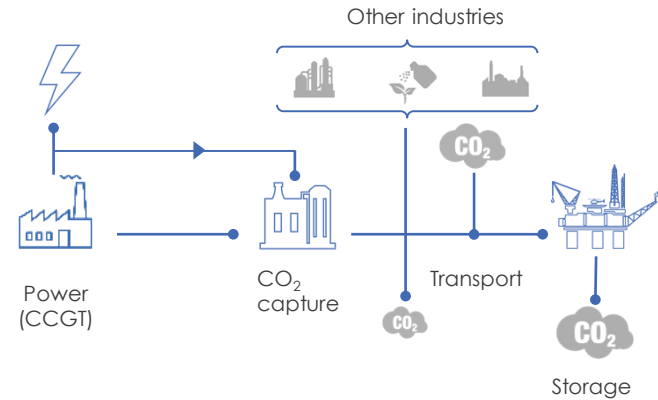
- Help 5 emerging hubs to reach operations
- Identification and maturation of future hubs in a number of additional countries
- Global CO₂ Storage catalogue
- Clean Energy Ministerial-OGCI joint declaration on accelerating the CCUS industry to explore ways to work together to drive CCUS deployment

CCUS projects investments details (1/2)

UK – Net Zero Teesside



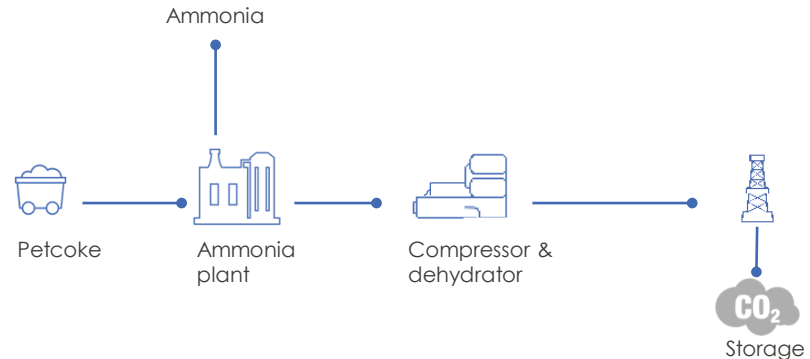
- Greenfield project: **power & industrial**
- Potential impact **3-5 Mtpa**
- Start date ~ **mid-2020s**
- Policy structure: **hybrid**
- Partners : **5 OGCI companies**



USA (IN) – Wabash Valley



- Brownfield project: **industrial**
- Potential impact > **1.5 Mtpa**
- Start date ~ **2023**
- Policy structure: **45Q + ...**
- Partners: **developers + DOE**



Impact of 4 projects approx. 9 Mtpa CO₂e equivalent to taking 2 million cars off the road.

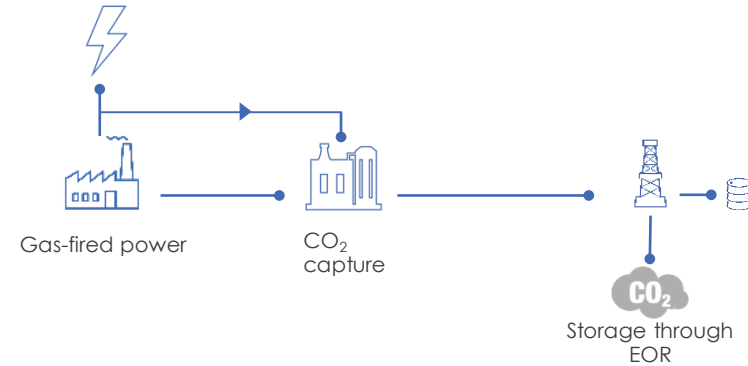
CCUS projects investments details (2/2)

USA (CA) – Elk Hills Power



Elk Hills Carbon LLC

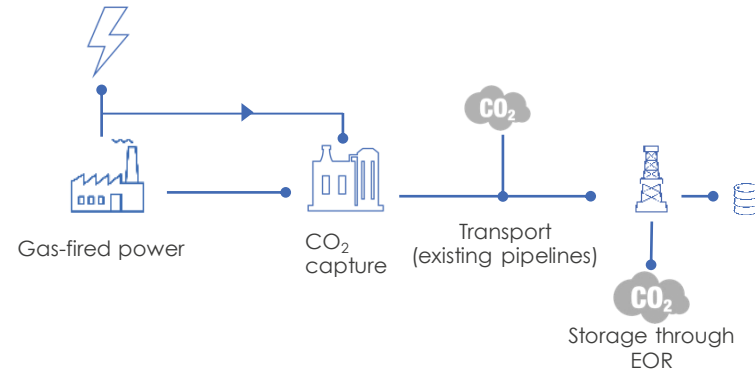
- Brownfield project: **Gas-fired power**
- Potential impact > **1 Mtpa**
- Start date ~ **2024**
- Policy structure: **45Q, LCFS, Cap & Trade**
- Partners : **DOE, California Resources Corporation**



USA – Starwood Power

Starwood Energy
Elysian Ventures
Carbon Capture Project

- Brownfield project: **Gas-fired power**
- Potential impact > **1.5 Mtpa**
- Start date ~ **2023**
- Policy structure: **45Q**
- Partners: **Starwood, Elysian**



Impact of 4 projects approx. 9 Mtpa CO₂e equivalent to taking 2 million cars off the road.