

26 February
2021

Joint research project

Decarbonizing Oil & Gas: An International Experience

Draft conclusions

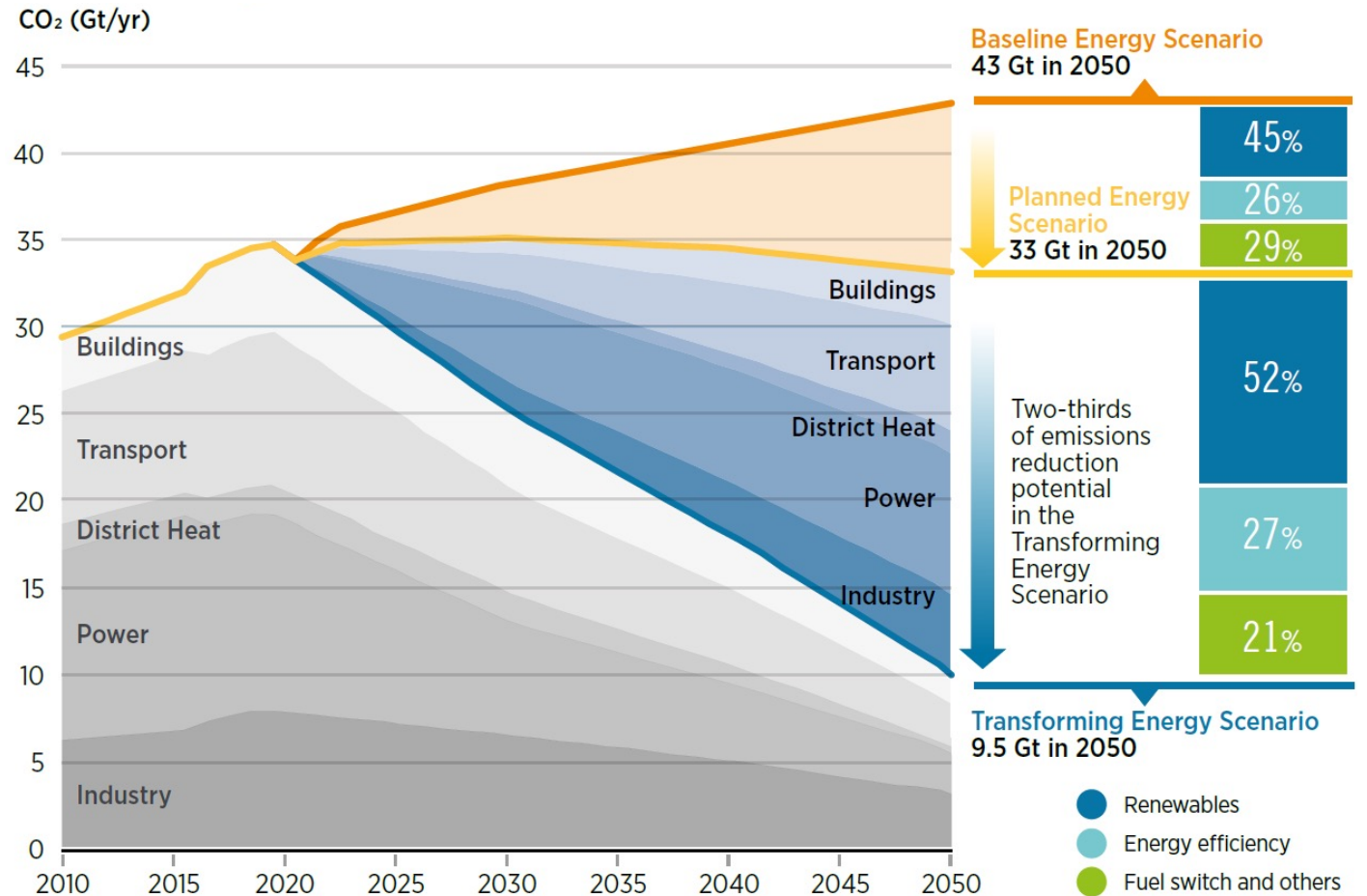
DECARBONIZING O&G COMPANIES - CONTEXT

THE MAIN FEATURES OF DECARBONIZATION
METHODS

DECARBONIZATION IN RUSSIA

CONCLUSIONS AND RECOMMENDATIONS

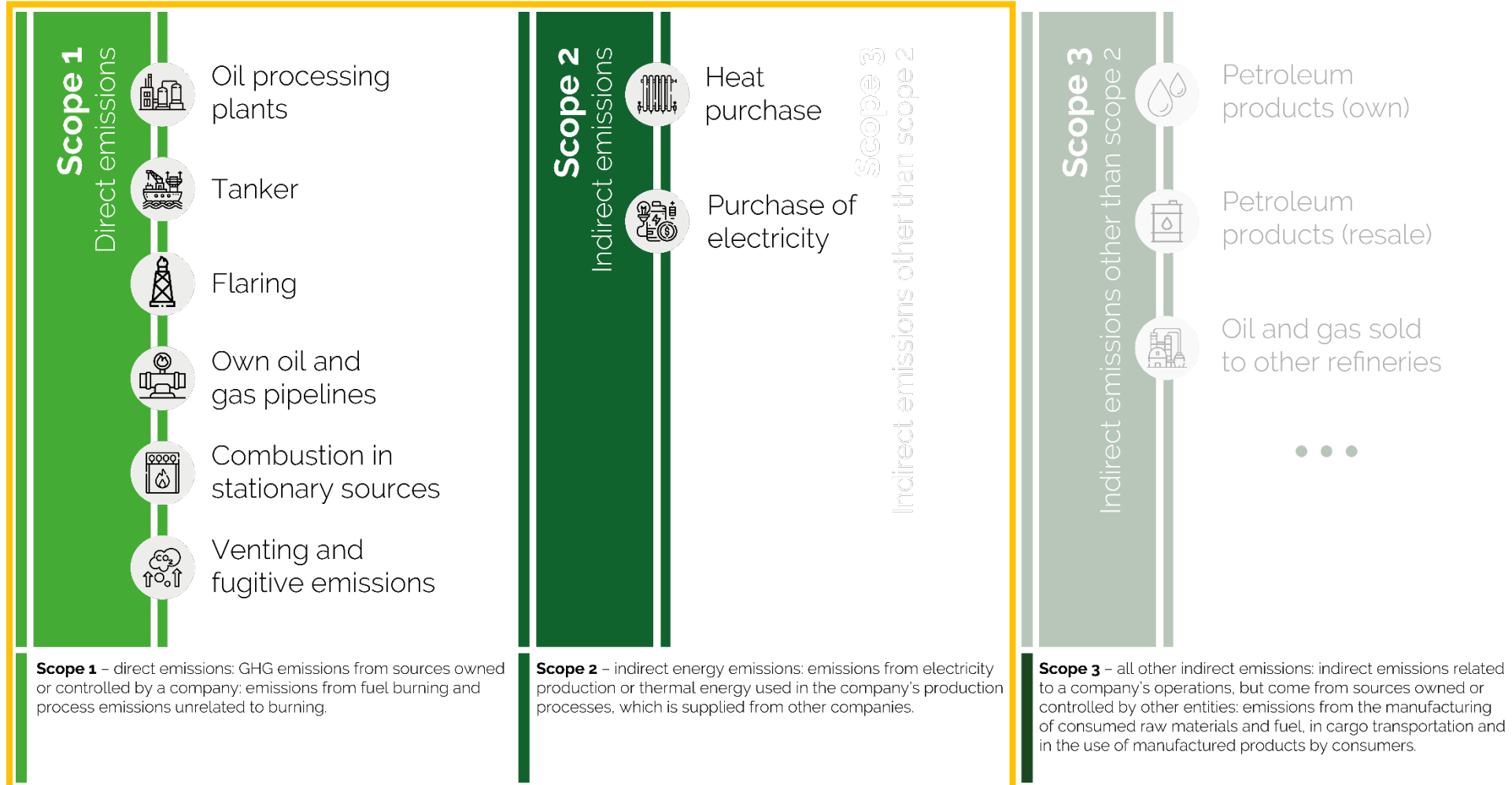
To reach the **2°C** pathway, global energy-related GHG emissions must be reduced by **70%** by 2050



Source: IRENA GLOBAL RENEWABLES OUTLOOK 2050 ENERGY TRANSFORMATION EDITION: 2020

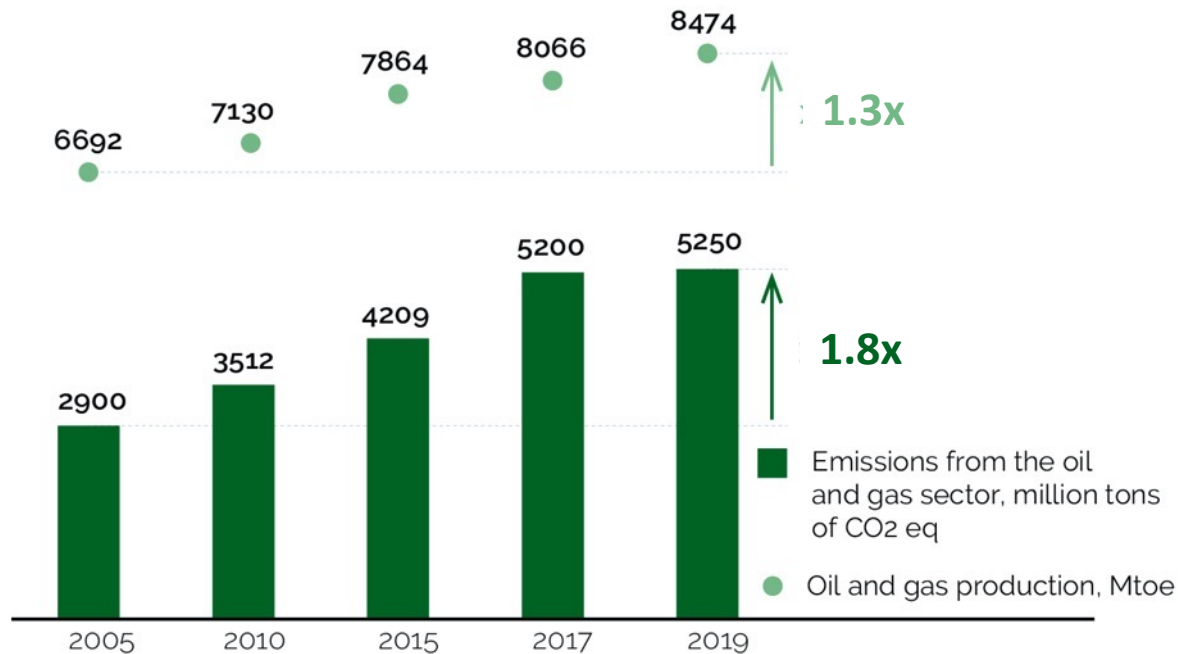
Note: the picture includes only CO₂ emission, does not include other GHG gases

In this research we largely focused on GHG emission scope 1 and 2



Proportion of GHG emissions from O&G in the last 15 years

Increased **1.8x**,
production increased **1.3x**



Sources: McKinsey on Oil & Gas, 2009, WEO 2018, WEO2020, BP statistical review 2020.

Increase in the proportion of global GHG emissions coming from the O&G sector due to:

- the increased amount of unconventional hydrocarbon production and
- increasing amount of depleting conventional oil and gas fields
- Improving estimation of methane emission

Fewer GHG emissions come from the gas production and processing than do from the oil

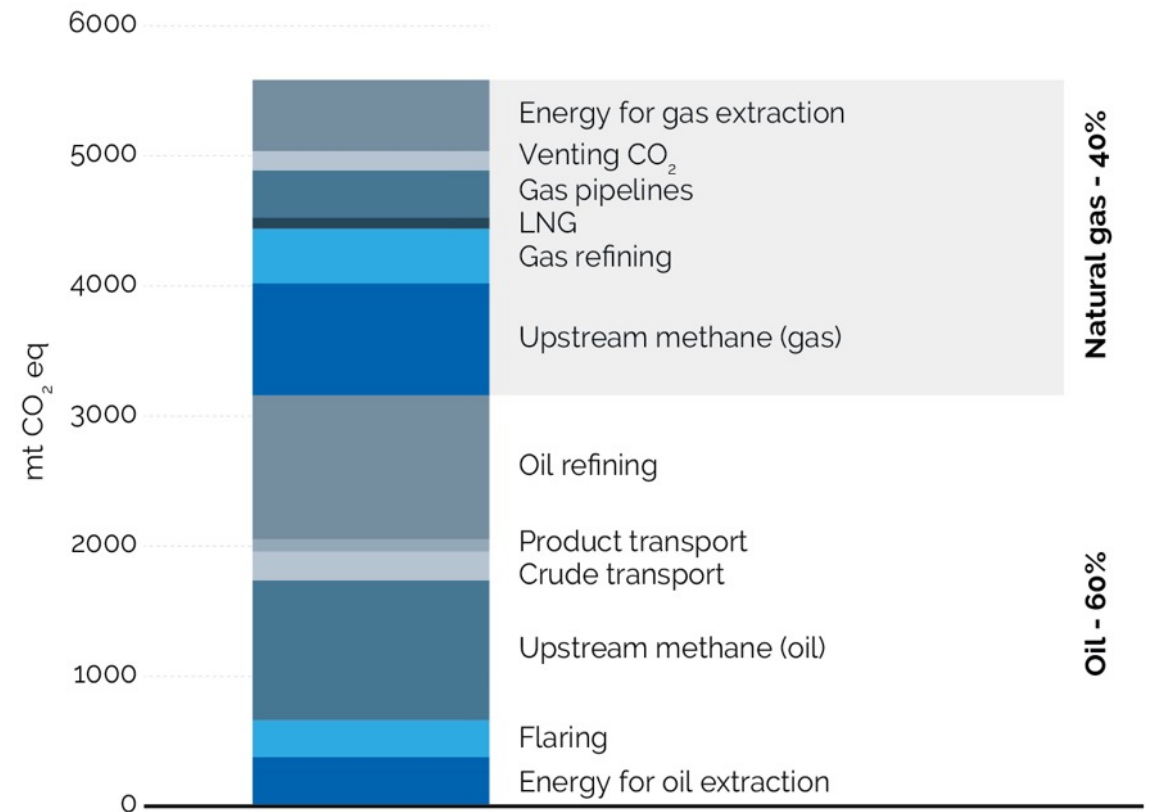
60% of total O&G GHG emissions come from the oil industry

40% of total O&G GHG emissions come from the gas industry

Methane emissions are a significant problem; they account for **45%** of the total emissions of aggregate emissions.

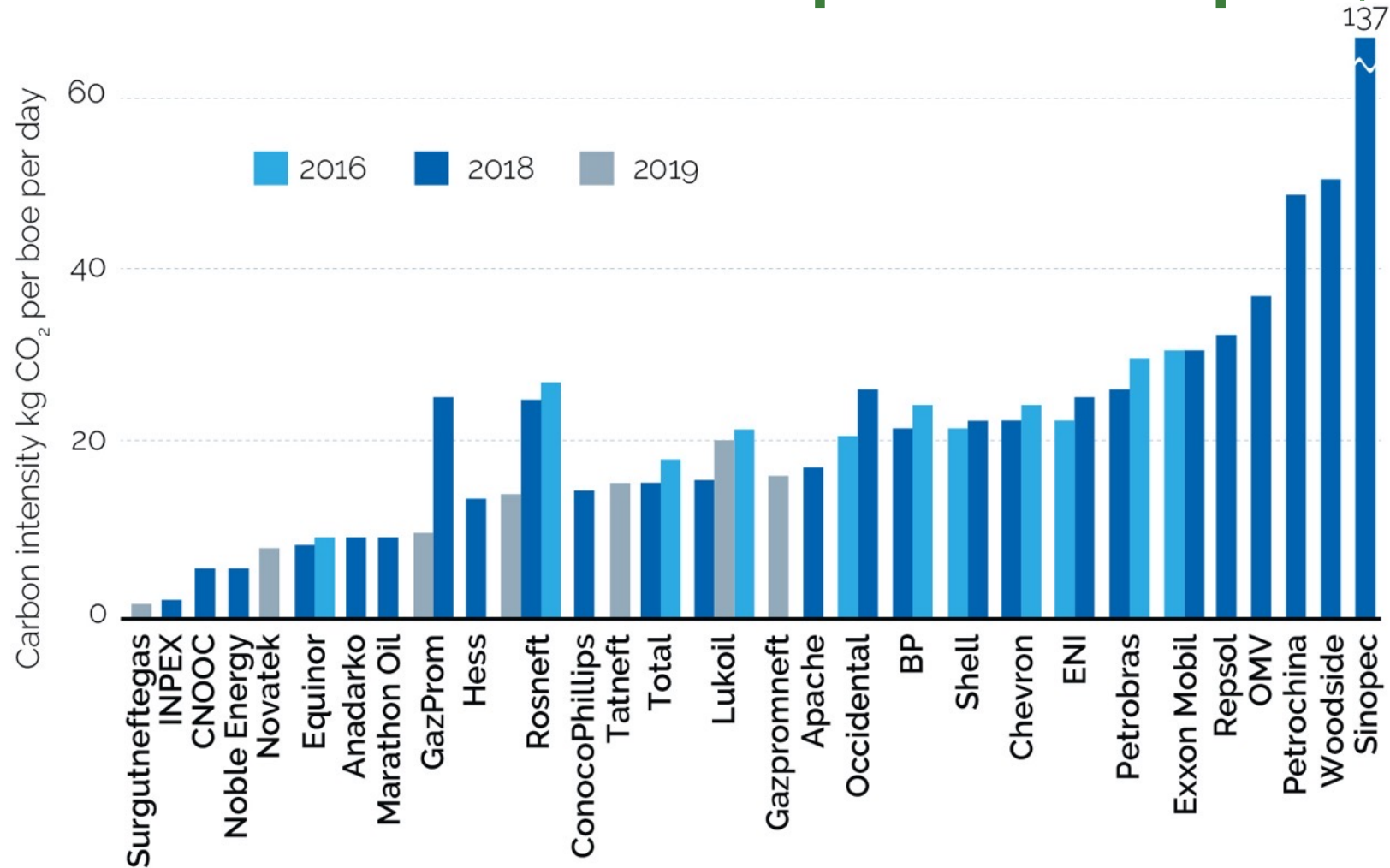
However, despite different approaches to reducing methane emissions in gas production and transportation, concentration of efforts, for example, in the upstream sector can bring greater benefits.

Global oil and gas GHG emissions structure in 2017

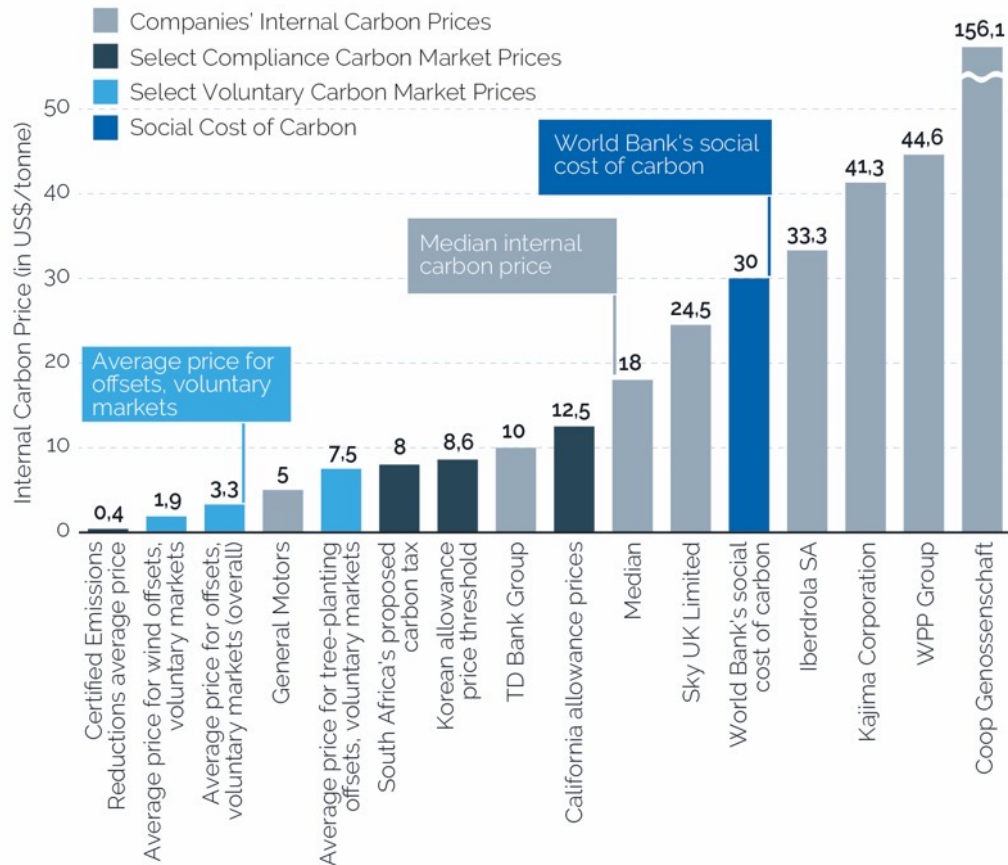


Source: IEA, World Energy Outlook 2018, Paris 2018 - in 2017

There is a big difference in the GHG intensity of production between O&G companies (Scope 1,2)



CO₂ pricing forecasts vary significantly (\$/ton)



<https://www.ecosystemmarketplace.com/articles/debunked-eight-myths-carbon-offsetting/>

€32
average
(2020-2030)

International Emissions Trading Association (IETA)

€60 (2025)

Zero Carbon Commission, U.K.

€81 (2030)

€50

Carbon Tracker, Institute of Analytics

€40-80
(by 2030)

Carbon market watch: to reach the Paris Goals

O&G companies are incorporating decarbonization into their strategies and management systems

KPI

on the decarbonization of company activities by 2030/2050 for top-management



Incentive plans for GHG emission reduction in the corporations

\$

Internal CO₂ pricing is becoming an important criterion for strategic decisions



Advocacy – reports on industry associations corporations support



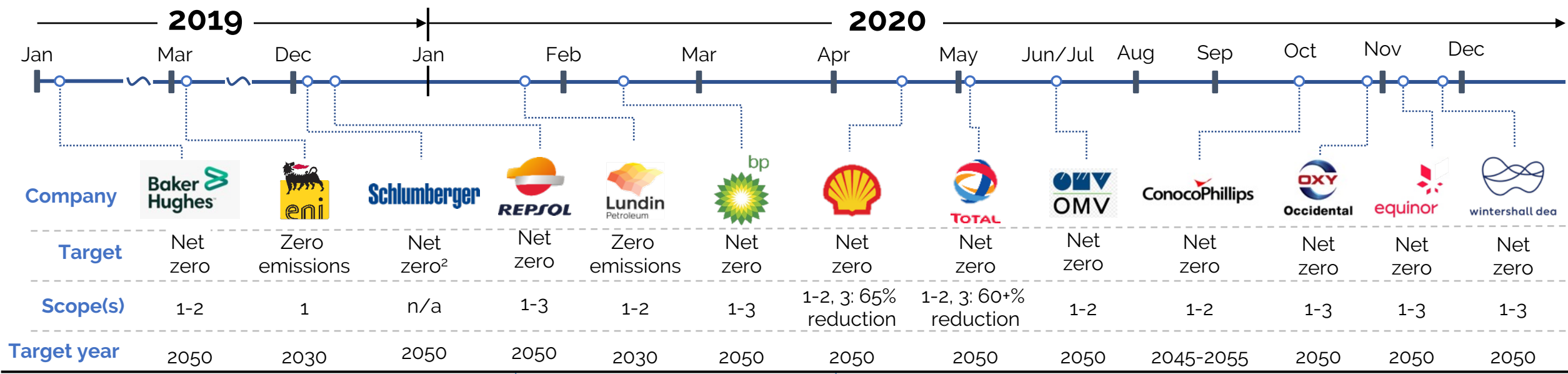
European companies began publishing climate reports earlier, and now do so more frequently, than their American and Russian counterparts



Restructuring of the O&G companies

O&G companies are making increasingly ambitious climate commitments

Net zero commitments of some O&G companies



Net zero commitments from consumer sector¹

<p>Airlines</p>	<p>Utilities</p>	<p>Mining operations</p>	<p>Automotive and logistics</p>
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1) Announcements in 2019 and 2020
 2) <https://www.slb.com/newsroom/press-release/2019/pr-2019-1219-slb-gs-sbti>
 Source: Strategy& analysis

O&G companies use several key methods of decarbonization



Corporate methods:

portfolio changes and carbon offsets, partnerships and other forms of collaboration

Operational methods

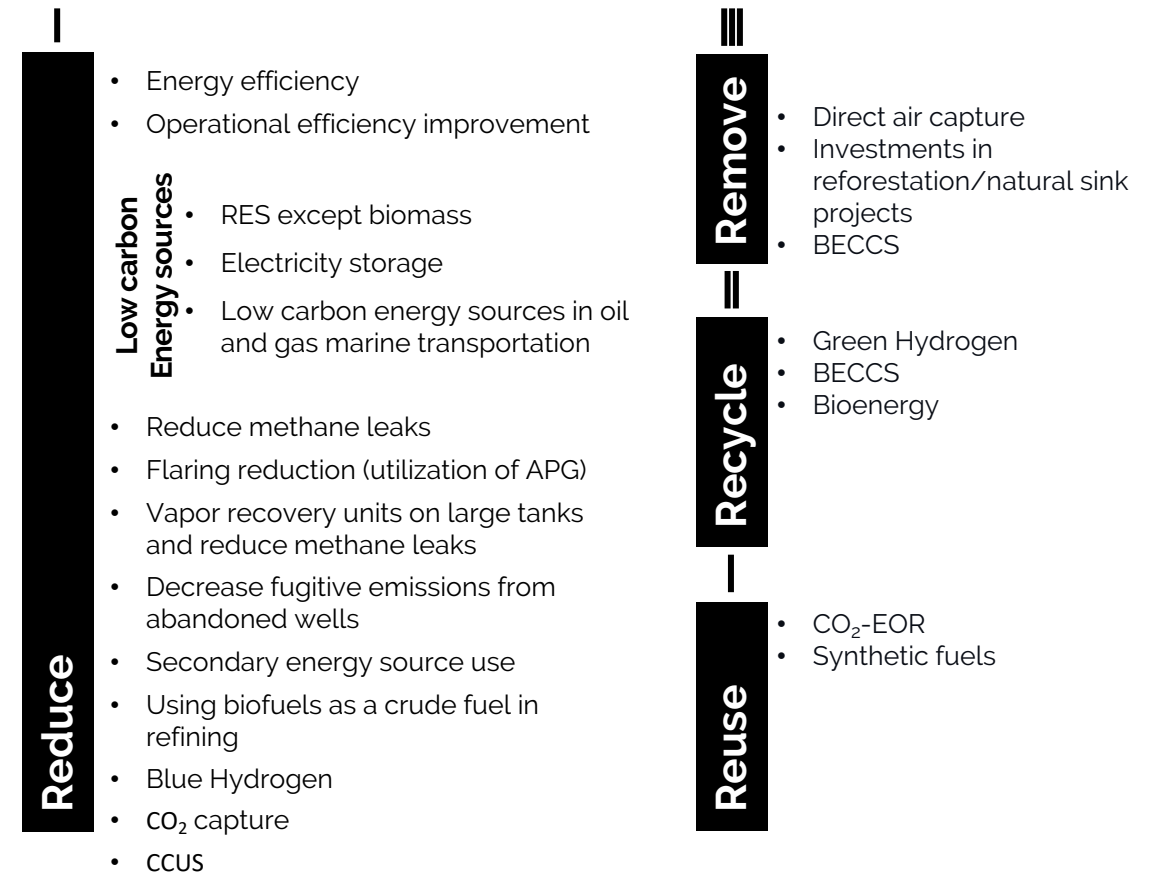
Methane emission reductions

Low-carbon energy supply for production

Deep decarbonization - CCUS and hydrogen

O&G decarbonization methods in the framework of a circular carbon economy

Circular Carbon Economy



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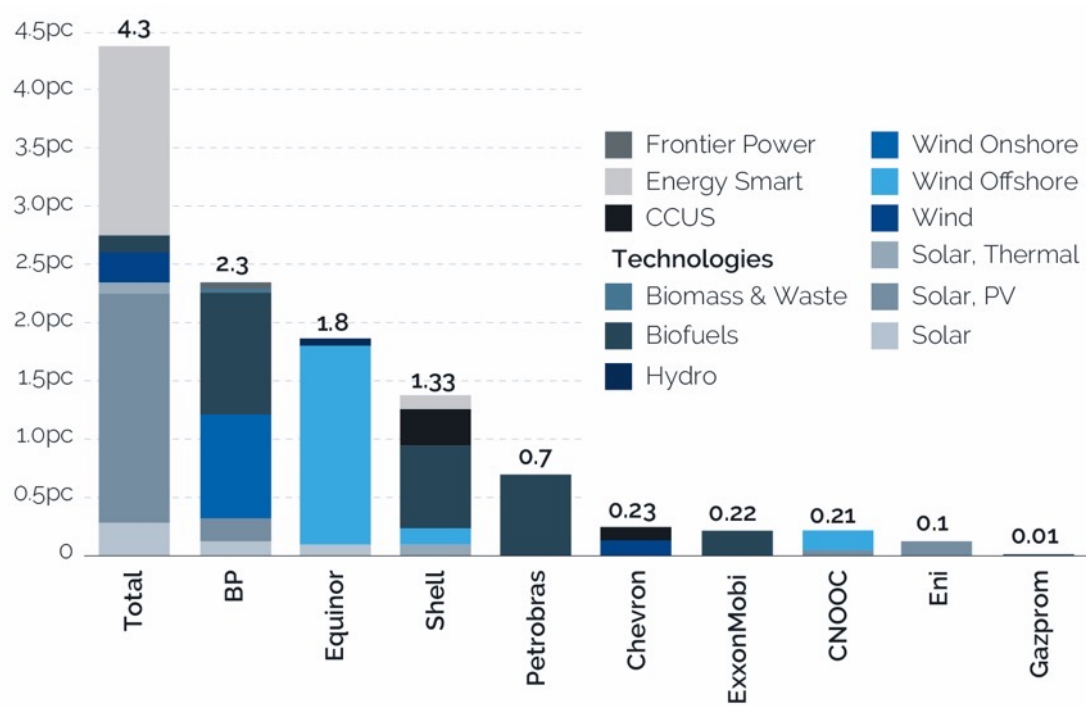
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O&G companies are changing their asset portfolios and cooperating in venture investments and R&D

Investments in renewable energy and low-carbon technologies are playing a relatively minor role



Source: <https://www.petroleum-economist.com/articles/low-carbon-energy/energy-transition/2020/dividing-lines-appear-in-transition-approaches>

Corporate methods

Divestment

- Mature/small-scale upstream assets
- Excess capacity infrastructure

Investment

- Gas
- Petrochemicals

RES diversification

- Renewables
- New mobility

Venture investment and OGCI






- Reducing methane leaks
- Reducing CO₂ emissions
- CCUS, hydrogen
- sharing risk for hard to scale up/high potential opportunities

O&G companies are actively investing in petrochemicals for decarbonization

Investing in petrochemicals:

1. expands a company's product range with lower carbon footprint products,
2. solves the problem of how to utilize associated petroleum gas, and
3. results in the development of new materials used in other industries, reducing the amount of GHGs emitted throughout a product's lifecycle.

Directions being taken to develop the petrochemical industry as seen in the strategies of the largest international O&G companies

	Synergy from integration with oil refining	Access to cheap raw materials	High-margin product mix	Ecology, decarbonization	Proximity to growing market	R&D, technology, innovation	M&A
	✓	✓	✓		✓	✓	✓
		✓		✓		✓	
	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓

Source: EY Energy Centre (Central, Eastern, South-Eastern Europe, and Central Asia)

Corporate methods

Carbon credits and nature-based solutions are viewed with a caution

“Reduce what you can, offset what you cannot”:

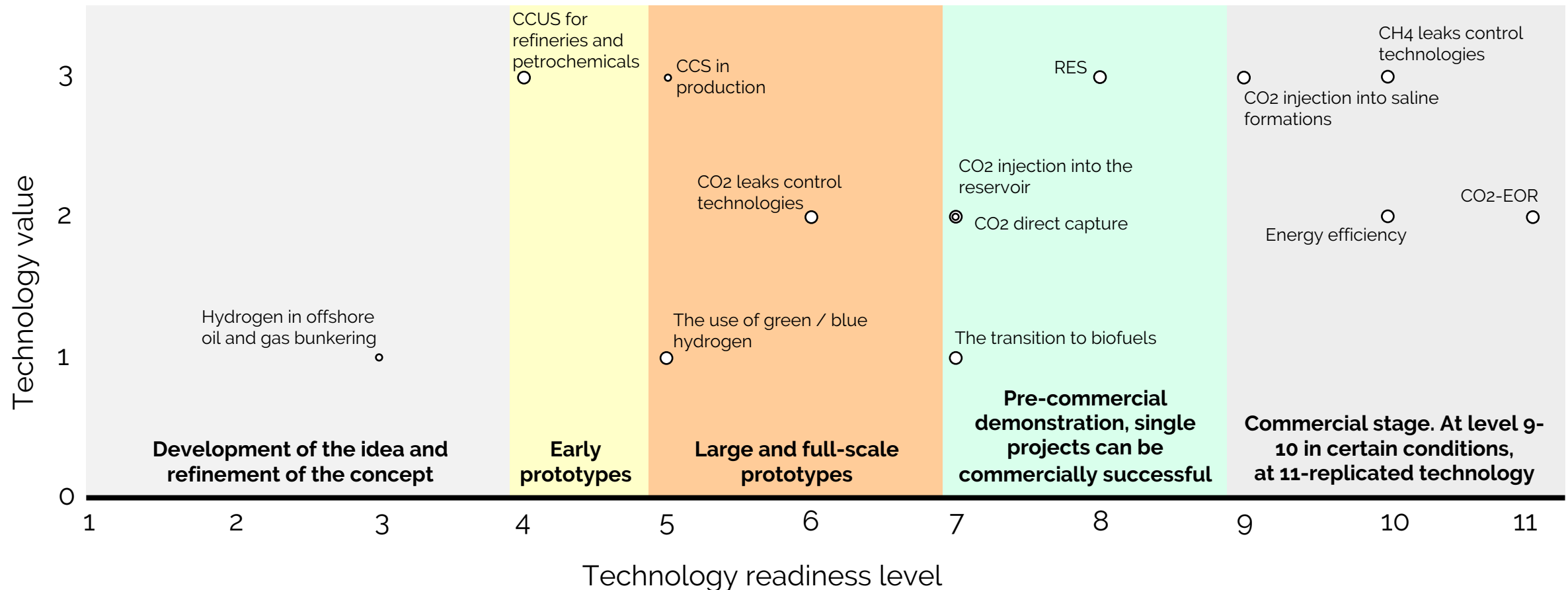
- Cautious attitude towards carbon credits and certificates; no more than 2% of annual emissions are credited
- High quality carbon credit notably based on best available framework/science
- Careful selecting of partners

Projects examples:

- Shell: certificates for clients based on Nature Based Solutions (\$300 million for 2019-2021)
- COP: fire and security projects (West Arnhem Land Fire Abatement Project in Australia)

Operational decarbonisation methods (energy efficiency, CH₄) - the most mature technologies

Technologies for decarbonizing the oil and gas sector matrix



The rational use of energy resources is one of the most efficient and cheapest ways of reducing GHG emissions.

Increasing the amount of energy efficient equipment

Investing in energy efficient technologies, which are to be used in production operations

Replacing APG flaring with using it as an energy resource

Converting existing power plants to cogeneration

Improving the energy efficiency of operating activities by energy management, modernization and digitalization

Examples of resource efficient upstream methods

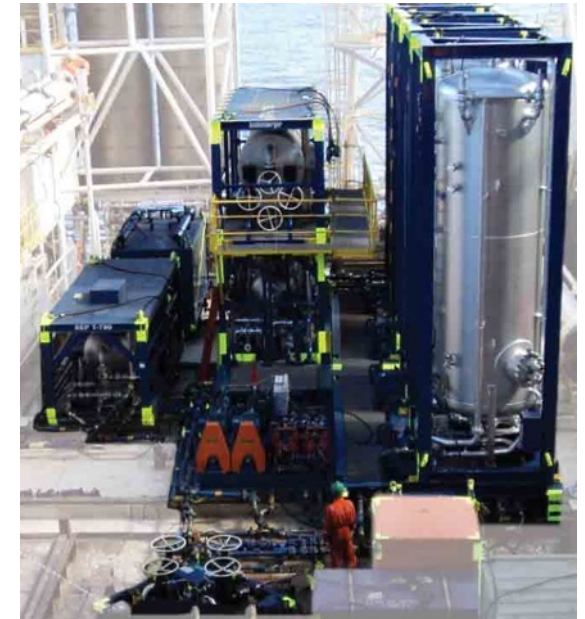
Reinjecting drilling cuttings:

- reduces environmental impact and GHG emissions,
- reduces/eliminates waste handling and transportation,
- can be adapted to existing sludge pits and landfills, and
- is used all over the world and in Russia since 2004.

Modular, compact solutions for oilfields:

- cut rig-up times by 50%,
- reduce deck-space by 40%,
- require minimal maintenance, ensuring safer operation,
- features interchangeable skids, which can be placed apart from each other, and
- can be used onshore

Modular compact well testing system



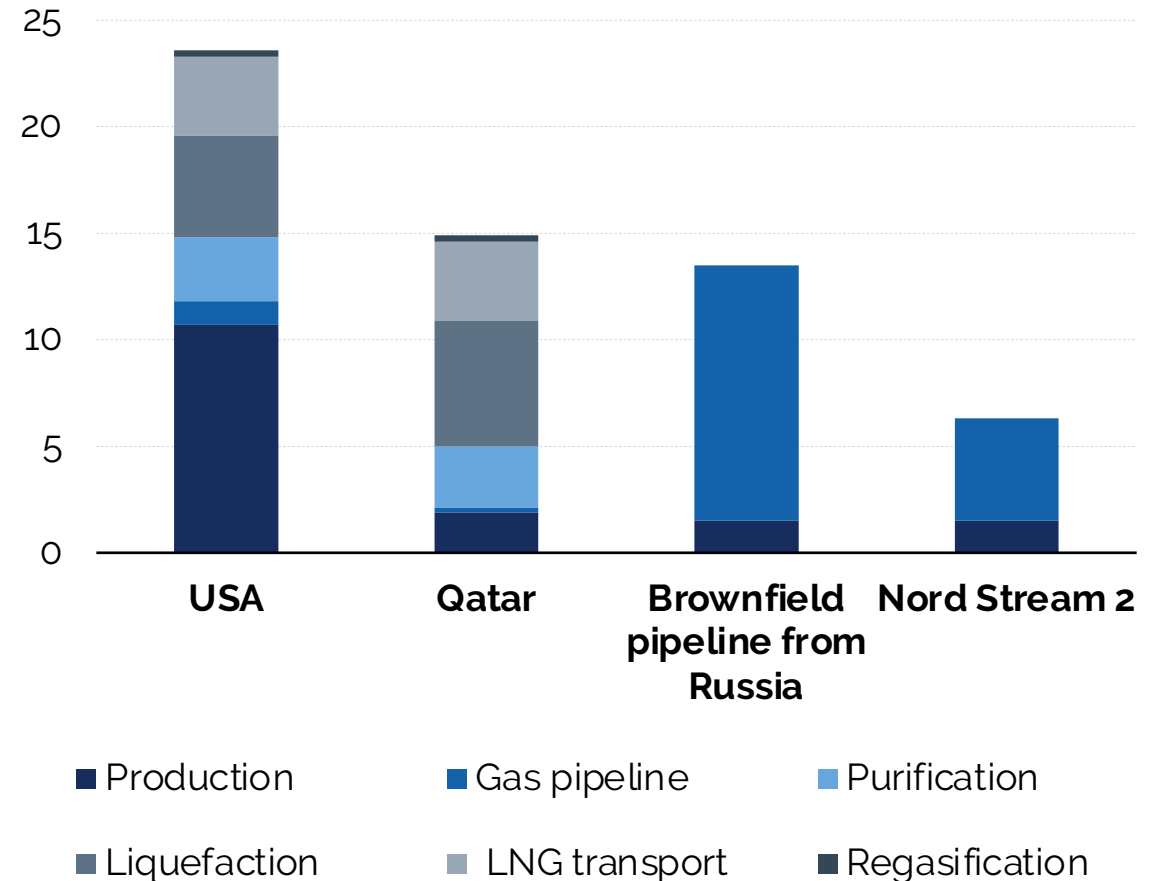
<https://www.slb.com/>

Reducing methane emissions is a priority for O&G companies

O&G companies are actively developing and implementing solutions for:

- leak prevention and monitoring systems,
- reducing associated petroleum gas flaring,
- using more energy efficient equipment to transport gas, and
- producing electricity.

GHG emissions from gas supplies to Central Europe
(grams of CO₂ per MJ)



Source: Gazprom, thinkcell, SKOLKOVO Energy Center analysis

Use of renewable energy at production sites



Miraah — solar thermal power plant for enhanced oil recovery in the Amal field

300K tons of CO₂ emissions reduced per year



Hywind Tampen — floating wind farm with **88 MW** capacity

Provides electricity to the **Snorre and Gullfaks fields** in the Norwegian part of the North Sea



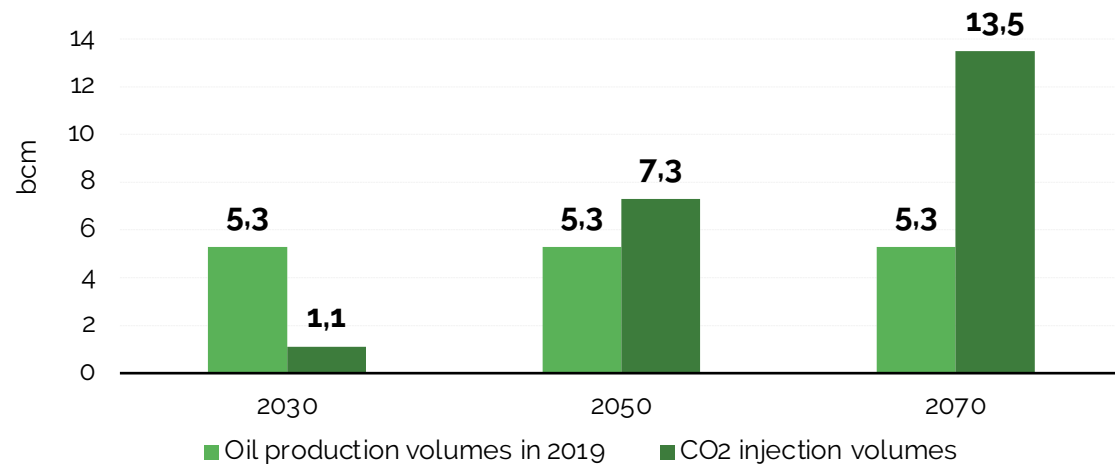
Phillips66 to convert refineries in Rodeo, with a capacity of **120K barrels per day**, for the production of renewable fuels

Plant to produce 2.5 Mt of diesel fuel, gasoline, and jet fuel

Will use vegetable oil, fats, and soy

Underground CO₂ storage - the industry of the future, comparable to the O&G industry today

Comparison of CO₂ injection and oil production volumes



Source: IEA

13%

Emissions reduction by 2050

5.5 GtCO₂

Needs to be pumped by 2050 for
permanent storage in the 2 degrees scenario

19

Existing projects today,
30 MtCO₂/year

**Regulatory, geological, and engineering
changes are required**

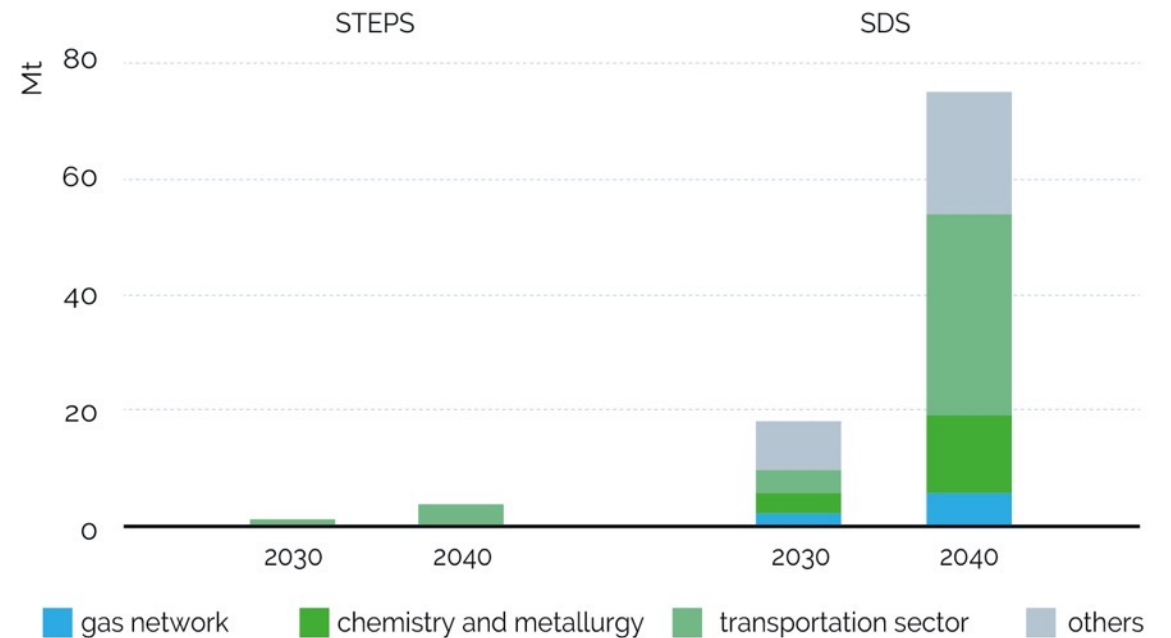
For the time being, deep decarbonization projects require industry cooperation and government support

- The Northern Lights project was approved for funding by the Norwegian Parliament on December 15, 2020 as a part of the large national project, “Longship”
- Equinor, Shell, and Total approved a conditional investment decision
- The first open-source project for the transportation and disposal of CO₂



In sustainable development scenarios, the demand for carbon-free hydrogen by 2040/2050 is comparable to the combined proportion of hydro, nuclear, and renewable energy sources today

Demand for carbon-free hydrogen forecast



Source: IEA WEO 2020

Green Hydrogen project from offshore wind turbines for industrial cluster NorthH2

by **2027** by **2030**

first hydrogen

3-4 GW

by **2040**

10 GW

the largest planned
project in the world



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European border carbon taxes will radically change competition in many markets... and require decisive action from Russian companies

- BCG estimates that the introduction of CO₂ taxes **will reduce the competitiveness of Russian oil compared to Middle Eastern oil**, and make Ukrainian and Chinese steel less competitive.
 - KPMG experts presented three scenarios for the introduction of a European climate tax for goods supplied from Russia. Under the basic option, Russian exporters will pay **€33.3 billion between 2025 and 2030**.
-

-65% ↓

Reduced profitability of mechanical and chemical pulp

-40% ↓

Reduced profitability of rolled steel products

-20% ↓

Reduced profitability of crude oil supplies to the EU

The Situation in Russia



Carbon regulation in Russia is in the early stages of development



Russian GHG emission goals in the Paris Agreement framework have already been achieved; **more ambitious goals are not discussed yet**



Introduction of carbon pricing **is not planned**

2X

The proportion of total GHG emissions coming from the Russian O&G industry is almost twice as high as the global average



The corporate sector is increasingly integrating decarbonization into its strategies

Nine Russian oil and gas companies voluntarily participated in international climate CDP reporting with one company receiving a B-rating and two receiving C-ratings, making the three of them comparable to international leaders

Examples of decarbonization in Russian O&G companies

The impact of such projects on reducing GHG emissions in companies remains negligible.

Gazprom Neft:

Solar PV (1 MW) at Omsk Refinery

Solar-wind Yurt hybrid **47.5 kW** installation at a remote field in the Yamalo-Nenets Autonomous District

Rosneft:

Ordered **10 Aframax tankers** that will run on LNG Biofuel vessel Vladimir Monomakh is already on the move (oil and LNG)

Transneft:

In 2019, **507,000 kWh** was produced by solar Mounted solar water heating station

NOVATEK:

Solar and wind power **to provide energy** to the condensate pipeline "Yurkharovskoye field – Purovsky ZPK", **the company avoided building a power line**

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CONCLUSIONS

- 1 “More energy with less carbon.”** Many international companies have made commitments to reach net zero in scopes 1, 2, and sometimes even Scope 3, by 2050.
- 2** Oil and gas companies use diversified portfolio of initiatives – **there can be no single “silver bullet” for decarbonization.**
- 3 “Avoid or reduce what you can, offset the rest.”** Investment in nature-based solutions is made with big focus on quality.
- 4 The immediate priority is operating methods of decarbonization,** such as resource efficiency, electrification operations, and reduction of methane emissions. It is necessary to change the operating standard to account for the task of reducing GHGs.
- 5 Hydrogen and CCUS** are an important part of the long-term strategies of all oil and gas companies. This is the industry of the future, comparable in scale to oil and gas today.
- 6 Industry cooperation in R&D,** venture investments, and deep decarbonization are necessary for a timely achievement of these goals.
- 7 Renewables potential in Russia is not fully realized.**

Recommendations for the Russian Government

- 1 Introduce a system for monitoring**, measuring, and reporting GHG emissions, as well as a national GHG pricing mechanism. Implement **carbon credit facilities** regulation to facilitate decarbonisation
- 2 Strength support for research**, pilots, and venture funding for decarbonization projects and technologies.
- 3 Analyze**, within an internationally recognized **technical and commercial framework**, Russia's **natural advantages** and then promote them on the domestic and international market.
- 4 Support** international and cross-sectoral **cooperation** on decarbonization projects with European and Asian companies.
- 5 Analyze**, within an internationally recognized **technical and commercial framework**, natural carbon sinks (forests, swamps, the Arctic zone) and biofuel potential.

Recommendations for oil and gas companies

- 1** Each company has **unique decarbonization opportunities and challenges**, and this should be reflected in its strategy. Explicit target on Scope 1,2,3 towards net zero by 2050 is expected
- 2** Conduct a comprehensive review and report of the company's GHG emissions sources and decarbonisation strategy.
- 3** **Incorporate internal CO₂ pricing** into investment and strategic decisions.
- 4** Decarbonisation strategy should be supported by clear management and incentive systems for the entire
- 5** Achieving energy efficiency and methane emissions targets may require a mindset change.
- 6** **Diversification can be provided through more climate neutral products**, such as hydrogen, renewable energies, bio-based products, recycled plastic materials, etc.
- 7** **Create a partner ecosystem** that can support decarbonization.
- 8** **Clearly communicate the company's unique competitive advantage** in the decarbonization strategy to external stakeholders.