Shared Duty: National, International Oil Companies Bound Together by Methane Obligations

Environmental Defense Fund

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

Methane emissions are a critical challenge for the world's oil and gas industry, and also a crucial opportunity. Methane, the primary ingredient of natural gas, is a potent greenhouse gas with over 80 times the warming power of carbon dioxide over the first 20 years after its release into the atmosphere. The oil and gas industry is among the largest emitters of human-caused methane emissions; cutting these emissions is widely recognized as the simplest and most affordable way to slash global emissions quickly.

The oil and gas industry has taken note, and many of the world's largest companies have pledged to reduce methane emissions from their operations. Volunteer collaborations, like the Oil and Gas Methane Partnership, have emerged to provide standardization and transparency for forward-thinking companies.

The overwhelming majority of this momentum is occurring within the international oil and gas companies (IOCs[1]), that produce 14% of the world's oil and gas. Furthermore, most of their methane pledges and commitments are limited to the assets they own and control directly. This leaves out two key components of the global oil and gas industry that will play an increasingly important role in the decarbonization transition: national oil companies (NOCs) and the IOC's non-operated joint ventures (NOJVs).

This paper addresses the critical nature of each and how, together, they can accelerate industry's methane momentum.

National (or state-owned) oil companies, produce half the world's oil and gas today and hold two-thirds of all reserves. In many cases, they are their country's largest economic engine. They typically operate without the stakeholder and public disclosures IOCs have grown accustomed to. As such, they have only recently started to address methane within their operations.

NOJVs, where a company owns a stake in a venture but does not own or have ownership control of the venture's operation, are a mainstay of the global energy industry. In addition to spreading financial risk among several partners, NOJV's are a conduit to technical and resource sharing within the industry and, in many cases, provide IOCs access to energy reserves of NOCs.

On average, NOJVs account for half of the IOC's equity production. However, with few exceptions, IOCs do not include NOJVs in their methane reduction pledges. That means the industry will not solve its methane challenge while excluding NOC and NOJV emissions from its efforts. Instead, IOCs should use the existing relationships with NOCs through their numerous joint ventures to empower these companies to act on methane pollution.

Some IOCs are formalizing work on methane emissions with national oil companies and their host countries. These include TotalEnergies (with NNPC in Nigeria) and bp (with SOCAR in Azerbaijan). Introduced at COP28, the Oil and Gas Decarbonization Charter (OGDC) included 30 national oil companies, 21 of which

[1] In this paper International Oil Companies (IOCs) are used to describe ten of the largest international publicly traded oil and gas companies - bp, Chevron, ConocoPhillips, Eni, ExxonMobil, Shell, Total Energies, Repsol, Occidental Petroleum, and Wintershall Dea.

EXECUTIVE SUMMARY (CONT.)

are engaged in joint ventures with international oil companies and members of the Oil and Gas Methane Partnership. But this momentum is young, and it has not yet produced any measurable methane reductions.

These efforts will be buttressed this year by a new methane-tracking satellite that will measure, process and publish high-resolution methane emissions from nearly every corner of the world's oil and gas infrastructure. Launched by an affiliate of Environmental Defense Fund in March 2024, MethaneSAT will, for the first time, allow joint venture partners near real-time insight into the methane emissions of all their assets and how they change over time, whether they operate them or not. Data from MethaneSAT will be freely available to stakeholders and the public.

These developments – from OGDC to MethaneSAT to individual IOC-NOC joint venture partnerships – represent a sea change opportunity for collaborative, transparent and rapid action on methane. If industry is to deliver on its broader climate pledges and truly transition toward decarbonization, it is critical that NOCs and NOJVs are part of their efforts.

NOCS - A CRITICAL PIECE OF METHANE REDUCTION EFFORTS

The UN climate talks in Dubai last year shone a light on the pivotal role national oil companies, like UAE's Abu Dhabi National Company (ADNOC), can - and ultimately must - play in the fight against climate change, particularly the urgent need to reduce methane emissions from the oil and gas supply chain.

Drilling, transporting and processing oil and gas generated more than five billion tons of CO_2-equivalent in 2022, according to the International Energy Agency (IEA). Cutting these emissions is a powerful opportunity to reduce the climate impact of fossil fuels that remain as countries and sectors work toward decarbonization.

This is especially true for methane, the main ingredient of natural gas and a usual byproduct of oil production, which has over 80 times the 20-year warming power of CO_2 – making it the fastest way to slow the rate of warming. International Energy Agency analysis consistently shows cutting oil and gas methane is among the simplest and most cost-effective emissions reduction solutions.

NOCs are Essential to Tackling Emissions

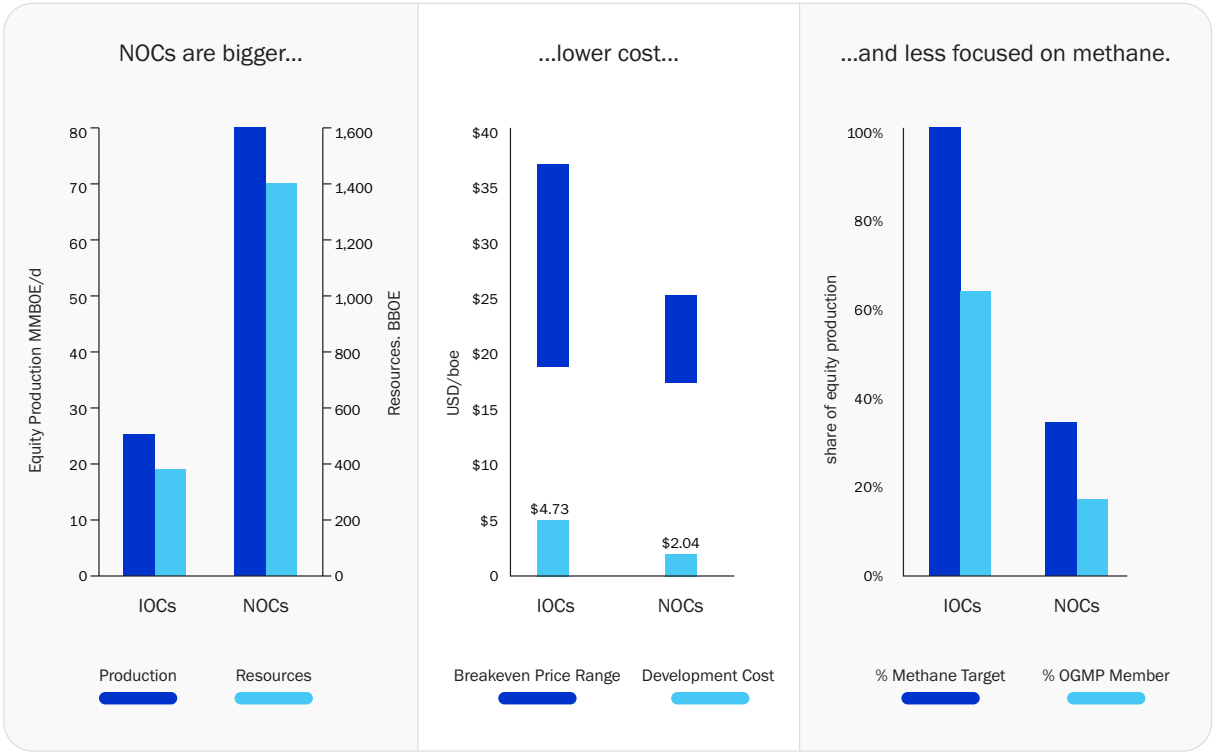

Figure 1: Global oil and gas production, resources breakeven prices and development costs. 2021, from Rystad UCube. Credit: EDF

NOCs produce half the world's oil and gas and hold two-thirds of all reserves. In addition, they have some of the lowest development and production costs. This makes them more resilient to declining demand and prices, and will likely mean they will be the ones lifting the last barrel from the ground. Addressing their operational emissions now is critical to bending the emissions curve as these nations take on the more challenging task of transitioning their economies away from fossil fuels.

It's difficult to characterize all NOCs together because they're so varied; ADNOC in UAE is very different from Sonatrach in Algeria or Petrobras in Brazil. They each face unique challenges – and not all have equally deep pockets. But they share some important attributes.

NOCs are often their countries' biggest economic engine. Decisions about production, trade and emission performance extend beyond the balance sheet to questions of politics, domestic finance and foreign affairs. Many have limited access to outside capital and technical resources required to achieve emissions reductions.

Access to oil and gas markets is increasingly dependent on methane emission mitigation

Europe is the world's largest gas importer. In a momentous climate decision, the European Union agreed on a first-of-its-kind legislation to rein in methane emissions within and far beyond its borders. The groundbreaking methane regulation sets strict new curbs on emissions from fossil fuel operations across the bloc's 27 member states. The standards will also apply to imports from the many oil, coal and natural gas exporters that supply to the EU - MRV measures will be applied by exporters to the EU by January 2027, and limits on methane intensity by 2030.

In July 2023, Japan and Korea announced the Coalition for LNG Emission Abatement toward Net-zero ("CLEAN") partnership. The world's biggest LNG buyers, the two countries have historically prioritized security of supply, yet are now engaging their suppliers on reducing methane in their supply chains. Ultimately, exporters who want to sell gas to Japan and Korea may have to reduce their methane emissions to near zero levels and report emissions using the latest MRV protocols.

Driving down methane emissions in exporting countries, often dominated by NOCs, is increasingly in the commercial interest of both NOC, host government, and IOCs with operated and non-operated interests in those countries. Failing to act on methane emissions immediately will give rise to a significant business risk, in addition to the associated climate harm.

OIL AND GAS DECARBONIZATION CHARTER BRINGS NOCS INTO THE FOLD

Announced by COP28 President Dr. Sultan Al Jaber, the Oil and Gas Decarbonization Charter (OGDC) commits companies to limit their upstream methane intensity to just 0.2% by 2030 – an ambitious but achievable target. It also calls for the elimination of routine flaring and requires companies to provide full, transparent, and independent reporting of emissions using internationally recognized standards.

What makes the OGDC so significant is the participation of 30 NOCs, a segment that has been largely absent from the methane and broader climate dialogue.

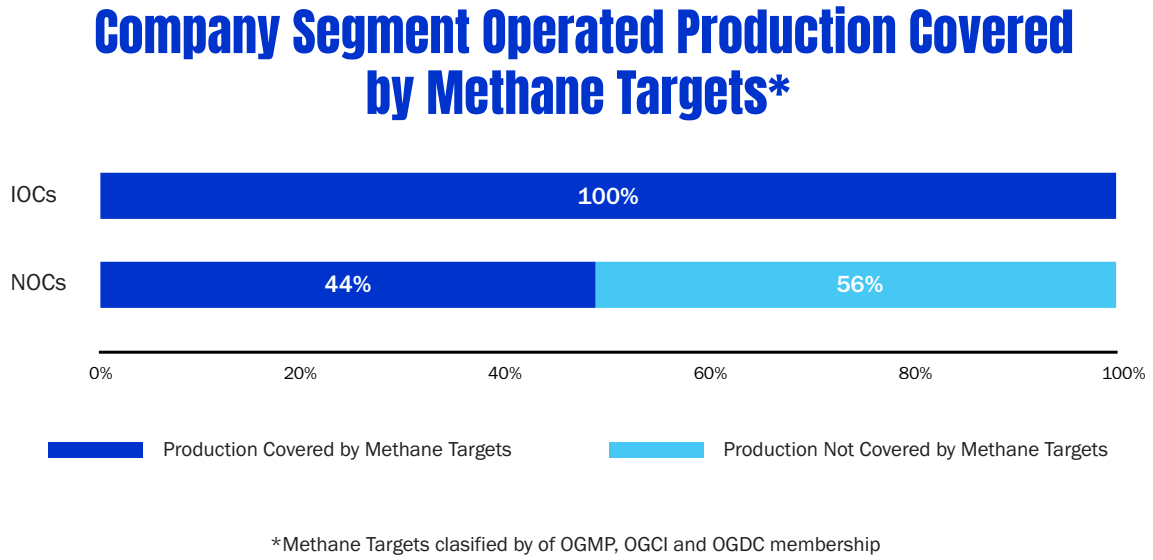

Figure 2: Company Segment Operated Production Covered by Methane Targets - while all IOCs have a near zero emissions target, only 44% of NOCs have a target to reduce methane emissions.

The OGDC covers about a third of global oil and gas production. When combined with additional companies that are members of the industry's Oil and Gas Climate Initiative (OGCI) and Oil and Gas Methane Partnership 2.0 (OGMP), both of which require a near-zero methane emissions target – approximately 46% of total upstream oil and gas is covered by a near-zero methane emissions target.

Coverage of Upstream Global Oil and Gas Industry by near-zero methane commitments

Global Equity Production by Company Type

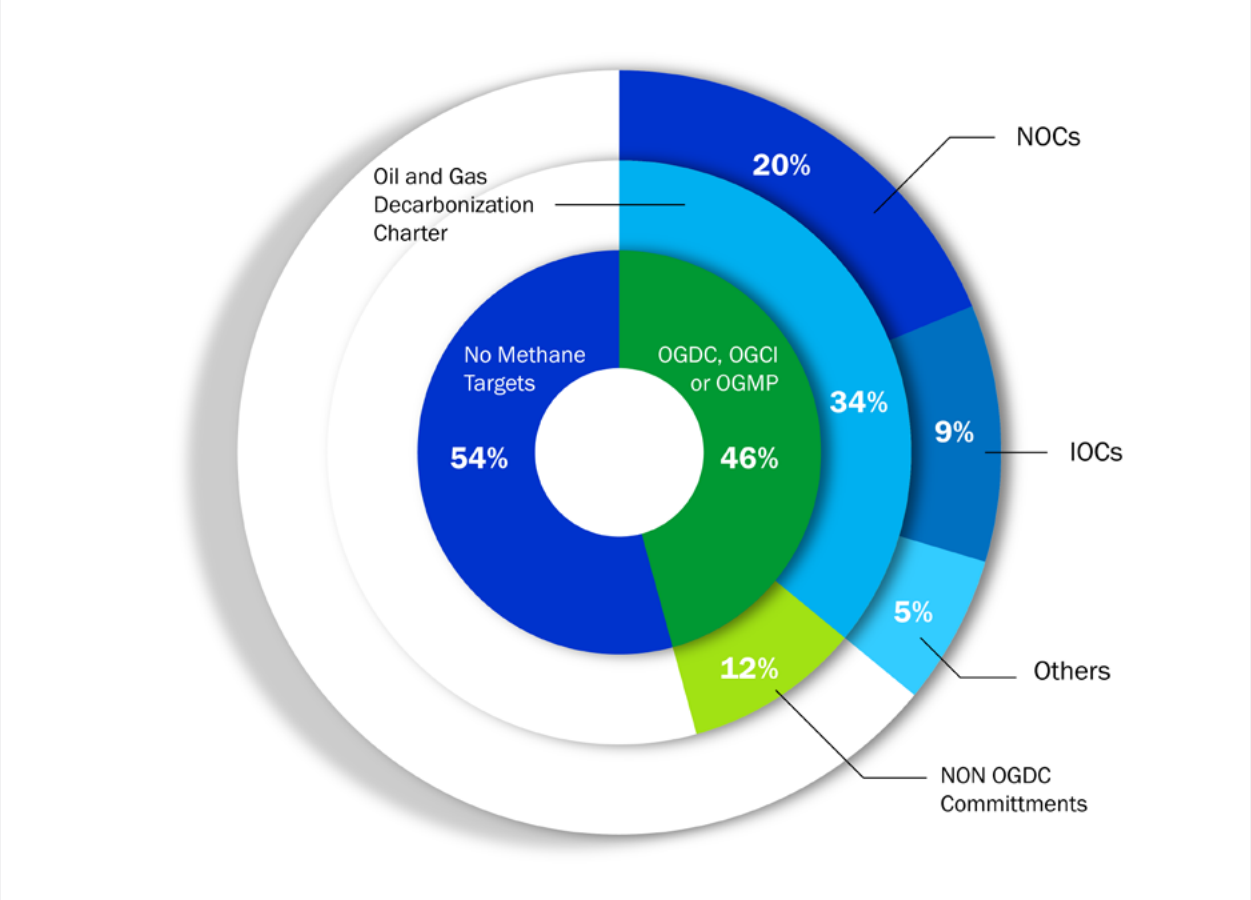

Figure 3: Coverage of global oil and gas production by global initiatives - 1) Oil and Gas Decarbonization Charter, 2) Oil and Gas Climate Initiative, 3) Oil and Gas Methane Partnership. The chart shows the share of global oil and gas production captured by the recent COP28 OGDC of NOC, IOC, and other signatories.

Not included in the OGDC are NOCs in the world's largest oil and gas-producing nations: Russia, Iran, Venezuela, China, Iraq, Kuwait, Mexico and Algeria. Another large gap is left by coverage of the US and Canada. The US is the largest producer of oil and gas, but the highly fragmented sector encompasses thousands of smaller operators that are largely missing from these global initiatives.

In the run up to COP29 talks this year in Baku, there is a significant opportunity to bolster global coverage by recruiting more companies to OGDC and encouraging more to implement measurement-based reporting and abatement strategies as part of OGMP. Gaps in coverage of global oil and gas methane emissions will also be covered by critical regulations in the US, Canada, and other jurisdictions, as well as implementing the import standards of the EU energy methane regulation.

Signatories to Oil and Gas Decarbonization Charter

NOCs: ADNOC, Bapco Energies, Ecopetrol, EGAS, Equinor, GOGC, INPEX Corporation, KazMunaiGas, Mari Petroleum, Namcor, National Oil Company of Libya, Nilepet, NNPC, OGDC, OMV, ONGC, Pakistan Petroleum Limited (PPL), Pertamina, Petoro, Petrobras, Petroleum Development Oman, Petronas, PTTEP, Saudi Aramco, SNOC, SOCAR, Sonangol, Uzbekneftegaz, ZhenHua Oil, YPF.

IOCs: Azule Energy, bp, Cepsa, COSMO Energy, Crescent Petroleum, Dolphin Energy Limited, Energean Oil & Gas, Eni, EQT Corporation, Exxonmobil, ITOCHU, LUKOIL, Mitsui & Co, Oando plc, Occidental Petroleum, Puma Energy (Trafigura), Repsol, Shell, TotalEnergies, Woodside Energy Group

Four letter acronyms - three groups towards one goal

Oil and Gas Decarbonization Charter (OGDC)

Announced by COP28 President Dr. Sultan Al Jaber, the Oil and Gas Decarbonization Charter (OGDC) commits fifty companies to limit their upstream methane intensity to just 0.2% by 2030. In addition, companies pledge to eliminate routine flaring and achieve net-zero on Scope 1 & 2 by 2050. It explicitly mentions engaging with joint venture partners but does not extend targets to joint ventures.

Oil and Gas Methane Partnership (OGMP)

The Oil & Gas Methane Partnership 2.0 (OGMP 2.0) is the flagship oil and gas reporting and mitigation program of the United Nations Environment Programme (UNEP). It is the only comprehensive, measurement-based international reporting framework for the sector. It requires a near-zero target for operated assets and explicitly requires reporting and mitigation at joint ventures. It encompasses over 130 companies with assets in more than 70 countries on five continents, representing nearly 40 per cent of the world's oil and gas production.

Oil and Gas Climate Initiative (OGCI)

OGCI is a CEO-led initiative focused on accelerating action on reducing emissions from the oil and gas industry - one focus area is reducing methane emissions. The 12 member companies have committed to reducing methane emission intensity from their operations to below 0.2% by 2025, and have convened additional companies to make a near zero by 2030 pledge. OGCI's 0.2% target for methane intensity is now frequently used as an industry standard.

OGCI explicitly mentions engaging with joint venture partners, but with the exception of Chevron, their members do not extend targets to their equity production at joint ventures.

INTERCONNECTION TO PUBLICLY TRADED INTERNATIONAL OIL COMPANIES

Joint ventures present one of the most significant opportunities to manage the oil and gas industry's climate risk, secure new emission reduction commitments, source financing and distribute technical expertise that will drive real-world emission reductions.

The portfolios of the world's largest publicly traded IOCs are composed of two types of assets: wholly-owned assets and joint ventures. Wholly-owned assets are straightforward: they are fully controlled and operated by the company and use the company's standards for processes, tools and systems. Only 10-25% of the IOC's assets are wholly-owned.

The remaining 75-90% of assets are part of joint ventures, which spread costs, revenues and risks. Joint ventures are also an important option for companies to gain access to resources: they are often a regulatory

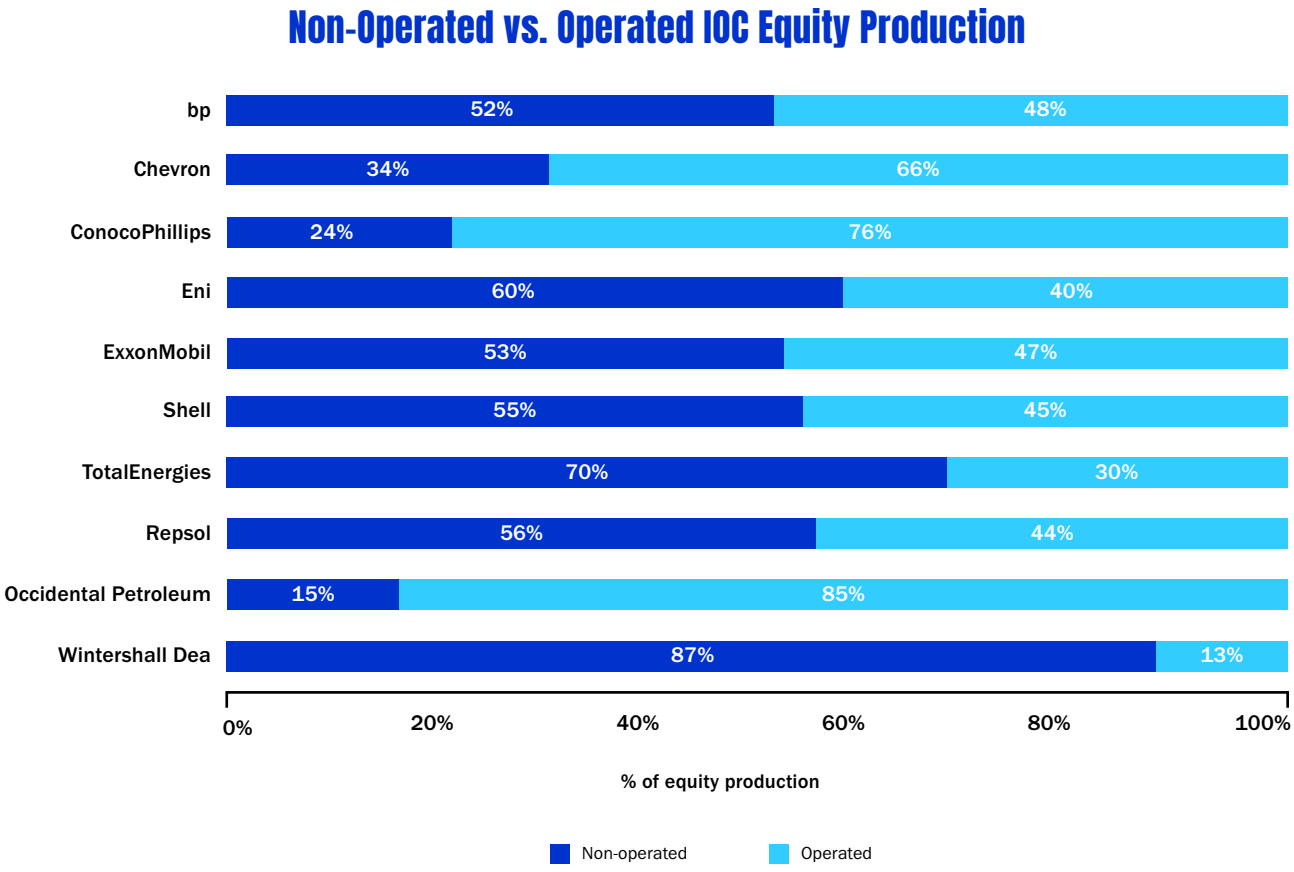

Figure 4: Non-operated vs Operated IOC Equity Production - on average 51% of IOC equity production comes from assets that a partner operates. Corporate methane emission reduction commitments rarely extend to these non-operated assets.

requirement in NOC-dominated markets. Joint ventures bring access to cutting-edge technologies, and added capacity and experience to modernize, optimize and improve operational efficiency.

Joint ventures are common operating models that are as central to the oil and gas industry as the fossil fuels extracted from the ground. On average, 50% of the equity production from IOCs comes from joint ventures where the IOC owns a share of the project but does not operate it.

Every joint venture has operating and non-operating partners with varying equity stakes, and often with different standards and practices for emissions management. NOCs are IOC's most significant partners, responsible for an average of 60% of their non-operated production, including through NOC-owned operating companies.

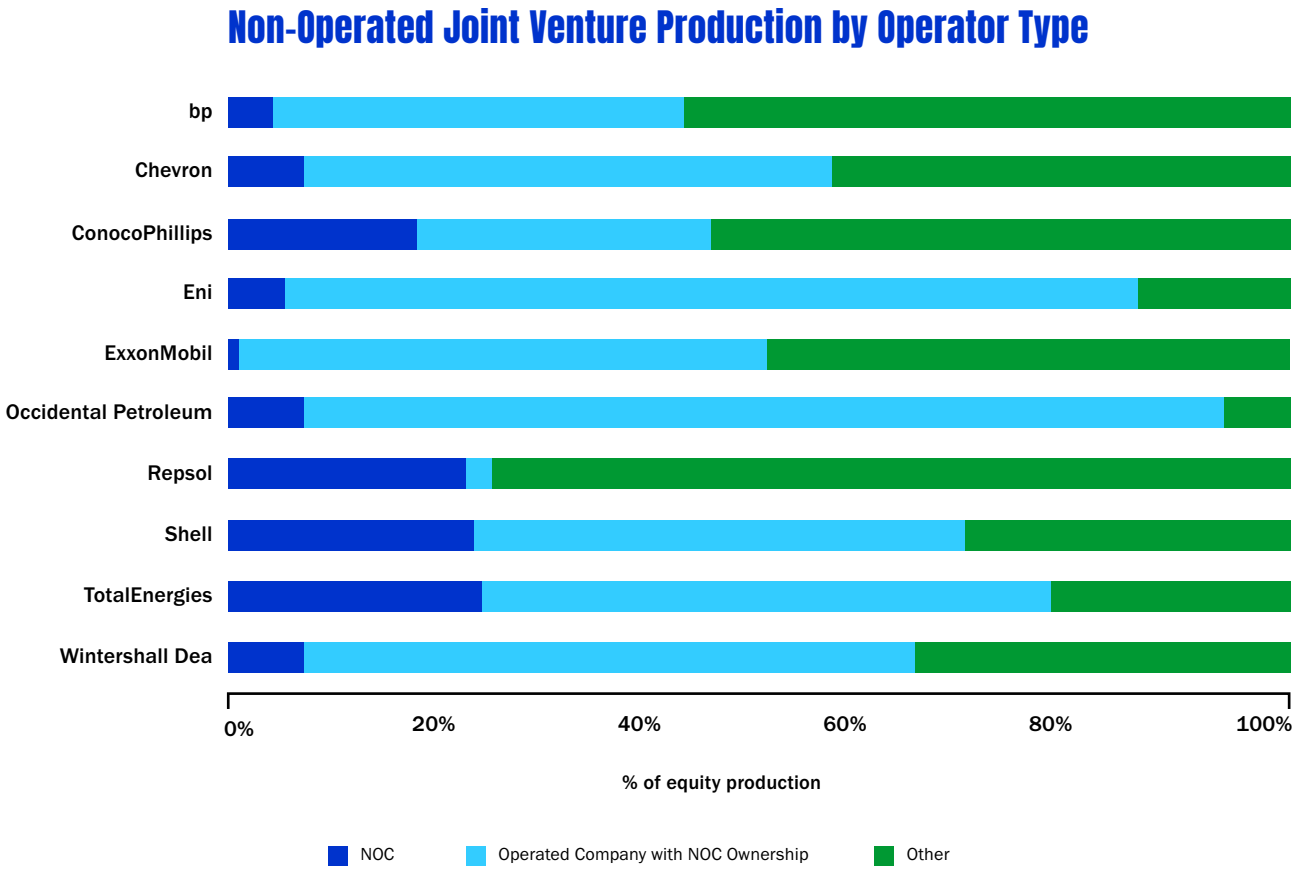

Figure 5: Non-Operated Joint Venture Production by Operator Type - when breaking down who operates the IOCs' non-operated portfolio the vast majority is done by NOCs or an NOC owned operating company. The remainder is operated by a peer IOC or smaller independent operator.

The OGDC is an opportunity to catalyze renewed action at joint ventures. EDF analysis finds significant overlap between the charter's 30 NOC signatories and the IOCs that have been working on methane emissions for almost a decade. Connections between NOCs and companies that are members of OGCI and OGMP could act as a conduit for technical resources and insights to flow and jumpstart methane management in these companies and countries.

OGDC NOC Signatories and Their Top 5 Joint Venture Partners

Company	Joint Venture Partners				*Blue signifies OGMP or OGCI membership
ADNOC	TotalEnergies	Inpex	bp	GS Holdings	KNOC (S. Korea)
BAPCO (Bahrain)	Saudi Aramco				
Ecopetrol	SierraCol Energy	Occidental Petroleum Repsol	Frontera Energy Corporation	Sinochem	
EGAS	EGPC (Egypt)	Eni	SEGAS		
Equinor	Petoro	TotalEnergies	ConocoPhillips	Vaar Energi	Aker BP
Inpex	TotalEnergies	ADNOC	bp	CNPC (parent)	ExxonMobil
KazMunaiGaz (parent)	ExxonMobil	Chevron	Lukoil	Eni	Shell
Mari Petroleum	GHPL	Al-Haj	Jura Energy	Pakistan Petroleum Limited (PPL)	OGDCL (Pakistan)
Namcor	Azule Energy	Dayuan International Development	New Bright International Development	Petrolog Oil & Gas	Sequa Petroleum
Nilepet	Petronas	CNPC (parent)	Dar Petroleum Operating Company (DPOC)	Sinopec Group (parent)	Tri-Ocean Energy
NNPC (Nigeria)	TotalEnergies	Eni	Shell	ExxonMobil	Chevron
NOC (Libya)	TotalEnergies	Waha	ConocoPhillips	OMV	Arabian Gulf Oil Company (AGOCO)
OGDCL (Pakistan)	Pakistan Petroleum Limited (PPL)	GHPL	Pakistan Oilfields	MOL	Al-Haj
OMV	Wintershall Dea	TotalEnergies	Equinor	OJSC Severneftegazprom	Gazprom
ONGC (India)	Inpex	ITOCHU	Indian Oil	Bharat Petroleum Corp (BPCL)	Rosneft
Pakistan Petroleum Limited (PPL)	OGDCL (Pakistan)	GHPL	Pakistan Oilfields	MOL	United Energy
PDO (Oman)	Eni	ITOCHU	Indian Oil	Bharat Petroleum Corp (BPCL)	Rosneft
Pertamina	PetroChina	Basra Oil Company (Iraq NOC)	ITOCHU	Repsol	Petronas
Petoro	Equinor	TotalEnergies	ConocoPhillips	Vaar Energi	Shell
Petrobras	Shell	Sinopec Group (parent)	Galp Energia SA	Pre-sal Petroleo (PPSA)	CNPC (parent)
Petronas	TotalEnergies	PTTEP	Shell	PetroChina	Sinopec Group (parent)
PTTEP	Shell	TotalEnergies	ADNOC Gas Processing	ADNOC	Energy Development Oman (EDO)
Saudi Aramco	BAPCO (Bahrain)	Kuwait Petroleum Corp (KPC)			
SNOC	Eni				
Socar (Azerbaijan)	bp	TPAO (Turkey)	NIOC (Iran)	Lukoil	MOL
Sonangol	Azule Energy	TotalEnergies	ExxonMobil	Equinor	New Bright International Development
Uzbekneftegaz	Lukoil	Korea Gas	GS Holdings	Uz-Kor	Honam Petrochemical (Lotte Chemical Corp)
YPF	Pan American Energy	TotalEnergies	Chevron	Wintershall Dea	Pluspetrol
ZhenHua Oil	CNPC (parent)	ADNOC	GS Holdings	KNOC (S. Korea)	Inpex

Figure 6: National Oil Company signatories of the Oil and Gas Decarbonization Charter and their major joint venture partners by equity production. Highlighted are partners that have set methane emission reduction targets and are members of the Oil and Gas Methane Partnership methane reporting framework. Each highlighted company represents an opportunity for technical assistance and capacity building.

IOCs Top 5 NOC Joint Venture Partners by Equity Production*

Company	Joint Venture Partners				
ExxonMobil	QatarEnergyLNG	QatarEnergy	Inpex	Kazmunaigas	CNOOC
Shell	PTTEP	Petrobras	Sinopec	PDO (Oman)	EDO (Oman)
Chevron	Kazmunaigas	Lukoil	Tengizchevroil	KPC	Equinor
TotalEnergies	ADNOC	CNPC	Equinor	Inpex	QatarEnergy
ConocoPhilips	Sinopec	Petoro	QatarEnergy LNG	QatarEnergy	Petronas
Eni	Mubadala Energy	Rosneft	Korea Gas	Kazmunaigas	Mission Oil
Occidental	Mubadala Energy	ADNOC	Eni	Sonatrach	PTTEP
bp	Inpex	TPAO (Turkey)	SOCAR (Azerbaijan)	ADNOC	KNOC
Repsol	Pertamina	OMV	Petrobras	NOC Libya	Sonatrach
Wintershall Dea	Gazprom	OMV	Equinor	Petoro	Inpex Norway

*Blue signifies OGMP or OGCI membership

Figure 7: IOCs and their largest NOC joint venture partners by equity production.

No Company is an Island - The International and National Oil Companies Have Extensive Ties Across the Globe.

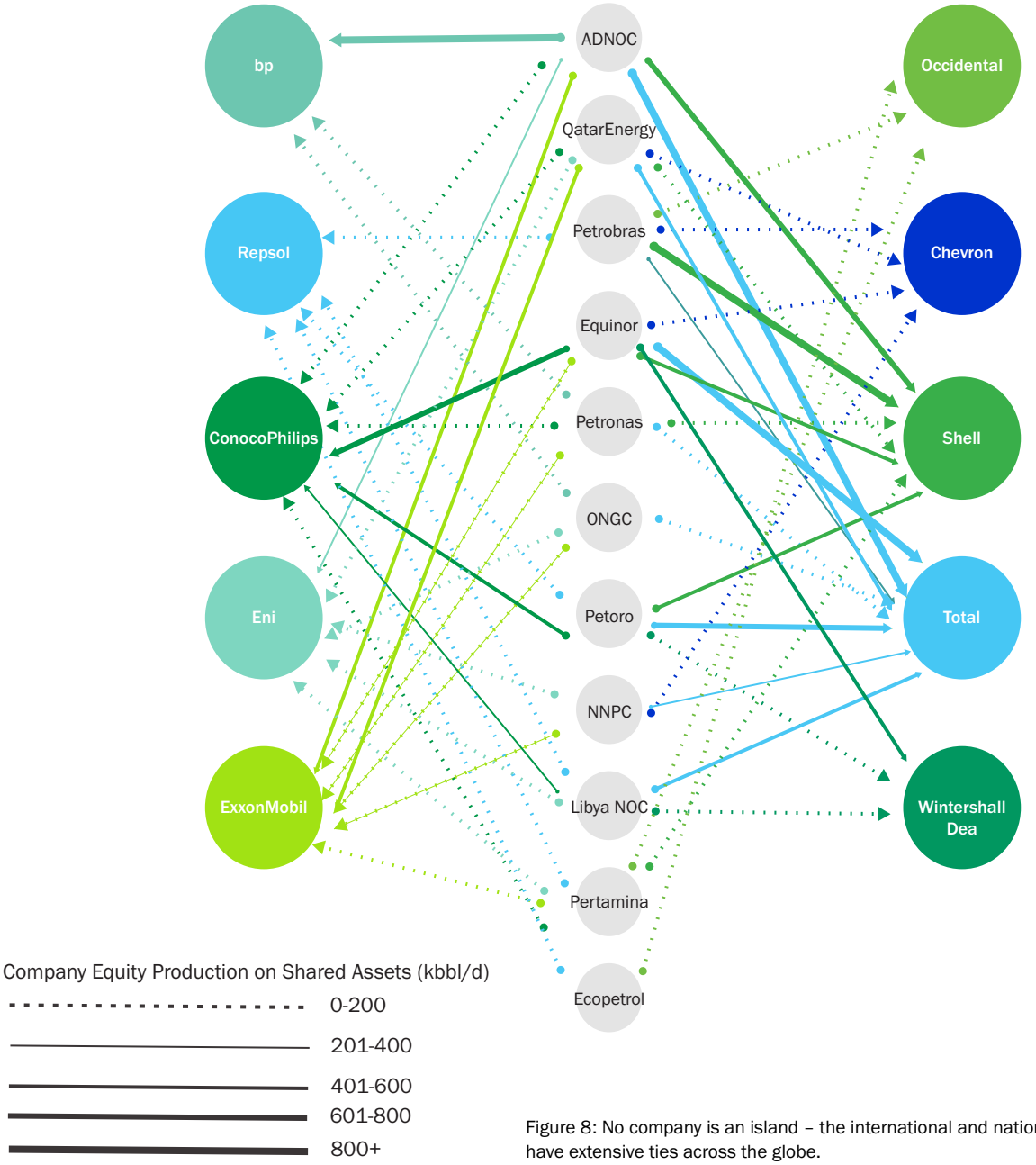

Figure 8: No company is an island – the international and national oil companies have extensive ties across the globe.

JOINT ACTION: CATALYZING METHANE EMISSION REDUCTION AT OIL AND GAS JOINT VENTURES

International oil and gas companies (IOCs) are under mounting pressure from investors, customers and other stakeholders to embrace the energy transition and address the climate challenge. With approximately 50% of upstream production coming through non-operated joint ventures (NOJVs), IOCs need to ensure that climate risks and opportunities are addressed throughout their businesses, including NOJVs.

Governing NOJVs can be challenging. The different non-operating partners can have misaligned strategies or incentives, and each partner has numerous stakeholders – including board members, parent company executives, and government regulators. For existing joint ventures, topics such as emissions management may not have been agreed at the formation of the JV. As such, good governance at JVs, especially around climate and environment, requires careful thought and consideration.

The life of a typical joint venture is composed of three distinct phases – formation, operations and the end of the venture – and each phase warrants different actions.

PATHWAYS TO INFLUENCE

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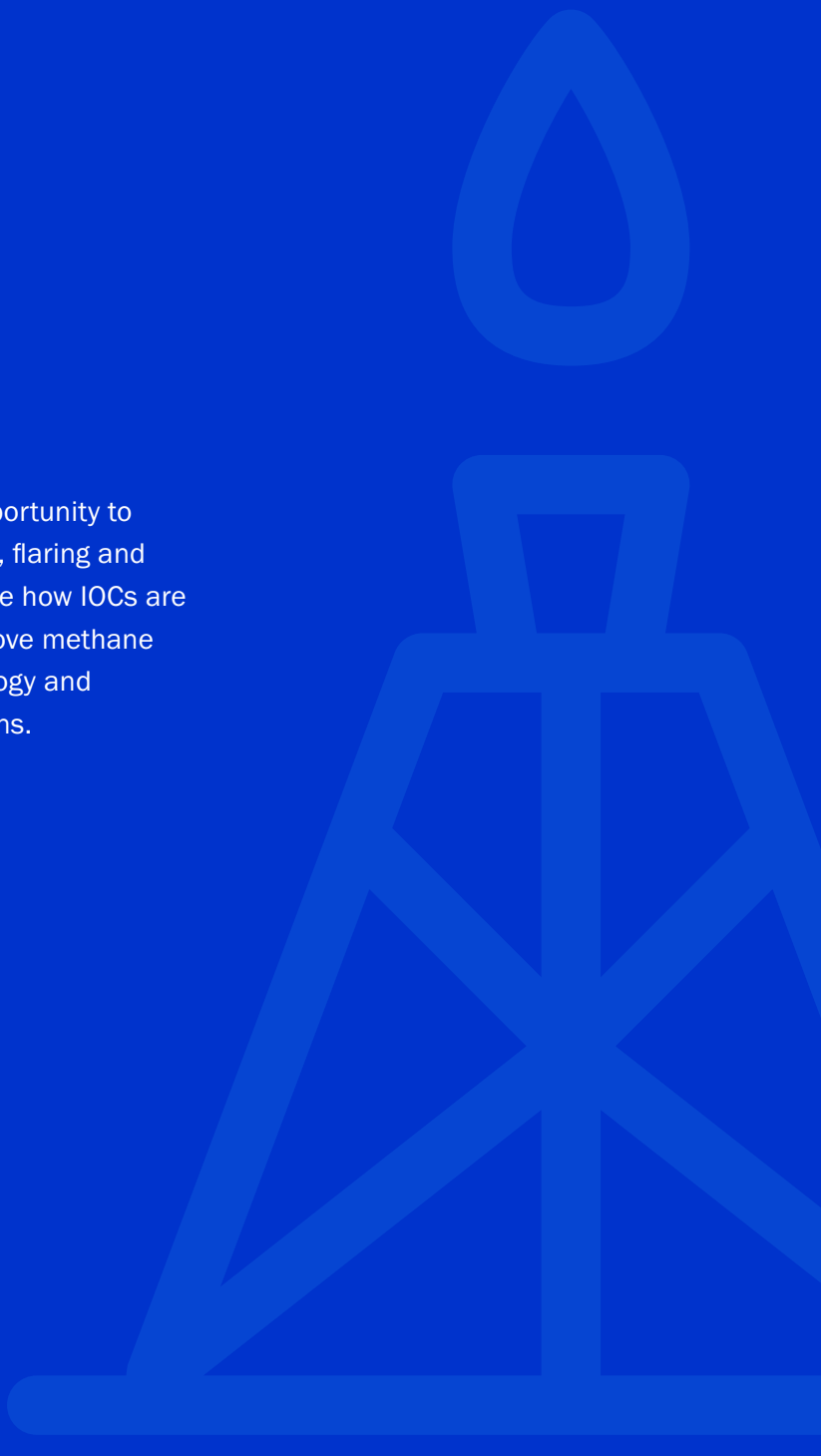
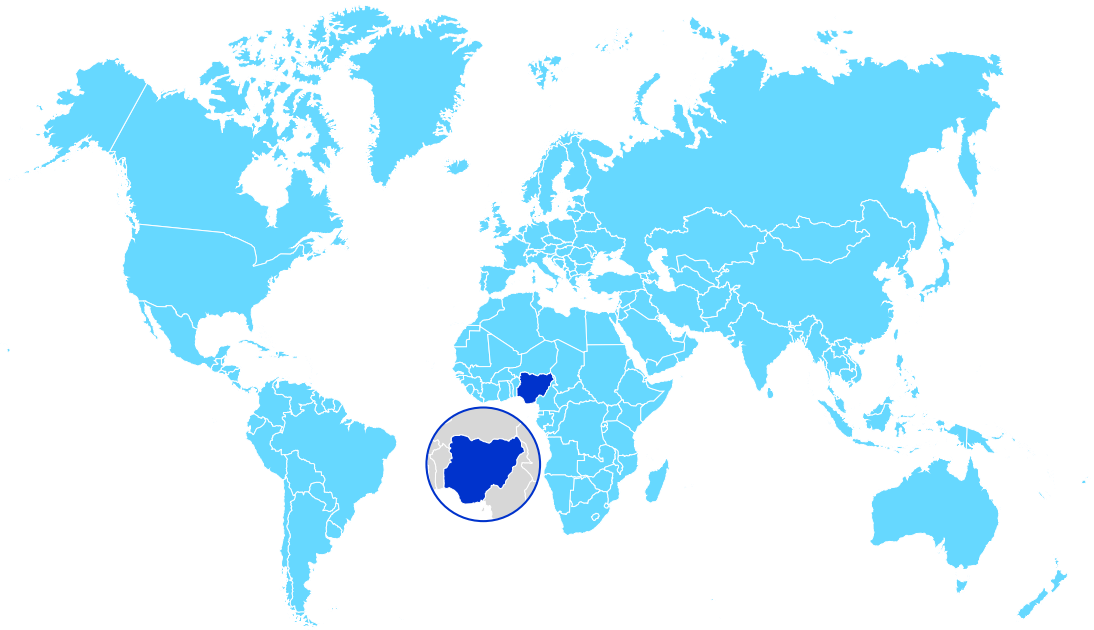
CASE STUDIES

IOC relationships with NOCs present a significant opportunity to manage the oil and gas industry's methane pollution, flaring and Scope 1 & 2 emissions. These two examples illustrate how IOCs are partnering with NOCs and their governments to improve methane emission management and create access to technology and expertise that can drive real-world emission reductions.



CASE STUDY

Nigerian National Petroleum Company Ltd. and TotalEnergies



Year	Company	Company Segment	Production (Million bbi)	Production in Nigeria (Million bbi)	% Production in Nigeria
2023	TotalEnergies	IOCs	906.294*	79.934**	12%
2023	NNPC (Nigeria)	NOC	325.808	325.808	100%

*Coming from TotalEnergies 2023 Q4 Report Reporting 2,483 kbbl/d in 2023

**Coming from TotalEnergies, reporting 219,000 boe/d in Nigeria for 2023

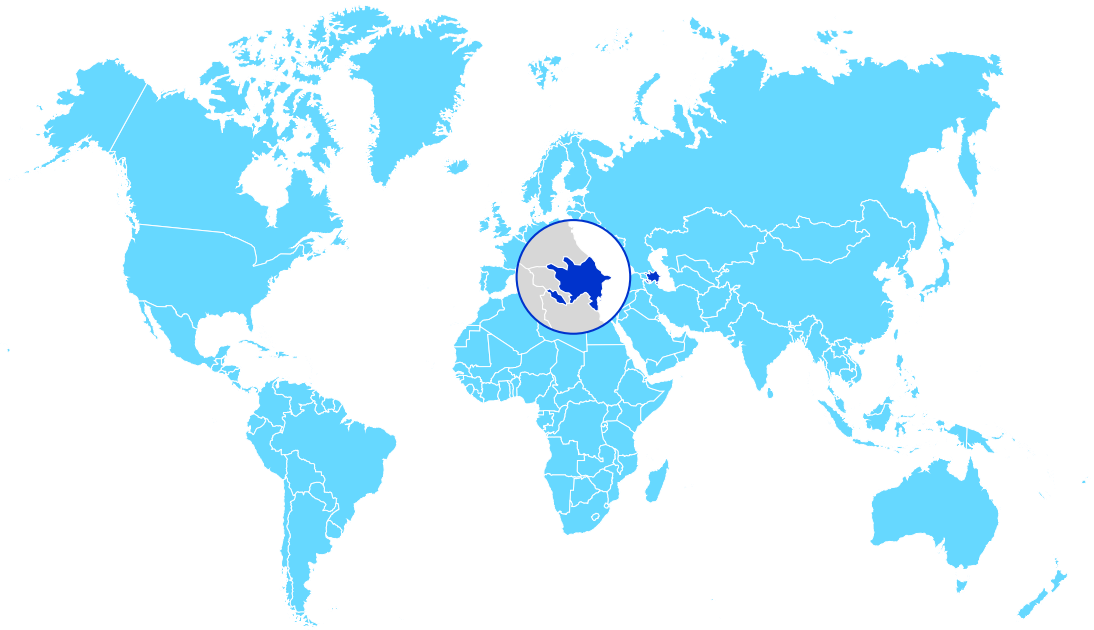
In the wake of the Oil and Gas Decarbonization Charter at COP28, Nigerian National Petroleum Company Ltd. (NNPC) and TotalEnergies signed a memorandum of understanding for NNPC's adoption and deployment of Airborne Ultralight Spectrometer for Environmental Applications (AUSEA), a TotalEnergies technology to detect and quantify greenhouse gases (including methane).

The many advantages of using such detection and quantification technologies include identification of unaccounted emission sources and implementing corrective actions. Collecting such insights are foundational to designing and executing a methane abatement strategy.

Since COP28 in Dubai, TotalEnergies have announced four cooperation agreements with Petrobras (Brazil), SOCAR (Azerbaijan), Sonangol (Angola) and ONGC (India). This is an example of an IOC using its joint ventures and other relationships with NOCs as a conduit for technology and expertise to mitigate industry methane pollution. Such ventures enable NOCs new to methane mitigation to benefit immediately from a decade's worth of research and development in methane detection and quantification.

CASE STUDY

State Oil Company of the Azerbaijan Republic (SOCAR) and bp



Year	Company	Company Segment	Production (Million bbi)	Production in Azerbaijan (Million bbi)	% Production in Azerbaijan
2023	bp	IOCs	991.0522	97.28	10%
2023	Socar (Azerbaijan)	NOC	182.4322	182.4322	100%

The State Oil Company of the Azerbaijan Republic (SOCAR) signed onto the Oil and Gas Decarbonization charter at COP28 in Dubai. Many IOCs have a presence in Azerbaijan, including Equinor, TotalEnergies, and Chevron. Of all IOCs, however, bp has the largest production share in Azerbaijan and has had a presence there since 1992.

Reducing methane emissions from Azerbaijan's oil and gas industry is critical as regulation looms in the EU that would require new import contracts for oil and gas to confirm that strict monitoring, reporting and verification obligations are met by exporters. The regulation will establish a methane intensity methodology and maximum levels for new contracts for oil and gas.

Subsequent to the launch of the OGDC, SOCAR and bp signed a memorandum of understanding (MoU) to share expertise on emissions management and work together on deploying methane emission technology and abatement projects. A section of the MoU, aligned with a broader Advancing Global Methane Reduction initiative, expands the scope beyond company boundaries to drive methane emissions down across the oil and gas sector in Azerbaijan. Notably, the scope isn't limited to SOCAR and bp joint operations but extends to all oil and gas production in the country, including smaller independent companies. The intent is to bring industry partners, research institutes and government leaders to support efforts toward developing a custom pathway that meets the needs of Azerbaijan's energy sector.

A NEW ERA OF INCREASED TRANSPARENCY OF METHANE EMISSIONS WILL DRIVE ACCOUNTABILITY

IOCs have the societal obligation to incentivize their operating partners to accelerate the energy transition and support them with the means to deliver in ways consistent with their own corporate commitments. This includes addressing methane emissions and flaring.

Although IOCs do not have direct control over the day-to-day operations of their NOJVs, they form part of the joint venture's ownership group and have influence and contractual rights. Embedding climate governance into future and existing joint ventures is critical to reducing the industry's methane footprint.

Though the joint venture challenge has historically been a barrier to the systemic industry-wide efforts to reduce emissions, the OGDC opens up new opportunities for historic collaboration across the vast web of the global industry. Indeed, the growing consensus across the global industry to take this issue seriously has already begun to create formal partnerships between IOCs and NOCs.

With the launch of MethaneSAT, 2024 marks the start of a new era of radical transparency in greenhouse gas measurement and, with it, accountability, and action to rapidly reduce methane emissions.

MethaneSAT will bring unprecedented capabilities to the existing set of methane-detecting satellites and usher in a new era of transparency and accountability. What today is a cloudy and coarse muddle of company estimates and an incomplete collection of studies will become a much clearer picture of total methane emissions, where they come from, and how they change over time.

For the first time, we'll be able to calculate total global methane emissions and track how emissions change over time for a production basin, a country, or the world. For companies that have joined the OGDC, OGMP and OGCI initiatives, MethaneSAT data will be an indispensable tool in their efforts to demonstrate they are following their own pledges and commitments with meaningful action.

Expanded tracking and data integration from Environmental Defense Fund, International Energy Agency and United Nations Environment Program's International Methane Emission Observatory and others will provide financial institutions, governmental ministries, commercial gas buyers, NGOs and media the data and analysis needed to build solutions, craft policies and hold companies accountable.

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