

Highly preliminary outside-in analysis, based on methane emissions estimates and reflecting country-level measurement

# Insights emerging from regional collaboration efforts on methane emissions

The Caspian is the 2<sup>nd</sup> most methane emissions intensive region in the world

Our outside-in analysis indicates limited transparency on 90% of methane emissions in the Caspian, creating major uncertainty on MMRV<sup>3</sup> readiness and on the region's true pace of reduction

A regional platform could improve transparency and enable progress at right pace

This is why we are launching the Caspian Methane Emissions Accelerator

- 1 Methane represents 45%<sup>1</sup> of oil and gas operational emissions (82Mt CH<sub>4</sub>), of which upstream contributes 75% (61Mt CH<sub>4</sub>). Reducing these emissions is the single most effective lever for delivering short-term climate impact
- 2 Regions with largest methane emissions footprint are North America (18Mt), Middle East (14Mt), Russia (9Mt) and Caspian (9Mt). Out of these, highest methane emissions intensity<sup>2</sup> is in the Caspian (6%)
- 3 Timely regional progress in the Caspian will require rapid transformation from many companies with methane emissions intensities of up to 20%, according to our outside-in analysis
- 4 Unfortunately, there is limited transparency on 90% of methane emissions in the region, creating major uncertainty on MMRV readiness and the region's true pace of reduction
- 5 7 companies contributing 10% of methane emissions in the region are already operating with near zero methane emissions, are OGMP 2.0 Gold Standard or OGMP 2.0 members
- 6 However, 8 companies contributing 90% of methane emissions in the region are not OGMP 2.0 members and disclose no methane emissions MMRV and reduction roadmap - potentially undermining visibility of efforts and progress to date
- 7 We believe a regional platform could improve transparency, amplify regional leadership, increase flow of investment and create economic gain for the region (up to \$2B per year)
- 8 Experience in ASEAN confirms the benefits of regional collaboration to progress on methane emissions driven by structured CEOs engagement, improved transparency, joint projects and synergies
- 9 Moreover, Caspian countries share common challenges - many assets are impractical and expensive to retrofit, external incentives are limited, NOC budgets are linked to higher return projects, while org and government readiness can be low
- 10 **This is why we are launching the Caspian Methane Emissions Accelerator**, a platform to incubate, pilot and implement solutions tailored to the region

1. Using a Global Warming Potential (GWP) of 28 ; 2. Methane emissions intensity = methane emissions (m<sup>3</sup>) as % of produced methane (m<sup>3</sup>)

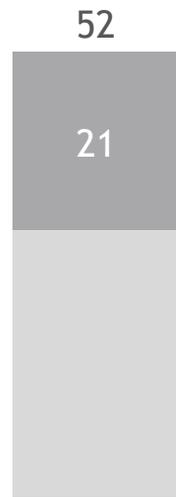
3. Measurement, monitoring, reporting and verification

Source: BCG O&G Decarbonization Team

# Methane represents 45% of oil and gas operational emissions

Out of which upstream contributes ~75%

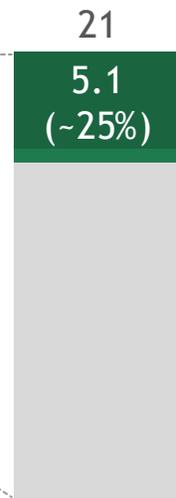
Global GHG emissions  
(GtCO<sub>2</sub>e/y)<sup>1</sup>



■ O&G GHG emissions  
■ Other emissions



O&G GHG emissions (S1+2+3)  
(GtCO<sub>2</sub>e/y)



■ Scope 1  
■ Scope 2  
■ Scope 3



O&G GHG emissions (S1+2)  
(GtCO<sub>2</sub>e/y)

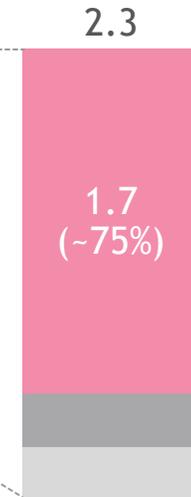


■ Methane (CH<sub>4</sub>)  
■ Carbon Dioxide (CO<sub>2</sub>)

> 82<sup>2</sup>  
MtCH<sub>4</sub>



O&G CH<sub>4</sub> emissions  
(GtCO<sub>2</sub>e/y)



■ Upstream  
■ Downstream  
■ Midstream

> 61<sup>2</sup>  
MtCH<sub>4</sub>

Note: Scope 1 = Direct emissions from sources owned or controlled by O&G companies, Scope 2 = Indirect emissions from the consumption of purchased electricity, steam, heat or cooling, Scope 3 = All other indirect emissions (not covered in Scope 2) that occur in the company's value chain, both upstream and downstream

1. GtCO<sub>2</sub>e = Gigatons of carbon dioxide equivalent 2. Using a Global Warming Potential (GWP) of 28

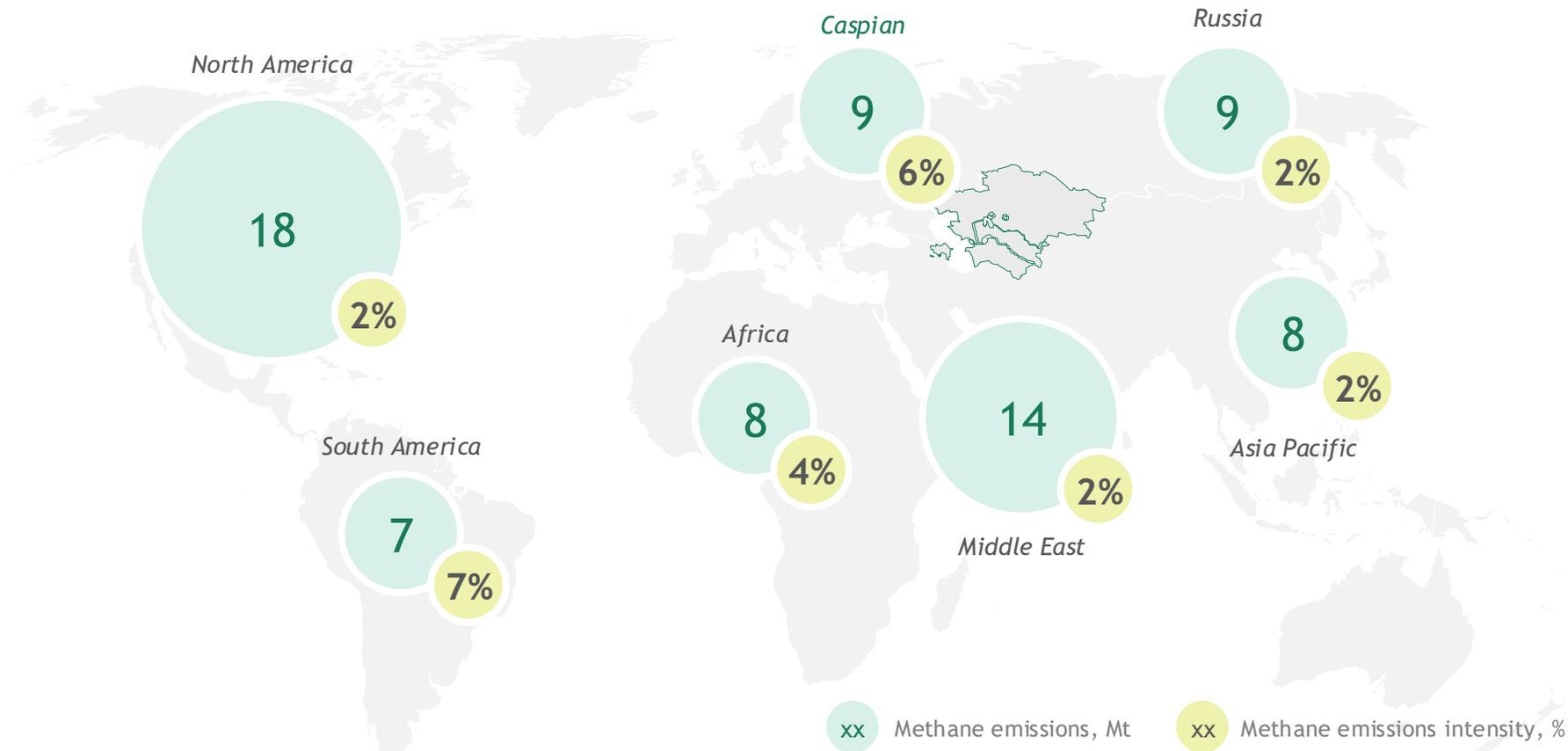
Source: Wood Mackenzie 2025, IEA 2025, UN Emissions Gap Report 2020, Our World in Data 2025, BCG O&G Decarbonization Team

Highly preliminary outside-in analysis for global O&G operations, based on estimates and reflecting country-level measurement

# North America, Middle East, Russia and Caspian are largest emitting regions

Out of these, highest methane emissions intensity is in the Caspian (6%)

Global methane emissions from O&G operations  
Mt CH<sub>4</sub>



Caspian methane emissions profile

9 Mt CH<sub>4</sub>

Methane emissions

6%

Methane emissions intensity<sup>1</sup>

1. Methane emissions intensity = methane emissions (m<sup>3</sup>) as % of produced methane (m<sup>3</sup>)  
2. 9Mt CH<sub>4</sub> emissions remaining are from O&G operations in RoW including 2Mt CH<sub>4</sub> from Europe  
Sources: Global Methane Tracker 2025, Wood Mackenzie 2025, GHGSat, BCG O&G Decarbonization Team

Highly preliminary outside-in analysis for O&G operations in the Caspian region, based on estimates and reflecting country-level measurement

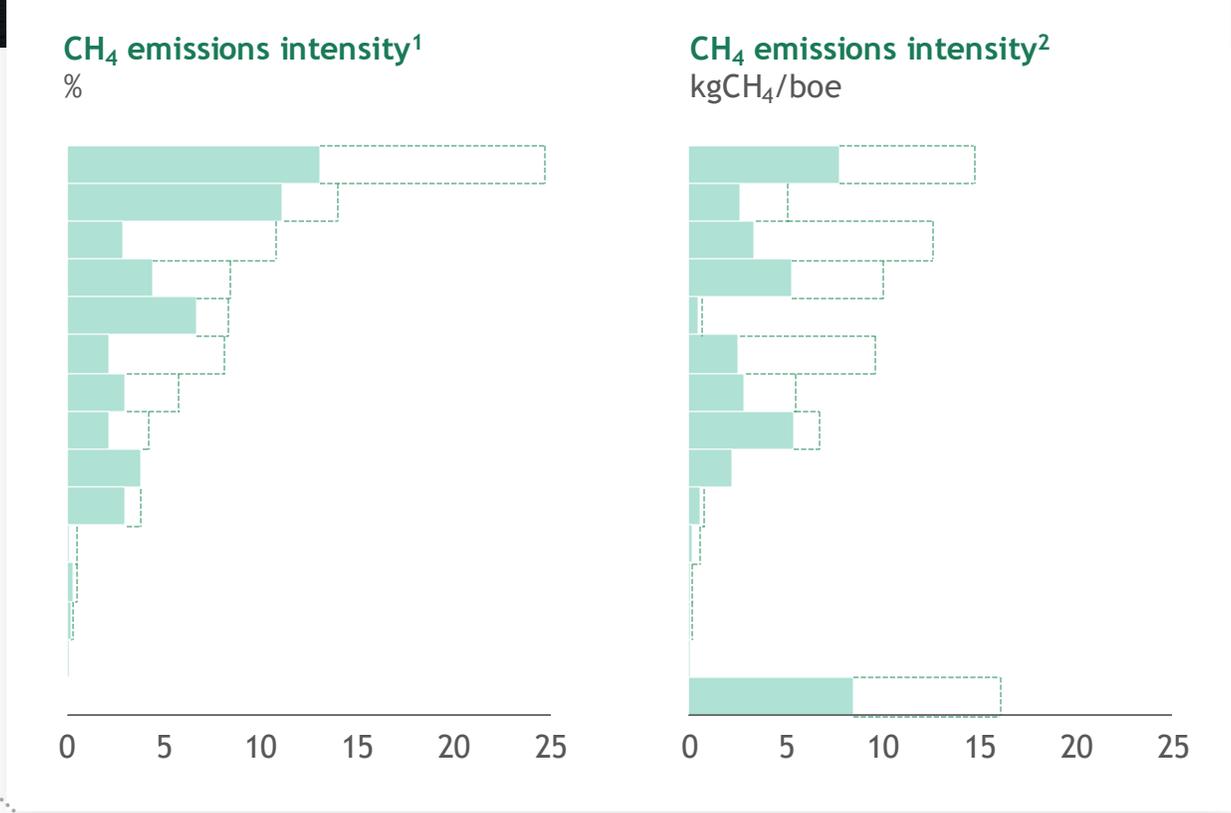
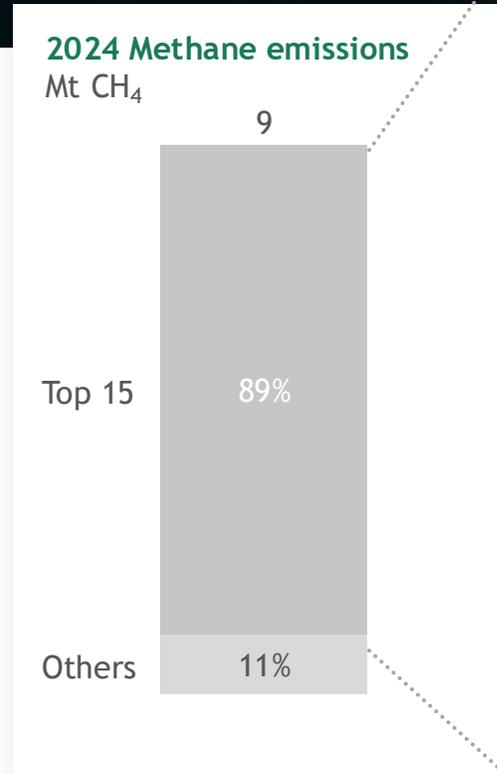
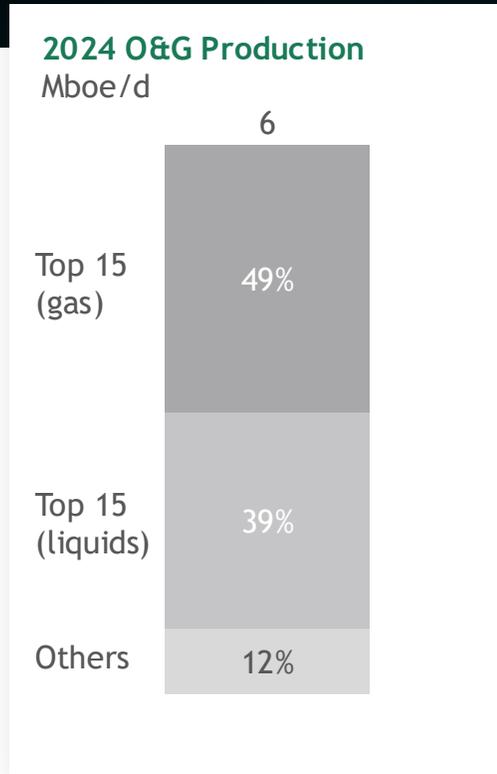
# Caspian | Timely progress requires rapid transformation from many companies

Some of which have methane emissions intensities of up to 20%, according to our outside-in analysis

15 operators account for ~90% of O&G production

And ~90% of methane emissions

Wide variation in methane emissions intensity across producers for both gas and liquids



1. Methane emissions intensity = methane emissions (m<sup>3</sup>) as % of produced methane (m<sup>3</sup>); 2. Methane emissions intensity = methane emissions (kg) divided by gas and liquids production (boe)  
 Sources: Global Methane Tracker 2025, Wood Mackenzie 2025, GHGSat, BCG O&G Decarbonization Team

■ Low range □ High Range

Highly preliminary outside-in analysis for top 15 O&G operators in the Caspian region, based on estimates and reflecting country-level measurement

# Caspian | There is **limited transparency** on **90% of methane emissions** in region

Creating major uncertainty on MMRV<sup>1</sup> readiness and on the region's true pace of reduction

## PACESETTERS

1%

**Two** companies operate with near zero methane emissions<sup>2</sup>

## ADOPTERS

9%

**Five** companies whose operators or JOPs<sup>3</sup> are OGMP 2.0 members or Gold Standard

## LAGGARDS

90%

**Eight** companies are not OGMP 2.0 members and disclose no methane emissions roadmap

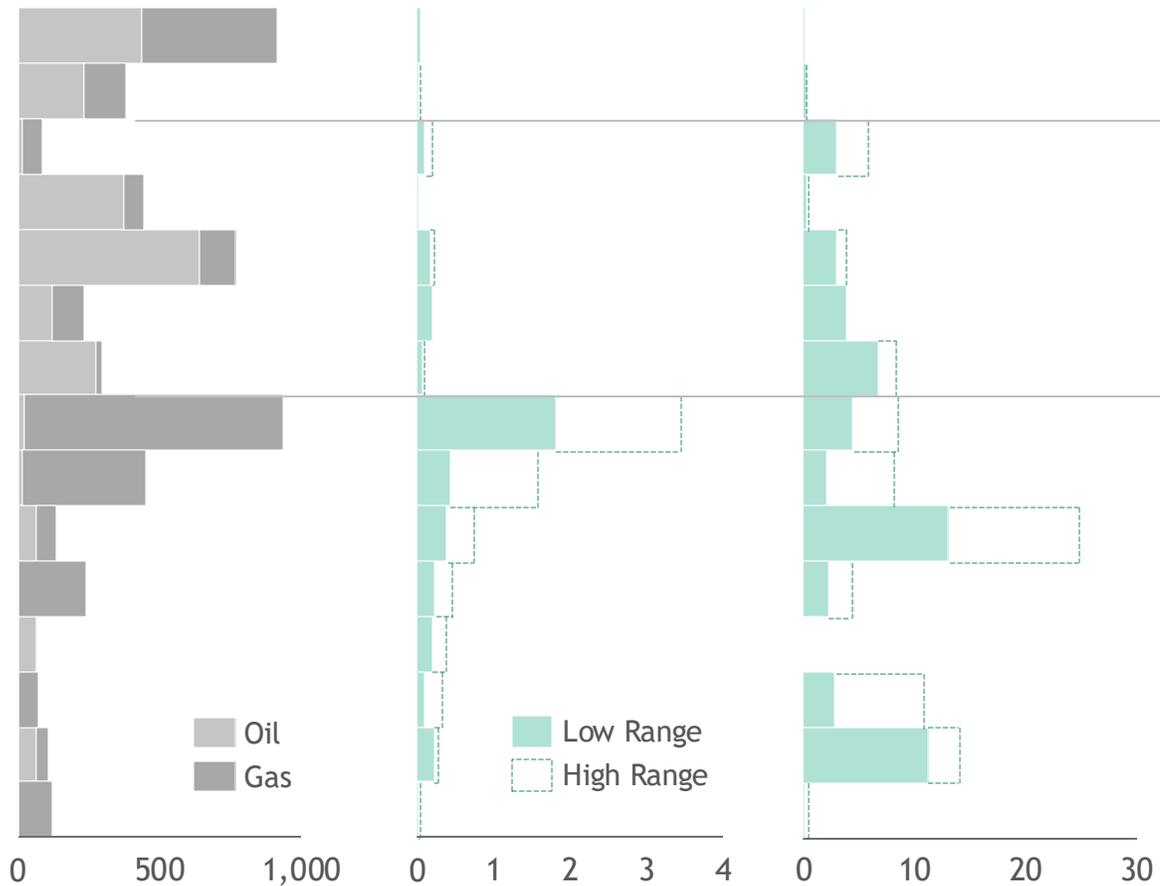
1. Measurement, monitoring, reporting and verification; 2. <0.2% methane emissions intensity, demonstrated via measurement; 3. Join Operating Partners  
Source: Global Methane Tracker 2025, Wood Mackenzie 2025, GHGSat, BCG O&G Decarbonization Team

xx % of Caspian emissions

Highly preliminary outside-in analysis for top 15 O&G operators in the Caspian region, based on estimates and reflecting country-level measurement

# Caspian | 1% of emissions are with pacesetters, 9% with adopters and 90% with laggards

Gross operated prod. kboe per day    Methane emissions Mt CH<sub>4</sub>    CH<sub>4</sub> emissions intensity<sup>1</sup> % (share of gas production)



## Maturity

**Pacesetters** 1%

Companies operate with near zero methane emissions<sup>2</sup>

**Adopters** 9%

Operator or joint operating partners are either OGMP 2.0 Gold Standard or OGMP 2.0 members

**Potential Laggards** 90%

Company is not an OGMP 2.0 member and disclose no methane emissions MMRV and reduction roadmap

- Operator is OGMP 2.0 Gold Standard Reporting
- One or more JOPs<sup>4</sup> are OGMP 2.0 Gold Standard Pathway/Reporting
- Operator joined OGMP 2.0
- % of Caspian emissions

1. Methane emissions intensity = methane emissions (m3) as % of produced methane (m3); 2. <0.2% methane emissions intensity, demonstrated via measurement; 3. Adopters are ranked by methane emissions measurement, reporting and verification maturity; 4. Joint Operating Partners  
Source: Global Methane Tracker 2025, Wood Mackenzie 2025, GHGSat, BCG O&G Decarbonization Team



We believe a regional platform could improve transparency, amplify regional leadership and bring significant benefit to the region

“A lower emissions asset is a better asset”



Highly preliminary analysis for O&G operations in the Caspian region

## Amplify regional leadership

Some oil and gas companies are at the forefront in methane emissions abatement in the region and we see the opportunity to amplify their impact

The four Caspian countries are signatories to the Global Methane Pledge; and the top 15 producers are affiliated to OGDC<sup>1</sup>

Lessons are relevant across Caspian given common infrastructure and practices

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## Increase flow of investment into the region

Tackling this challenge could require significant capex<sup>2</sup>

Methane emissions projects are likely to attract funds from outside the region

Moreover, greater emissions transparency and progress could signal improved operational performance and increase investor attraction to the region

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## Create economic gain for the region

Monetizing or using gas otherwise burnt or lost could create significant economic gain, up to \$2B per year<sup>3</sup>

For some producers, near zero methane operations could facilitate both access to Europe and no penalties from 2027

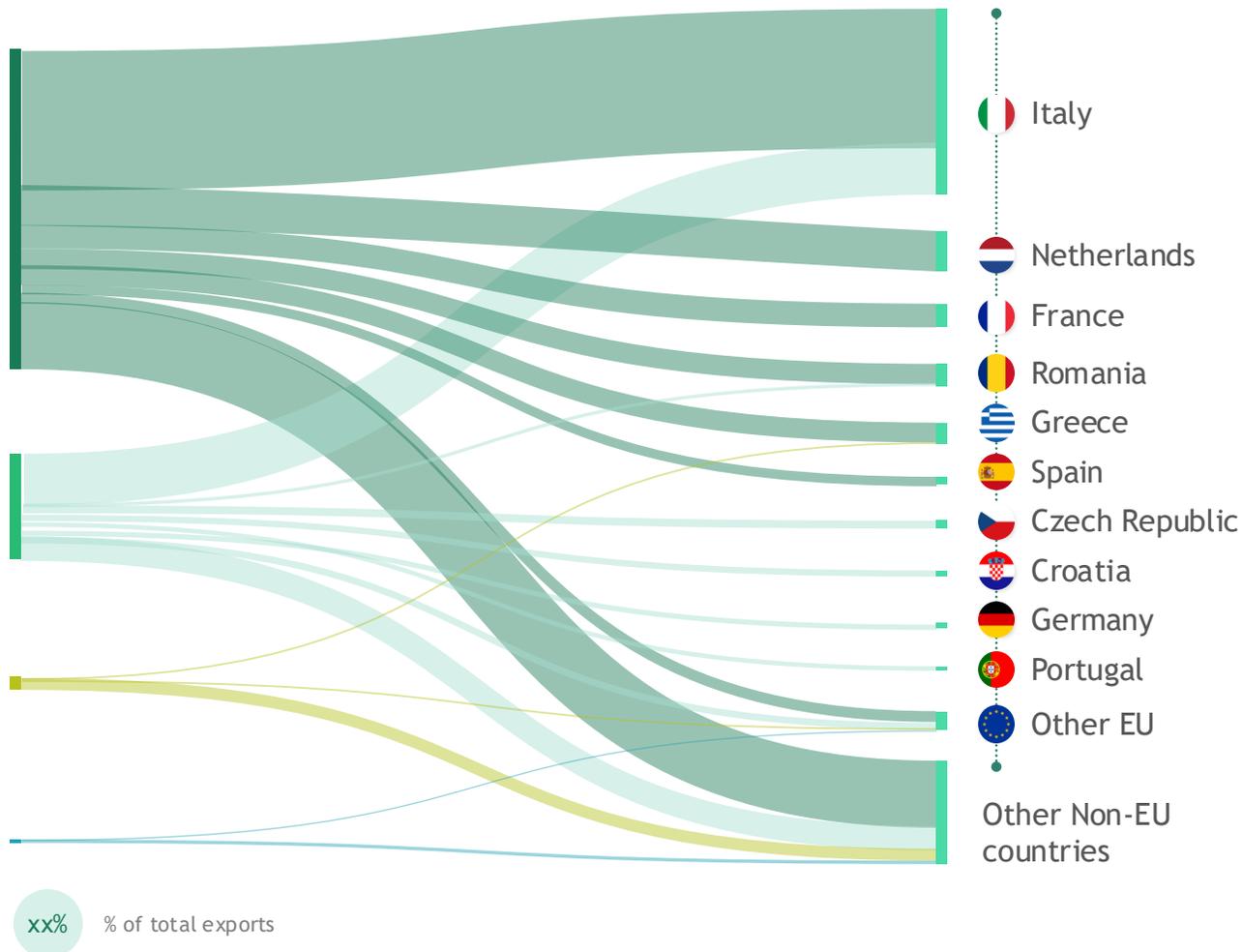
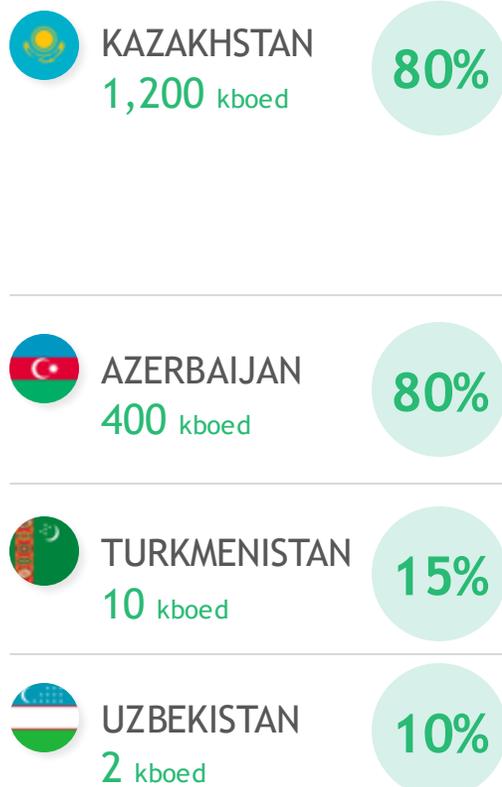
About 1.5 Mboed of Caspian liquids production faces potential exposure to the EU methane emissions regulation

1. Either producer itself or parent company is signatory to the OGDC; 2. Highly preliminary assessment: ~\$5B to \$25B=8,500kt CH<sub>4</sub> (0.2% intensity) x \$0.6 to \$3.1k/t CH<sub>4</sub>; 3. Highly preliminary assessment: ~\$2B=11B m<sup>3</sup> CH<sub>4</sub> x \$0.18/m<sup>3</sup>  
Source: BCG O&G Decarbonization Team

# Caspian | About 1.5Mboed liquids production from the Caspian face potential exposure to the EU methane emissions regulation

## Liquids flow from Caspian Countries<sup>1</sup>

Approximate exports to EU



~75% of Caspian liquids production is exported (2 of 2.7 Mboed)

~75% of liquids exports go to the EU (~1.5 of 2 Mboed), mainly from Kazakhstan and Azerbaijan

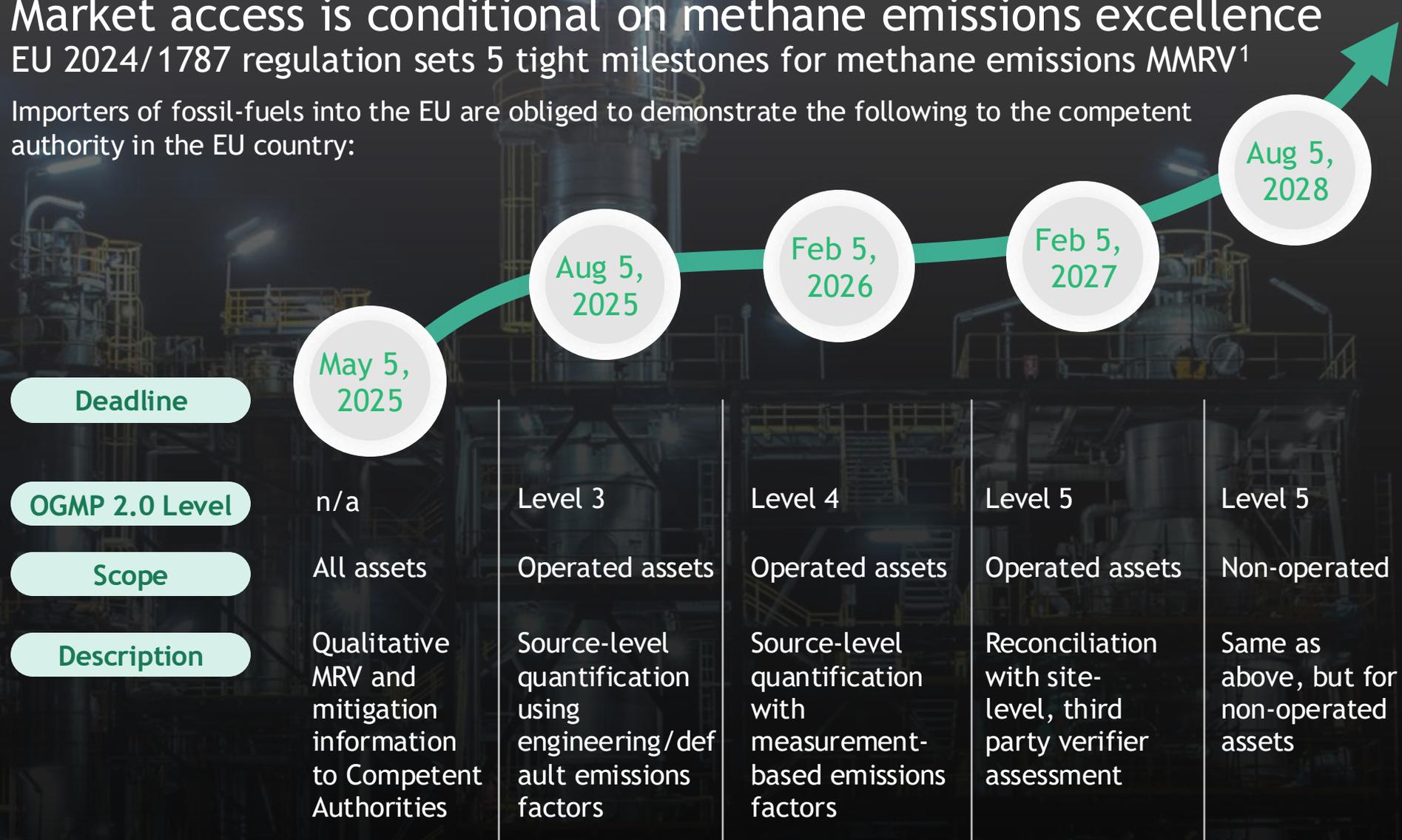
< 15% of Caspian gas exports go to the EU, primarily from Azerbaijan

1. Liquids production includes crude oil and condensates; liquids exports include petroleum oils and oils from bituminous minerals (crude) and products containing by weight 70% or more of petroleum oils or oils from bituminous minerals, and waste oils  
Source: Wood Mackenzie 2025, UN Comtrade, BCG O&G Decarbonization

# Market access is conditional on methane emissions excellence

EU 2024/1787 regulation sets 5 tight milestones for methane emissions MMRV<sup>1</sup>

Importers of fossil-fuels into the EU are obliged to demonstrate the following to the competent authority in the EU country:



### Applies to

- O&G exploration and production, gas gathering and processing
- Inactive wells, temporarily and permanently plugged and abandoned wells
- Natural gas transmission and distribution
- Underground storage
- LNG facilities
- Active and closed underground and surface coal mines

### Direction of travel

- Joining OGMP 2.0 and achieving Gold Standard could soon become a requirement for other buyers

1. Measurement, Monitoring, Reporting and Verification  
 Source: EU 2024/1787 regulation, Methane Mitigation Summit, BCG Decarbonization Team

# Experience in ASEAN confirms the benefits of regional collaboration on methane emissions



Structured CEOs engagement

**Regional companies' CEOs got together** at the ASEAN Methane Emissions Roundtable in 2021

Since then, **executives gather yearly** to endorse structural collaboration on methane emissions



Improved transparency of starting point and progress

The **ASEAN Oil and Gas Methane Emissions Dashboard** establishes a baseline and identifies large methane emissions sources from oil and gas operations

**Improving transparency** of methane emissions progress in the region



Joint projects and initiatives tailored to the region

PETRONAS is collaborating with JOGMEC to establish the **Southeast Asia Methane Emissions Technology Evaluation Centre**

HORIZONS, is a regional hub, focused on **policy, database, research and capacity building, and financial**



Synergies, for capability building and efficient implementation

The Methane Leadership Program (MLP) launched in 2023 with **focus on capability building**

The MLP 2 launched in October 2024 with **focus on implementation**

# Moreover, Caspian countries share common challenges in their fight against methane emissions



## Challenge

## Implication



External incentives are limited, both from government and market

Not a business priority driven by external drivers



NOC budgets are linked to production and growth (higher return) projects

Measurement and abatement projects often stall



Many assets are impractical and expensive to retrofit

Abatement business cases “are weak”



Impact from data to date is often limited

Limited transparency and awareness of problem



Organizational readiness, willingness and ability are low

Sustainable change at pace is hard to implement

The journey toward near zero methane emissions oil and gas operations

# This is why we are launching the Caspian Methane Emissions Accelerator

A platform to incubate, pilot and implement solutions tailored to the region, considering each company's starting point



Funding for the journey



Practical emissions baseline to inform target

Plausible abatement program to inform target

Underpinned reduction target

Measurement pilot to inform emissions factors

OGMP 2.0 Gold Standard Pathway

OGMP 2.0 Gold Standard for operated assets: source-level and site-level measurements and reconciliation



Abatement solutions techno-economic feasibility

Abatement solutions engineering studies

Abatement projects execution

New BAU O&M



Setup of digital solution that can integrate data, actions, and reporting



Continued coordination (PMO), communication, awareness, training, capability and culture development, and management of change efforts



Benchmark and org readiness assessment

Changes to operating model and organization



Underpinned Targets



Secured funding



Baseline & MMRV



Abatement program



Digital enablement



Op model & culture

Not exhaustive

# Industry leaders making this happen

Afgan Isayev  
Andrew Baxter  
Ben Attia  
Daulet Zhakupov  
Daniel Palmer  
Frigyes Lestak  
Georges Tijbosch  
Geraldine Alias  
Ilham Asgarli  
Jessica Uhl  
Jouko Salo  
Julien Perez  
Katarina Vinković  
Maria Kuosa  
Madina Kunafina  
Mahmud Nigmadjanov  
Mark Davis  
Mustafa Gurbanli  
Nazrin Jafarova  
Nurgul Kuzembayeva  
Pietro Mezzano  
Roland Kupers  
Ruslan Mukangaliyev  
Shokhzodjon Kholbaev  
Simone Pugliese  
Stephane Germain  
Ulzhan Akhmetova

Not exhaustive

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# Regional collaboration to accelerate methane emissions reduction

BCG Point of View

DECEMBER 2025

